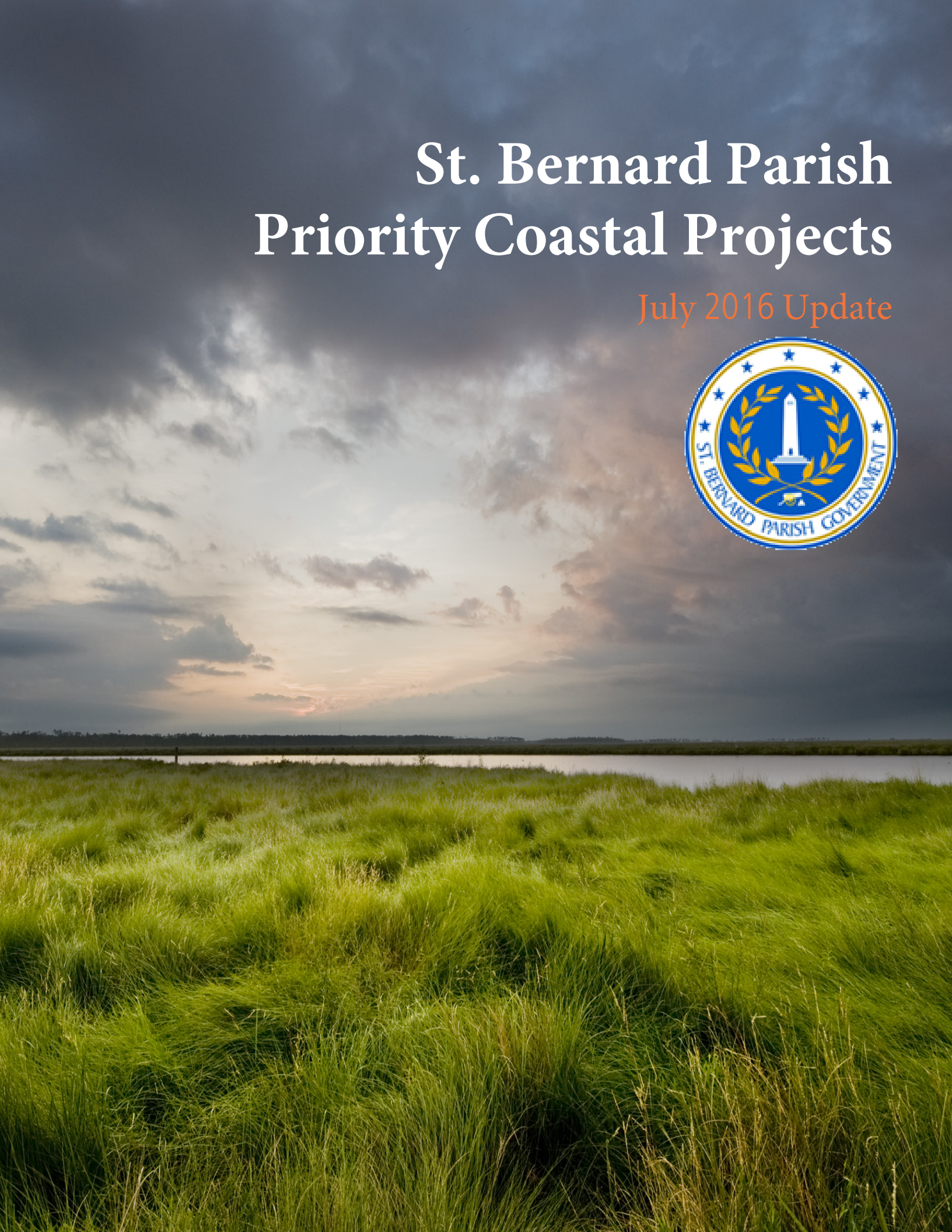

St. Bernard Parish Priority Coastal Projects

July 2016 Update

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Introduction

The objective of this document is to provide preliminary feasibility analyses for existing St. Bernard Parish Government (SBPG) coastal projects and develop sufficient information so that the purpose, benefits, location/extent, construction methodology, and cost for each project are clearly defined. Additionally, a number of new projects are proposed in this document and have also been the subject of preliminary feasibility analyses. This robust level of project detail will allow for the complete slate of projects to be prioritized at the local level and be more competitively and strategically advanced, nominated, and/or submitted to a wide variety of funding sources including, but not limited to, the Resources and Ecosystems Sustainability, Tourist Opportunities and Revived Economies of the Gulf Coast States Act (RESTORE Act), the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), the Coastal Protection and Restoration Authority (CPRA), the United States Army Corps of Engineers (USACE) Continuing Authorities Program (CAP), and the BP Natural Resources Damages (NRD) program. Ultimately, this document will provide SBPG with a project priority list (PPL) of coastal projects and a pathway to project funding and implementation.

The projects included in this document were initially drawn from the existing St. Bernard Coastal Zone Advisory Committee (CZAC) PPL, which was adopted on February 11, 2015. The process of developing detailed information for each of the existing projects, and for the newly-proposed projects, included: (1) reviewing existing documentation (such as existing state- and parish-level master plans, projects identified by the CWPPRA Task Force, and other plans composed by local private and public entities such as the Biloxi Marsh Land Corporation (BMLC) and the Lake Pontchartrain Basin Foundation (LPBF)); (2) developing project details such as cost, scope, alignment, and required permitting activities; and (3) developing funding strategies that would provide SBPG with a pathway to funding and implementation for each project.

Projects identified and prioritized by the CZAC in 2015 were updated and adjusted based on their feasibility, benefits, cost, ability to compete for funding sources, and other ancillary information. Newly-proposed projects were similarly analyzed and added to the PPL. The SBPG Coastal Division subsequently developed an updated draft list of priority projects based on the new information developed.

In the following pages you will find:

- The original CZAC Priority Project List
- Changes (project alterations, additions, and omissions) to the original CZAC Priority Projects
- The updated SBPG Priority Project List
- Fact sheets for each of the updated SBPG Priority Projects, which summarize the identified projects and include the following details:
  - Project Location
  - Problem(s) the Project Addresses
  - Previous Planning Efforts
  - Current Status
  - Recommended Solution(s)
  - Projected Benefits
  - Projected Costs
  - Consistency with CPRA Master Plan and other Ongoing Regional Efforts
  - Potential Risks, Mitigation Measures, and Permitting Requirements
  - Restoration of Areas Impacted by Deepwater Horizon Oil Spill
  - Funding Strategy and Sources

Original CZAC Priority Projects

(as approved on February 11, 2015)

RESTORE PRELIMINARY PROJECT PRIORITIES
ST. BERNARD COASTAL ZONE ADVISORY COMMITTEE
(unanimously approved by CZAC on February 11, 2015)

Overall Objectives

- ✓ Maximize funding from multiple sources in order to leverage resources to the greatest extent possible
- ✓ Proceed through the planning and approval process as expeditiously as possible in order to implement projects quickly
- ✓ Continue to monitor State objectives regarding large sediment diversion projects affecting St. Bernard

Tier 1

1A Bayou Terre Aux Bouefs Ridge Restoration

1B Bayou La Loutre Ridge Restoration

1C 40 Arpent Canal Ridge Restoration (Caernarvon to the back levee)

1D Enhancing and Armoring the Delacroix Island Back Levee (tidal levee)

Tier 2

2B Lake Lery Marsh Creation and Rim Restoration Project
*Phase 2 completion
*Phase 3

2C Lake Machais Ridge Restoration

2D Lake Athanasio Ridge Restoration

2E Oyster reef installation in accordance with State of Louisiana Coastal Master Plan (Louisiana's Comprehensive Master Plan for a Sustainable Coast, 2012)

Tier 3

3A Central Wetlands

1. Expansion of Wastewater Treatment Plant (WWTP) effluent demonstration project to Central Wetlands Segment A3 (Munster Wastewater Treatment Plant)
2. Reforestation Project (using cypress stumps) for Central Wetlands and other areas outside the levee system
3. Utilize Central Wetlands to expand eco-tourism opportunities including multi-purpose trails (land and water), environmental education, and a recreational park with trail access near E.J. Gore Station
4. Create Paris Road gateway as outlined in the Mississippi River Gulf Outlet (MRGO) ecosystem restoration plan with water-related economic development projects

3B Comprehensive Wetlands Management Program

Develop a comprehensive wetlands management program (backfilling canals to restore hydrology, installing weirs to control salinity, manage Carnarvon diversion outfall including planting freshwater vegetation).

Changes to the Original CZAC Priority Projects

Tier 1

1A Bayou Terre Aux Bouefs Ridge Restoration

This project had not previously been identified in other plans or studies and all information had to be created based on the original CZAC alignment found in Figure 1. A southern phase extending from the CZAC alignment to the Gulf of Mexico entrance was also added.

1B Bayou La Loutre Ridge Restoration

This project had been previously investigated by multiple agencies and henceforth encompassed multiple and different alignments. For this planning effort, the approximate 22 miles of restored ridge from the 2012 CPRA Master Plan was broken into three (3) phases with the Central Phase mirroring the alignment included in the CWPPRA PPL26 project.

1C 40 Arpent Canal Ridge Restoration (Caernarvon to the back levee)

This project had not previously been developed in other plans or studies. A field visit was undertaken to review the status of the surrounding wetlands highlighted on Figure 1. During the field visit, it was found that the area was already thick with healthy vegetation, and it was expected that further restoration measures to the area (such as building a ridge on existing wetlands) would incur high mitigation costs making the project financially infeasible. It was determined that a more worthwhile approach would be to reforest areas immediately adjacent to the federal levee system from Caernarvon to Verret, which would promote some additional level of protection for the levee and help restore the area ecologically. For this reason, the project was reclassified from ridge restoration to reforestation and moved from a Tier 1 project to Tier 3.

1D Enhancing and Armoring the Delacroix Island Back Levee (tidal levee)

Based on forecasted funding sources, anticipated need, and available data, the scope of this project was widened to include several facets of improvement and protection for Delacroix Island, and this project was relabeled as the Delacroix Island Resiliency Plan. It was split up into narrowly-defined components, which should allow for faster implementation and easier constructability, while improving the chance of funding by being under a comprehensive plan for the Island. In this strategy, the resiliency plan was split up in discrete components involving: (1) the existing tidal levee protecting the eastern side of Delacroix Island, (2) Louisiana Highway 300 (LA 300) which connects Delacroix Island to the upper reaches of the Parish, and (3) a component involving growing the economic, tourism, and recreational capabilities of Delacroix Island. Based on the anticipated costs, need, and scope of the project overall this project was moved from a Tier 1 project to Tier 2.

Tier 2

2B Lake Lery Marsh Creation and Rim Restoration Project

This project is a continuation of ongoing restoration efforts located along the shoreline of Lake Lery. New phases were introduced, including marsh creation and shoreline protection measures based on infrastructure protection (Phase 2) and combating high levels of shoreline retreat (Phase 3). Because this project is imminently constructible, affordable, extremely beneficial to the area, and a strong candidate to receive matching funds from other programs, this project was moved to Tier 1.

2C Lake Machais Ridge Restoration

Efforts to locate previous planning efforts regarding the Lake Machais Ridge Restoration measures did not return any results. Due to the expected sea-level rise, immediate settlement of the area, poor load-bearing capacity of the underlying soil, and location, it was determined that ridge restoration efforts are not feasible at this location. From satellite imagery and recent studies, it was determined that oyster barrier reefs would be a better project alternative and would help slow the rate of shoreline retreat for the area. For this reason, the project was grouped with other similar oyster barrier reef applications.

2D Lake Athanasio Ridge Restoration

Efforts to locate previous planning efforts regarding the Lake Athanasio Ridge Restoration measures did not return any results. Due to the expected sea-level rise, immediate settlement of the area, poor load-bearing capacity of the underlying soil, and location, it was determined that ridge restoration efforts are not feasible at this location. From satellite imagery and recent studies, it was determined that oyster barrier reefs would be a better project alternative and would help slow the rate of shoreline retreat for the area. For this reason, the project was grouped with other similar oyster barrier reef applications.

2E Oyster Reef Installation (in accordance with 2012 CPRA Master Plan)

The scope of this project remained unchanged. Lake Machais and Lake Athanasio project areas were also reviewed (in addition to project areas included in the 2012 CPRA Master Plan).

Tier 3

3.A.1 Central Wetlands – Expansion of WWTP effluent demonstration project to Central Wetlands Segment A3

This project is no longer under consideration as it was dependent upon Orleans Parish acting upon a Coastal Impact Assistance Program (CIAP) Grant which has since expired for segment A2 of this project. As such, segment A3 will be on hold indefinitely.

3.A.2 Central Wetlands – Reforestation Project (using cypress stumps) for Central Wetlands and other areas outside the levee system

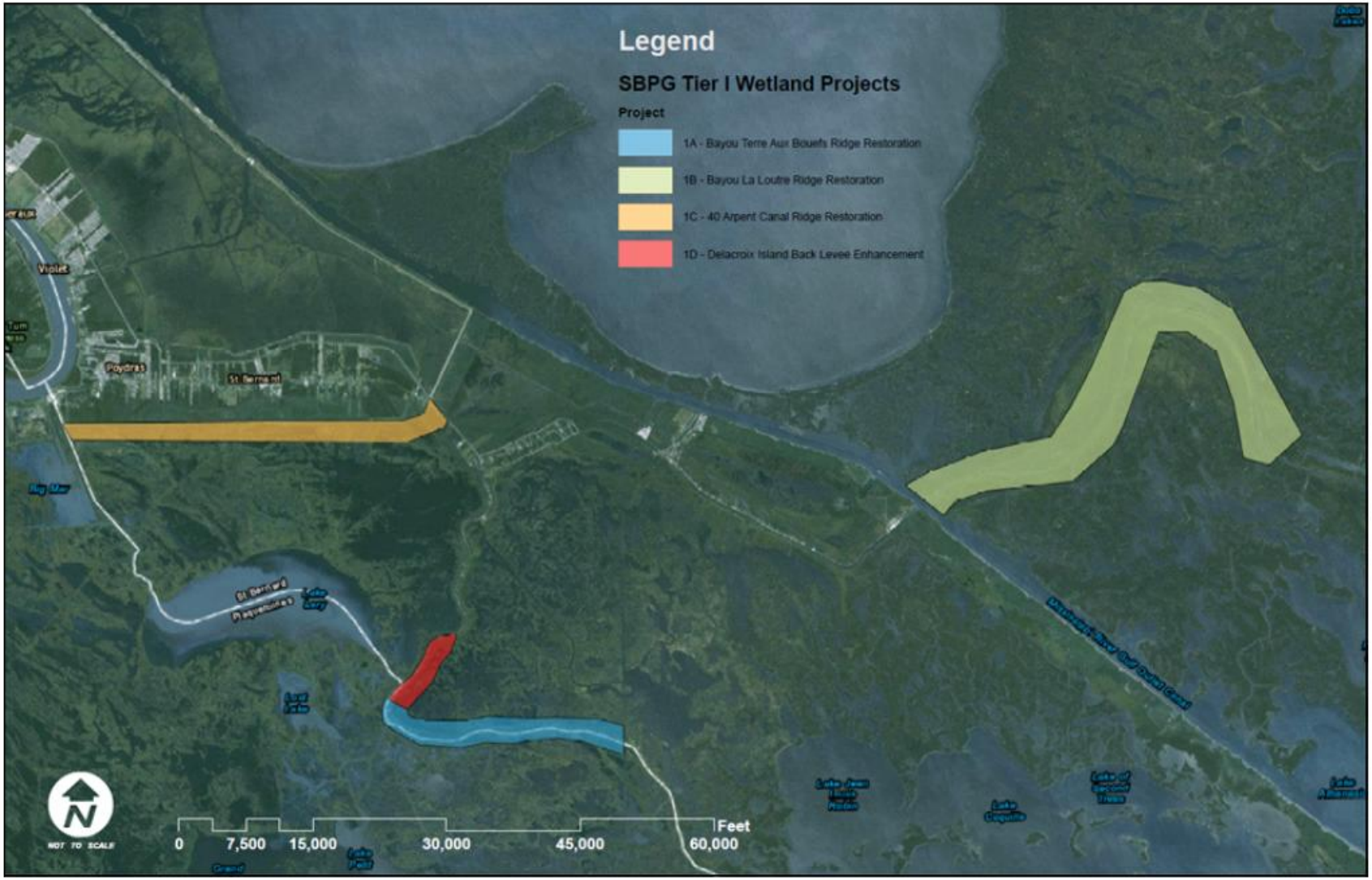
The general scope of this project remained unchanged in regards to the project area, though it is herein recommended to plant healthy tree saplings on existing ridges and other suitable landforms rather than decaying cypress stumps. This change in scope arose out of the concern that the decaying stumps could potentially fail in adverse conditions, thus eradicating the tree saplings before adequate root growth could be accomplished.

3.A.3 Central Wetlands – Expansion of Eco-tourism opportunities

The general scope of this project remained unchanged, though it was split into two distinct programs: the (1) Recreational Fishing Pier and (2) Public Seafood Market/Pavilion. Due to anticipated funding obligations, these projects were moved from Tier 3 project to Tier 2.

3.A.4 Central Wetlands - Paris Road Gateway

The scope of this project remained unchanged, and due to (1) funding the Parish has already set aside for this project, (2) the ability of the project to attract funding via the RESTORE Act (under the provision of contributing to the overall economic recovery to the area, and (3) the anticipated benefits to the Parish, this project was moved from a Tier 3 project to Tier 2.



	ST. BERNARD PARISH GOVERNMENT		**FIGURE #1** ORIGINAL CZAC PRIORITY PROJECTS - TIER 1

Additions to the PPL

Tier 1

North Shell Beach Marsh Creation via Long Distance Sediment Pipeline – East / Lake Borgne / Beneficial Use of Dredged Material (BUDMAT)

This project was not included among those listed on the initial project priority list, but was added to the Tier 1 category due to the projected benefits (both ecosystem and storm surge), available funding (project is identified for construction funding in NRDA), consistency with CPRA Master Plan, and synergy with Shell Beach South Marsh Creation (PO-168) as approved through CWPPRA.

Point Aux Marchettes Shoreline Protection and Terracing

This project was not included among those listed on the initial project priority list, but was added to the Tier 1 category due to the projected benefits, previous planning efforts conducted through CWPPRA, consistency with CPRA Master Plan, and synergy with other projects described herein.

Tier 2

St. Bernard Parish Harbor of Refuge

The Harbor of Refuge is an ongoing project that is fully funded. It was herein included in case there are future funding opportunities to enhance the current scope of work. Due to the scope and existing funding sources, it was included in the Tier 2 category.

Recreational Fishing Pier and Public Seafood Market / Pavilion

This project is currently in the planning phase and was included due to the expected economic benefits to the Parish and the ability of the project to attract funding via the RESTORE Act (under the provision of promoting tourism via recreational fishing and also promoting the consumption of seafood harvested from the Gulf Coast Region). Due to the scope and anticipated funding sources, it was included in the Tier 2 category.

Tier 3

Black Mangrove Demonstration

The Black Mangrove project was added as a low-cost shoreline protection measure that also has expected storm surge and habitat benefits, with the existence of healthy stands in St. Bernard and the well-documented northern migration of the trees makes this project especially attractive. Due to the scope, scale, and anticipated funding sources, it was included in the Tier 3 category.

Derelict Crab Trap Removal Program

The Derelict Crab Trap Removal was added so that SBPG can capitalize on upcoming mandatory state crabbing closures during which all crab traps must be removed from the water. During this time, all remaining traps are considered derelict and SBP can conduct its own removal operations. Due to the scale and anticipated funding sources, it was included in the Tier 3 category.

Updated SBPG Priority Project List

Tier 1

The following projects listed in Tier 1 are large-scale projects which will require a significant federal/state contribution and will have the greatest net benefit to coastal restoration and protection efforts. These projects are focused on land creation and nourishment, which will serve to protect adjacent levee systems and communities from storm surge, saltwater intrusion, and related land-loss. The location of all Tier 1 projects can be found on Figure 2.

a. North Shell Beach Marsh Creation via Long Distance Sediment Pipeline – East / Lake Borgne / BUDMAT
b. Bayou La Loutre Ridge Restoration (West, Central, and East Phases)
c. Lake Lery Rim Restoration and Marsh Creation (Phases 2 and 3)
d. Bayou Terre Aux Bouefs Ridge Restoration (North and South Phases)
e. Point Aux Marchettes Shoreline Protection and Terracing

Tier 2

The following projects listed in Tier 2 are mid-sized projects which, based on their varying project scopes, will have different funding sources and strategies than projects found in Tier 1. These projects provide a more local-level of protection, restoration, and community benefits. The location of all Tier 2 projects can be found on Figure 3.

a. Delacroix Island Resiliency Plan
b. Oyster Barrier Reef Installations (in accordance with 2012 CPRA Master Plan)
c. St. Bernard Parish Harbor of Refuge
d. Recreational Fishing Pier and Public Seafood Market / Pavilion
e. Paris Road Corridor Welcome Center and Streetscape Enhancement

Tier 3

The following projects listed in Tier 3 are smaller projects which may be executable through partnerships, volunteerism, and philanthropy, and should require minimal state/federal investment. The location of all Tier 3 projects can be found on Figure 4.

a. Central Wetlands Cypress Reforestation
b. Caernarvon to Verret Floodwall Reforestation
c. Black Mangrove Demonstration
d. Derelict Crab Trap Removal Program

ST. BERNARD
PARISH GOVERNMENT

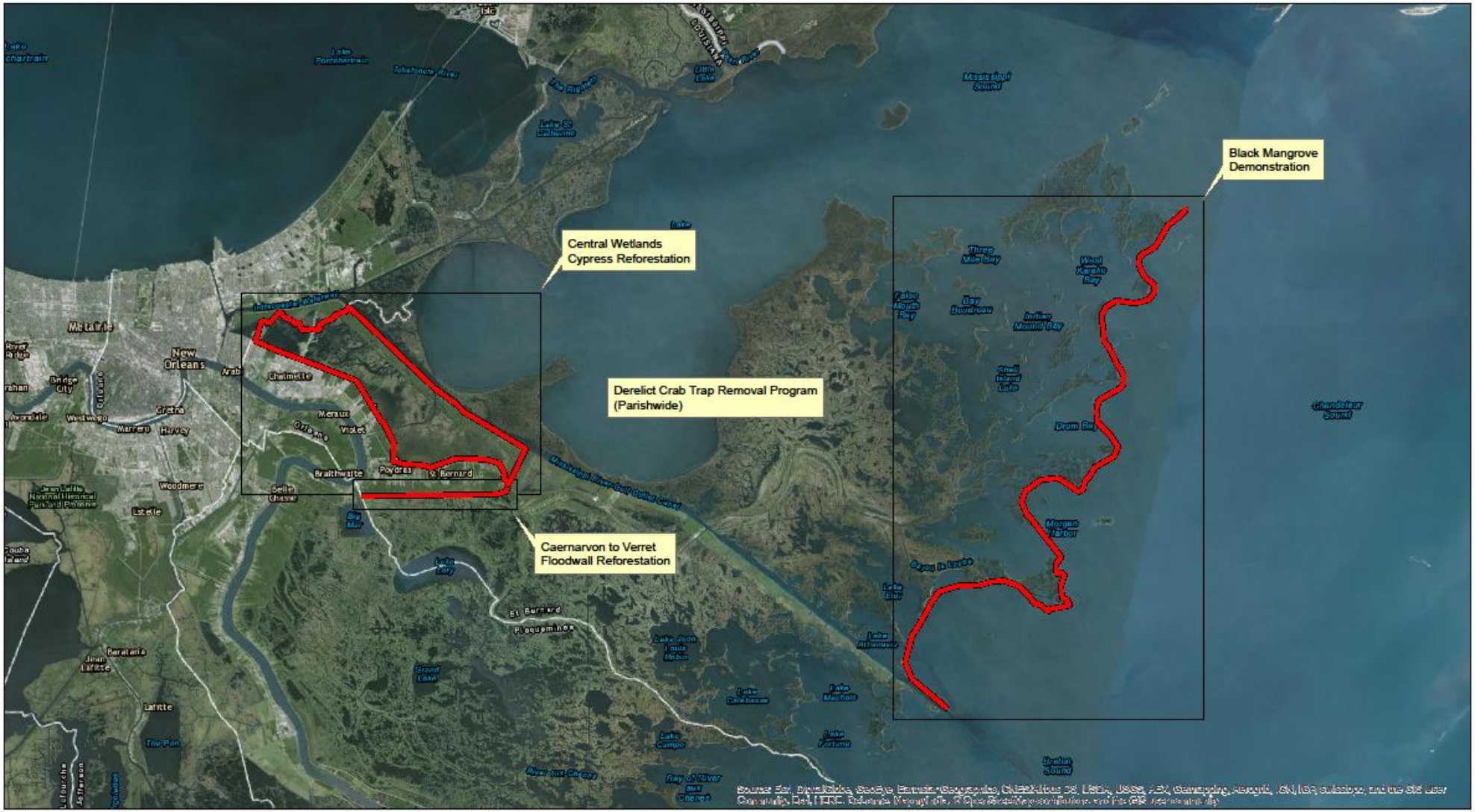
FIGURE #2

PRIORITY PROJECT LIST
TIER 1

ST. BERNARD PARISH GOVERNMENT

FIGURE #3

PRIORITY PROJECT LIST TIER 2



N

0 2.5 5 10 15 20 Miles

ST. BERNARD PARISH GOVERNMENT

FIGURE #4

PRIORITY PROJECT LIST TIER 3

Funding Outline for SBP Priority Projects

Introduction

Coupled with the extensive need to protect our coast, infrastructure, economy, cultural heritage, and property is a need to fund the projects in question. St. Bernard has a unique and unprecedented opportunity to leverage funding from different sources with federal and state entities to maximize benefits and long term positive returns. This analysis is an initial look at some of the key funding sources that should be pursued. The intent is not to have a comprehensive repository or a final strategy but to lay the ground work for a living database of funding sources and plan of action and pursuit for each.

Within this document there are included the following elements:

- This narrative which provides a brief overview of the agencies who control these entities, the program objectives, application process, and applicability to St. Bernard's objectives as a whole.
- A table matrix outlining each program and a few key specifics.
- A section within each project sheet proposing a course of action and likely funding source pursuits.

Funding Sources

There are easily more than two dozen discrete programs within Federal and State government applicable to coastal restoration and preservation efforts. The following is a brief description of each of the parent agencies approaches, their applicable programs, and some proposed courses of action.

RESTORE Act

The RESTORE Act will provide a significant amount of funding for coastal projects for the next 15 years beginning April 2017 (see graphic on following page), both directly to SBPG and, in large measure, through a competitive process whereby projects are nominated and funded on an annual basis. The State will receive $44M annually from the RESTORE Act (Pots 1 and 2 combined), while he Parish will receive $595K annually from Pot 1. The State will focus its investments on Master Plan projects but will also allocate funds annually (~$10M) to a matching program and solicit projects from coastal parishes seeking additional funding for local coastal projects. The RESTORE Act Council will receive $88M annually in the RESTORE Act Pot 2 to allocate via a competitive project nomination process. The criteria for project selection (shovel ready, ecosystem restoration, community resilience) favor Louisiana coastal projects; many of the projects identified by SBPG as priorities are ideally suited to be funded via these Pot 2 funds. Of note, however, is that CPRA controls the nomination of Louisiana projects for Pot 2 funding that are advanced to the Gulf Council. As such, it is important to keep in close coordination with CPRA in order to ensure SBPG projects receive all due consideration.

RESTORE ACT

20% of the civil and administrative penalties of the $5.5 billion settlement are deposited into the Oil Spill Liability Trust Fund. The remaining 80% is deposited into the Gulf Coast Trust Fund, also known as the RESTORE Act.

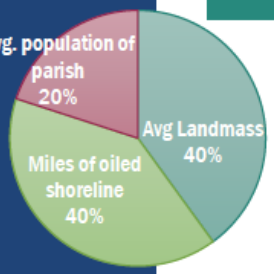
Equal State Allocation
35%
$1.54B
$103M / yr

Louisiana | 20%
$308M

State of LA
70%
$215.6M

Coastal Parishes
30% | $92.4M

Parish funds determined by formula



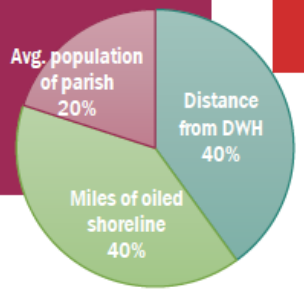
ST. BERNARD PARISH
allocation: 9.66743%
$595,500 / yr
$8.93M Total
Available: $1,657,000

Council Allocation
30% + 50% interest
$1.32B
$88M / yr

Council is comprised of:
Council Director
DOC
USDA
DOI
Army
Homeland Security
EPA
Gulf States

Impact Allocation
30%
$1.32B
$88M / yr

Gulf State amounts TBD.
Council must approve plan.
Funds determined by formula.



RSOMT Program
2.5% + 25% interest
$110M

RSOMT Program
2.5% + 25% interest
$20M

NOAA to consult with USFWS
GSMC
GOMFMC

Centers of Excellence
2.5% + 25% interest
$110M

In Louisiana: The Water Institute of the Gulf

Natural Resources Damage Claims (**NRDA**) are to be determined; however, $1B in early restoration has been approved.

Criminal penalties amounts have been divided as follows: Oil Spill Liability Trust Fund: $1.15B

- National Fish & Wildlife Foundation (NFWF): $2.544B (In LA, these funds can only for barrier island and river diversion projects)
- North American Wetlands Conservation Fund: $100M
- National Academy of Sciences: $500M

Natural Resource Damage Assessment (NRDA)

Injuries to the ecosystem from the BP oil spill were settled as part of the NRDA process within the global settlement signed April 2016. The settlement dictates that $288M/year be allocated to NRDA projects in Louisiana. Many of the projects to be funded via this program have been identified and some are alluded to in the final settlement. Many of the priority projects (N. Shell Beach, Biloxi Marsh, Oyster Reef Shoreline, etc.) in SBP are identified in NRDA documents; others are excellent candidates for NRDA as they seek to restore both ecosystem and human conditions impacted by the spill. As with RESTORE Act Pot 2, NRDA projects will be directed by the CPRA and as such it is critical to maintain close and continuous communication with the CPRA leadership in order to receive appropriate construction funding.

Federal USACE CAP

Under the CAP there are nine discreet programs which could apply to St. Bernard and its coastal communities in one way or another. These programs range from the Section 14 program which applies to emergency protection of facilities along waterways to the Section 1135 program which calls for ecosystem restoration and/or enhancement as a part of or in response to the installation of facilities the Corps participates in. These programs offer funding levels ranging from $500,000 to $7 Million and offer matches of 65% to 75%.

The process for application to these programs is very similar for all nine programs and starts with a simple request letter/package to the local Corps official(s) requesting a study and later implementation of a particular project or projects. Should the project have merit in the eyes of the Corps a study is initiated which is typically covered by the Corps at 100% of their cost up to the first $100,000. Once the study indicates a viable project the project can be funded and design/construction completed.

While several of the programs are directly or indirectly applicable the CAP 204, 205, and 206 programs (details in the below table) are most directly applicable and in fact there is a CAP 206 project in process at the time of this document. The primary drawback with these projects is the time associated with requesting and implementing. From project submittal to actual construction can be upwards of three years when the initial review, study, and design are considered. St. Bernard is highly familiar with the 206 process and has developed a strong set of relationships and trust with local Corps entities. These programs should prove very useful for some of the projects not funded via CPRA or other more expeditious sources.

GOMESA (Gulf of Mexico Energy Security Act, Bureau of Energy Management)

While SBPG will receive $1.3M annually from GOMESA beginning 2017, the State will be receiving $144M. Much of those state funds will be used to construct master plan projects, of which many are present in SBP. Additionally, within the GOMESA legislation is a program being implemented this coming fiscal year that applies directly to infrastructure projects.

As part of the state of Louisiana's push to fund the Highway 1 bridge there has been a 10% set aside for infrastructure projects related the following priorities:

- The project's contribution to community resilience (evacuation routes, connection to local businesses, contribution to regional commerce, etc.).
- The community's investment in the project.
- The project's contribution to state, regional and national energy security.
- Opportunities to leverage funding for the project from sources other than those discussed in this resolution.

This program is relatively new and the submittal deadline is set for October of 2016. The particulars of the application package have not been finalized and public comment is slated to remain open through July of 2016.

This pot of funding is useful primarily for projects such as the Delacroix Island Resiliency Plan. The augmentation of state Department of Transportation and Development (LaDOTD) funds and/or the inclusion of drainage pump or levee infrastructure to protect LA 300 would seem a perfect fit for this program.

Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA)

The CWPPRA program, administered by five federal agencies (USACE, NOAA, USFWS, USDA, EPA) and the State of Louisiana, is a competitive program with which St. Bernard is well acquainted. This program provides funding for a wide range of projects and members of the administration and staff have developed strong relationships with pertinent members of the project sponsoring and selection teams. Currently the CWPPRA Program receives ~$77M/year.

As with other competitive programs, an application package is submitted containing project scope, schedule, budget, and feasibility information. Sponsorship and buy-in from a single advocate appears to be critical to the success of project submitted under this program. It is advised that existing relationships be maintained and further developed so that broad support and multiple sponsoring entities can lend their assistance.

Federal Emergency Management Agency (FEMA)

The FEMA Pre-Disaster Mitigation (PDM) program provides grants for mitigation of future damages. This is a competitive program with emphasis placed on resilience and a favorable benefit cost analysis. The types of projects are diverse so long as damages are prevented. Wind damage mitigation projects are typically most beneficial but flood damages and the alleviation to adverse industry impacts are also of significant importance. During the annual submittal period a package is prepared including scope, schedule, budget, benefit cost, and supporting documentation. Submittals are made to the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) who then routes them to FEMA through their Region 6 office.

Projects such as the protection of Delacroix or other locations which have concentrations of structures, industrial or commercial interest, and recreational properties should be targeted. The Delacroix project should be a good system of projects to apply this avenue to. There could also be some shore line armoring or other types of projects proposed.

Department of Commerce

The Economic Development Agency (EDA) Utilities grant program works to provide infrastructure improvements that will enhance or increase commerce and business activities in certain areas. Emphasis is placed on rural communities. There are some requirements for estimates of additional business/commerce produced which are used in the benefit cost analysis. A package is submitted via grants.gov including scope, schedule, budget, and benefit cost information with letters or documentation from businesses or commercial interests indicating their ability to expand once the project is implemented. This project funding would be most applicable to Delacroix or the Paris Road Corridor projects.

US Department of Transportation (USDOT)

The most recent Transportation and Infrastructure bill included funding for large scale multi modal and freight related projects through the Fast Lane and Transportation Investment Generating Economic Recovery (TIGER) competitive grant programs. Applications including scope, schedule, budget, and benefit cost information are submitted via Grants.gov and DOT personnel score and award projects. Matches are variable and preference is given to projects with higher match levels.

USDOT programs are generally geared towards roadway and potentially rail related projects so applicability to this program are limited, with raising LA 300 proving to be one of the more applicable projects. However, there may be components related to fisheries and other commercial interests that could trigger a portion of a project.

NOAA Coastal Resilience

These grants are competitively selected and intended to assist communities in recovering from, and/or preparing for, "extreme weather events, climate hazards, and changing ocean conditions". Two rounds of funding totaling $9 Million have been historically awarded with 12-13 projects out of 130 applications awarded in the latest cycle. Project sizes are typically between $500K and $1 Million and must be related to coastal projects.

Once a notice of funding is distributed, a grant application is compiled including narrative, benefit cost, and financial information. A full application is submitted through Grants.gov. Many of the projects noted in the priority plan would fit this program. Should funding opportunities such as CWPPRA, or CAP 206 fall through, this program could/should be pursued as an option.

NOAA Coastal Ecosystem Resiliency Program

This program, administered through NOAA Fisheries, is a competitive national program with an emphasis on ecology and enhancing coastal communities' resilience in the face of changing climate and extreme weather events. Particular emphasis is placed on "Healthy Oceans" and "Resilient Coastal Communities and Oceans." The following goals are included in the full description:

- Restore habitat to support healthy fish populations and provide sustainable and lasting ecosystem functions that reduce hazard vulnerability and risks posed to U.S. coastal communities from extreme weather events, changing environmental conditions, and allow for adaptation to known or potential climate change impacts, Federal Funding Opportunity Page 6 of 29;
- Demonstrate collaboration and alignment among multiple stakeholders, including state and federal agencies, by proposing projects that implement ecosystem-based restoration recommendations and site-specific strategies outlined in existing coastal vulnerability or resiliency studies and comprehensive planning efforts;
- Result in socio-economic benefits associated with the restoration of healthy and resilient U.S. coastal ecosystems, such as increased economic activity, enhanced recreation including fishing, changes in human well-being, improved or protected infrastructure, decreased flooding impacts, elimination of safety hazards, and/or reduced maintenance costs;
- Restore habitat within NOAA priority areas, such as Blueprint Habitat Focus Areas, (http://www.habitat.noaa.gov/habitatblueprint/) or habitat for Listed species, including Species in the Spotlight (http://www.nmfs.noaa.gov/stories/2015/05/05_14_15species_in_the_spotlight.html);
- Implement on-the-ground restoration actions that will begin within 24 months of the proposed award start date, will result in beneficial impacts, and achieve the stated ecosystem resiliency and habitat goals; and
- Receive approval from the State Governor as evidenced by a letter or other form of documented correspondence, such as a letter from a Governor's appointee, prior to award (see Section III.C). Before awards are made, NOAA will verify that correspondence from the State Governor has been received.

As with many of the federal programs listed herein, a full application is required including a narrative, costs, availability of match funding, etc. This program would be applicable to any number of the marsh or ridge creation projects, especially those that benefit the commercial and recreational fishing interests in the Parish.

Louisiana CPRA

There are multiple programs and funding sources over which CPRA has control. Planning and implementation funds from GOMESA and the RESTORE Act have provided major infusions of capital, which are naturally focused on projects within the states master plan. Direct requests to leadership are the most likely means of moving specific projects forward. Collaboration on projects that overlap between St. Bernard and CPRA priorities is critical. There are four projects within the Tier 1 priorities that will be requested of CPRA. Those

projects all lie within the priorities of the master plan and will be able to move quickly from planning to design with local input and support leveraged by state and local funding.

Louisiana Capital Outlay

Making Capital Outlay requests and the projects they apply to is a well-documented and understood process which will likely be more beneficial as revenues statewide are increased. Examples of projects that qualify for inclusion in the capital outlay budget are: land acquisition; site development and improvement; acquisition or construction of buildings or other structures; additions or expansion to existing facilities; major repair or renovation of existing facilities; installation, extension, or replacement of utility systems or major building system components; roof replacement; hazardous materials abatement; fixed equipment that is connected to building utility systems; and initial equipment and furnishings for new buildings. All projects are eligible for Capital Outlay, however, applications must be made through State legislators.

For projects other than those funded from self-generated cash, federal funds, or dedicated revenues, it is necessary to limit capital outlay projects to those that have an anticipated useful life of twenty years or more and a value or cost of at least $50,000.

Funding Matrix

Program	Eligible Scopes	Funding Cap Limits or Typical Levels	Match/ Rate/ Cost Share	Agency	Dead-lines	Project Applicability	Process/Notes
FEDERAL SOURCES							
RESTORE Act	Primarily Ecosystem Restoration Projects with gulf wide influence, part of Master Plan, and have cost share from local sponsor.	Typically $15-50M	Variable	CPRA / RESTORE Act Gulf Council	TBD	Projects within the CPRA and/or Local Master Plans	Submitted to CPRA for POT 1 and POT 3 cost share, or to CPRA for POT 2 funding from Gulf Council. Dates TBD.
NRDA	Projects that directly address the impacts of the BP Oil Spill on the natural ecosystem and communities as defined in the Global Settlement	Variable $500K-$1B	None Required -Local Match / Shovel-ready Preferred	NRDA Trustee Council NOAA/ USFWS/ CPRA	Annual / TBD	Many of the projects in SBP are directly applicable, if not already identified (e.g., N. Shell Beach) in NRDA documents	Submit projects directly to CPRA and show linkage and synergy with NRDA plans and requirements. Accelerate process by initiating projects to be shovel ready.
USACE - 14	Studies, Canals & Bayous	$1.5 Million	35%	USACE	Fiscal Year	Emergency protection of public facilities along waterways	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
USACE - 103	Studies, Breakwaters & Levees	$5 Million	35%	USACE	Fiscal Year	Beach replenishment to protect public and private properties	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
USACE - 107	Studies, Canals & Bayous	$7 Million	10%-50%	USACE	Fiscal Year	Improvements to navigation canals/turning basins etc.	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out

Program	Eligible Scopes	Funding Cap Limits or Typical Levels	Match/ Rate/ Cost Share	Agency	Dead-lines	Project Applicability	Process/Notes
USACE - 111	Studies, Marsh Wetlands, Canals & Bayous	$5 Million	Same as Original Project	USACE	Fiscal Year	Repair of shorelines damaged by federal navigation projects or mitigation of future damages	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
USACE - 204	Drainage, Studies, Marsh Wetlands	Variable	35%	USACE	Fiscal Year	Protection, creation, and restoration of aquatic and ecologically related habitats focusing on use of dredge material	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
USACE - 205	Studies, Breakwaters & Levees	$7 Million	35%	USACE	Fiscal Year	Small scale flood protection projects with measures ranging from levees to flood warning systems and pumps	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
USACE - 206	Studies	$5 Million	35%	USACE	Fiscal Year	Projects related to ecosystem restoration and habitat construction	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
USACE - 208	Studies	$500,000	35%	USACE	Fiscal Year	Snagging and clearing of channels for flood control purposes	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
USACE - 1135	Studies	$5 Million	25%	USACE	Fiscal Year	Ecosystem restoration or augmentation of an existing USACE project or of damages caused by USACE facilities	A letter requesting consideration of a project is submitted to the local authority, once approved a study is initiated, once the study passes the design and construction are carried out
GOMESA Infrastructure	Water, Sewer, Drainage, Roads	Variable	TBD	Bureau of Energy Manage.	16-Oct	Projects related to "infrastructure directly impacted by coastal wetland loss"	A submittal in coordination with CPRA is made and project award based on priority criteria is made on a competitive basis

Program	Eligible Scopes	Funding Cap Limits or Typical Levels	Match/ Rate/ Cost Share	Agency	Dead-lines	Project Applicability	Process/Notes
CWPPRA	Ridge Restoration, Marsh Creation, Shoreline Protection, Hydrologic Restoration	$20-40M	15%	Multiple	-	Coastal restoration projects geared to "acquire, restore, manage, or enhance coastal wetlands"	An application to the competitive program is submitted on an annual basis using a sponsor agency
FEMA - PDM, HMGP (Hazard Mitigation Grant Program), FMA	Facilities	Variable (roughly $250K to $1 M)	75%	Dept. of Homeland Security	17-Jun	Flood and wind damage prevention related projects	A package containing benefit cost, project scope, and damage mitigation elements is submitted to GOHSEP and routed to FEMA for the PDM and Flood Mitigation Assistance (FMA) programs. In order to be eligible for 404 assistance the inclusion of potential projects should be added to the Parish accepted hazard mitigation plan in the event of a future declared disaster.
EDA - Public Works	Water, Sewer, Drainage, Roads	$1-$3 Million	50%-75%	Dept. of Commerce	Rolling	Grant projects for public utilities and other public works that will create jobs and economic growth	Generation and submittal of a project application including project scope and a benefit cost analysis which places emphasis on generation of new economic development by the project in question
Nationally Significant Corridors	Roads	Over $5 Million	20%-40%	USDOT	17-Apr	Large scale infrastructure projects related to transportation with an emphasis on freight	A grant application package is completed and submitted via Grants.gov. The package includes benefit cost information, narratives, letters of support, and scope/cost information.
TIGER	Roads	$5 Million plus	80%-100%	USDOT	17-Apr	Large scale transportation related projects	A grant application package is completed and submitted via Grants.gov. The package includes benefit cost information, narratives, letters of support, and scope/cost information.
NOAA Regional Coastal Resilience	Drainage, Roads, Facilities, Studies, Marsh Wetlands, Breakwaters & Levees, Canals & Bayous	$500K to $1M	2:1 Federal to Non Federal	NOAA, NOS	TBD	Projects promoting resilience in coastal regions, communities, and economic sectors specifically targeting severe weather	Completion of a grants package and submittal through grants.gov.

Program	Eligible Scopes	Funding Cap Limits or Typical Levels	Match/ Rate/ Cost Share	Agency	Dead-lines	Project Applicability	Process/Notes
Coastal Ecosystem Resiliency Grants Program	Studies, Marsh Wetlands	$250K to $750K	2:1 Federal to Non Federal	National Marine Fisheries Service, NOAA, Commerce	16-Aug	Projects addressing coastal communities and ecosystems to protect from future hazards and support sustainable fisheries	Completion of grant application per terms of notice of funding opportunity through grants.gov.
STATE SOURCES							
CPRA	Marsh Wetlands	Variable	Variable	-	-	Projects fitting within master plan guidelines are advisable	Depending on the funding or desired outcome a variety of requests from formal letters to face to face meetings requesting priority projects is advisable
Capital Outlay	Water, Sewer, Drainage, Roads, Facilities, Studies, Marsh Wetlands, Breakwaters & Levees, Canals & Bayous	Variable	25%	-	16-Nov	Any project fitting within state guidelines and priorities	A request for Capital Outlay allocation is made and processed via standard procedures
Pre-Scripted Missions	Drainage	$100,000	0%	GOHSEP	Rolling	GOHSEP has the authority to set in place a plan to deploy National Guard resources including personnel and equipment	GOHSEP adds a specific set of tasks/resources in their disaster response plan
LOCAL SOURCES							
RESTORE Act - Economic Damages (Pot 1)	Water, Sewer, Drainage, Roads, Facilities, Studies, Marsh Wetlands, Breakwaters & Levees, Canals & Bayous	Variable	100%	-	-	Virtually any project related to coastal issues can be funded. This is a prime source for matching money.	Documentation of use and project purpose
RESTORE Act - Pot 2	Studies, Marsh Wetlands, Breakwaters & Levees, Canals & Bayous	Variable	-	-	-	Projects aligning with the master plan are advisable	A request is made to the authority having jurisdiction

Program	Eligible Scopes	Funding Cap Limits or Typical Levels	Match/ Rate/ Cost Share	Agency	Dead-lines	Project Applicability	Process/Notes
Public Private Partnerships	Water, Sewer, Drainage, Roads, Facilities, Studies, Marsh Wetlands, Breakwaters & Levees, Canals & Bayous	Variable	Variable	Industry, Universities, Land Owners, PNPs, etc.	-	Any project with local buy in and investment could be pursued. Projects such as the black mangrove plantings would be excellent fits.	Identifying a matrix of interested partners and working through Parish relationships the attached list of priority projects could be connected with interested parties.
Bond Funds or Budgeted Items	Water, Sewer, Drainage, Roads, Facilities, Studies, Marsh Wetlands, Breakwaters & Levees, Canals & Bayous	Variable	100%	-	-	Parish Discretion	Internal documentation of project intent and agreement by proper internal authorities

Fact Sheets for Updated SBPG Project Priority List

Fact sheets for each of the updated SBPG Priority Projects, which summarize the identified projects include the following details:

- Project Priority
- Current Status
- Project Location
- Problem
- Previous Planning Efforts
- Recommended Solution
- Projected Benefits
- Projected Costs
- Consistency with CPRA Master Plan and other Ongoing Regional Efforts
- Potential Risks, Mitigation Measures, and Permitting Requirements
- Restoration of Areas Impacted by Deepwater Horizon Oil Spill
- Funding Strategy and Sources

Project Name

North Shell Beach Marsh Creation via Long Distance Sediment Pipeline – East / Lake Borgne / BUDMAT

Project Priority

Tier 1

Current Status

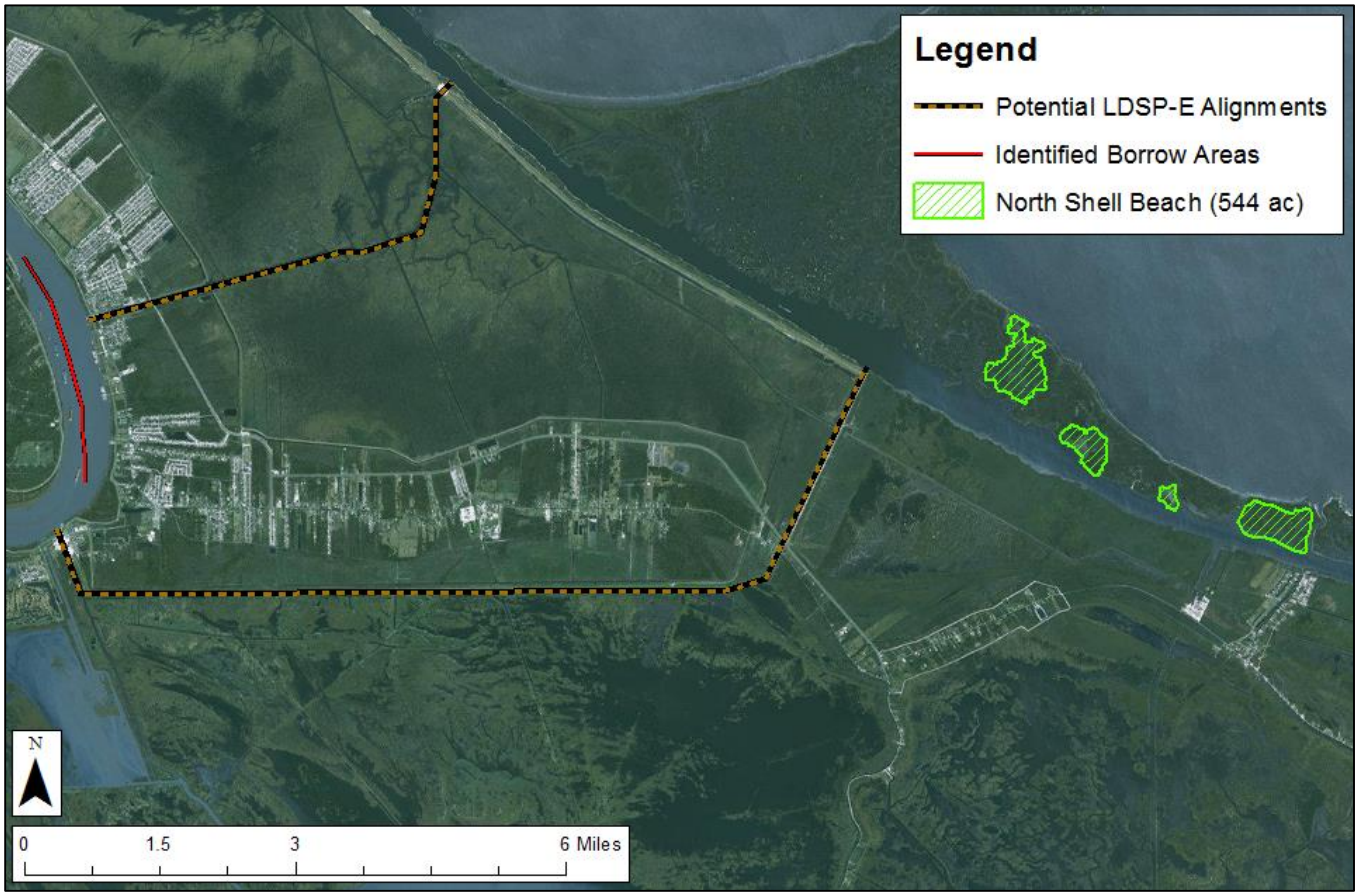
This project is not currently funded in any existing program.

Project Location

St. Bernard Parish, north bank of the MRGO between Proctor's Point and Bayou Yscloskey.

Problem

Much of St. Bernard Parish is composed of emergent wetlands, which are continuing to deteriorate and recede due to factors such as subsidence, sea-level rise, the lack of new inputs of sediment, and erosional forces from seasonal storms. One of these areas, the landform separating Lake Borgne and the MRGO (North Shell Beach), was subject to even greater erosional forces caused by the historic use of the MRGO, and though much of the project area is now protected from edge erosion by rock dike features, interior wetland loss attributed to subsidence continues to cause marsh fragmentation and open water conversion. As these marshes provide the first line of defense from hurricanes to St. Bernard Parish and the Greater New Orleans (GNO) area, and as there has been over $17B invested in the GNO Hurricane Storm Damage and Risk Reduction System (HSDRRS) since Hurricane Katrina, it is critical that the marshes of St. Bernard stay intact to protect that investment and the surrounding communities.



Previous Planning Efforts

Previous planning efforts related to the restoration of the North Shell Beach include the 2012 CPRA Master Plan (project 001.MC.07a) which designed for the marsh creation and nourishment of approximately 2,230 acres of marsh along the south shoreline of Lake Borgne near Proctors Point, and the PPL26 of CWPPRA which proposed creating and nourishing 544 acres of marsh through dredging sediment from designated borrow sources in Lake Borgne. A project involving Shell Beach South Marsh Creation (PO-168) was also recently approved through CWPPRA and sponsored by the USACE.

Recommended Solution

The proposed project will create and nourish the 544 acres of marsh identified in the PPL25 of CWPPRA by dredging sediment from identified borrow areas found in the Mississippi River, from designated borrow sources in Lake Borgne, or potentially from material generated from the annual dredging of federal navigation channels (BUDMAT).

The ultimate borrow source would be identified in the engineering and design portion of this project and would include, in addition to design of the marsh creation features, an analysis of potential pipeline sediment corridors from the river to the project site. The rationale for studying the feasibility of using the Mississippi River as potential borrow source is as follows:

- Relative to the Long Distance Sediment Pipeline (LDSP) West and Atchafalaya to Terrebonne, a pipeline corridor from the Mississippi River through St. Bernard Parish (herein referred to as LDSP East) may prove to logistically more challenging, however, sufficient investigation has not been done to determine the feasibility of potential alignments.
- Though more costly from a single project perspective, building permanent piping infrastructure and corridors would allow for future cost savings for the over 30,000 acres of marsh creation the Master Plan has already identified for implementation in St. Bernard Parish.
- The state has already provided funds for the Atchafalaya to Terrebonne LDSP and LDSP West projects in support of the renewable sediment source concept.
- Lake Borgne cannot continue to be dredged long term without causing increased wave energy and shoreline erosion in the region, an alternate source of borrow must be found.

If the analysis shows the LDSP East to be infeasible (due to infrastructure concerns, land ownership, cost, etc.) the project will continue by using the existing identified and permitted Lake Borgne borrow areas as the source of sediment. In addition, analysis of the LDSP option of the project, while adding some cost (~$500K), would not slow project implementation as it would be done concurrently with project design.

Projected Benefits

By initiating the preliminary engineering and design of the LDSP East, there would finally be an avenue to implement much needed, and long-planned marsh creation in St. Bernard Parish. The conveyance pipeline would be used for multiple projects and would result in faster, and ultimately cheaper, project implementation due to use of existing infrastructure and savings through economies of scale. Additionally, this type of project would bring new sediment to a sediment-starved system, and ultimately, the marsh created would benefit from the State's sediment diversion projects.

In addition, the proposed project would benefit those communities that lie outside of the HSDRRS (Reggio, Shell Beach, Yscloskey, etc.) which will be increasingly exposed as loss of the landform continues through subsidence and interior marsh loss. The project would also benefit the immediate non-critical infrastructure (i.e., minor oil and natural gas facilities).

Projected Costs

Based on recent estimates composed for Bayou Dupont (BA-39) (marsh creation via LDSP) and Golden Triangle (marsh creation via Lake Borgne dredging and transport), total estimated project costs can be created based on the amount of desired restored acres. Ultimately, project costs will be driven by the selected source and location of the borrow area as determined in the feasibility analysis portion of this project. It is projected that the total project costs should fall between approximately $32M to $50M.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

This project is consistent with the objectives and approach utilized in the 2012 CPRA Master Plan in which fresh water and sediment from rivers were utilized to nourish existing marshes and provide sediment for building new land for a variety of projects. If the river is determined to be feasible as a source of borrow material, depending on the location of the borrow source and corresponding pipeline corridor, this project would coincide well with several Master Plan projects including the Upper Breton Sediment Diversion (001.DI.17) or the Central Wetlands Sediment Diversion (001.DI.18), in addition to providing sediment for a multitude of marsh creation projects also included in either implementation period (Hopedale, New Orleans East Landbridge, Lake Borgne – Component A, Central Wetlands – Component A, Biloxi Marsh, and the Golden Triangle).

Regardless of the borrow material source, the marsh creation component of this project would likely be synergistic with shoreline protection projects implemented under the CWPPRA program, and Corps of Engineers' MRGO 4th Supplemental Study, as well as marsh creation efforts recently approved in the Shell Beach South Marsh Creation Project.

Potential Risks, Mitigation Measures, and Permitting Requirements

Due to the nature of this project, assessment of environmental and cultural impacts will need to be performed. It is likely jurisdictional wetland determinations will be required for pipeline placement, work zones, and potential project fill areas when they are identified. Permitting actions will require drafting coastal use permit (CUP) applications, with emphases on avoiding and minimizing impacts to waterbottoms and wetlands, that address all requirements for the borrow area(s), pipeline placement, and fill areas. Utilizing existing bayous, canals, natural ridges, and spoil banks for pipeline placement and building upon previous permits in place for established pipeline conveyances and the Mississippi borrow area should minimize mitigation costs and overall project scheduling. Also, the 408 permitting process will be necessary as the LDSP-East would affect a federally authorized project(s) (Mississippi River and Tributaries project). Finally, because of the nature of the pipeline corridor, many landowners will likely be involved which will require extensive coordination and communication.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

Though North Shell Beach was not directly affected by the Deepwater Horizon Oil Spill, the potential LDSP produced during this project would provide a cost-effective source and means of transport of suitable sediment for a multitude of other project locations impacted by the Deepwater Horizon oil spill, helping to restore the natural resources, ecosystems, fisheries, estuarine and wildlife habitats, beaches, and coastal wetlands of those areas.

Funding Strategy and Sources *– This project would seem a perfect match for CPRA. The intent and project scope is included in their master plan and the use of a sediment pipeline creates multiple current and future benefits. It is proposed that the request to CPRA include a match of funding for initial soft costs from the RESTORE Act economic damages to CPRA funds to start the design process. Construction funding should be requested from CPRA as a cost share component once the design phase is completed.*

Project Name

Bayou La Loutre Ridge Restoration (West, Central, and East Phases)

Project Priority

Tier 1

Current Status

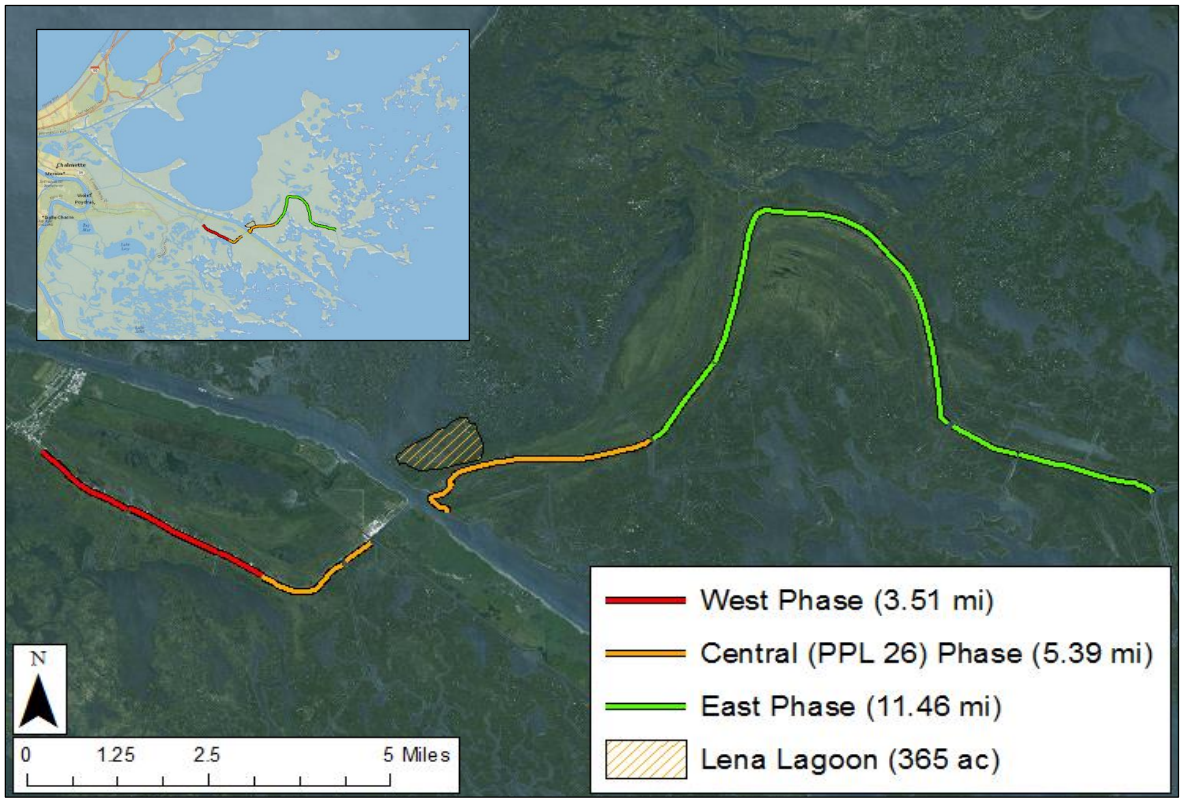
The Central Phase is pending CWPPRA funding via the USACE PPL 26

Project Location

Bayou La Loutre, St. Bernard Parish

Problem

The historic La Loutre Ridges occurring alongside Bayou La Loutre, elevated areas of land eight (8) to ten (10) feet high and lined with small oaks and marsh elder, are fading through natural subsidence; subjected to shoreline erosion due to increased boat traffic after the closure of the MRGO; and experiencing increases in salinity levels brought about the construction of the MRGO. Historically, the elevated ridges and its vegetation have provided natural protection for areas further inland by dampening storm surge energy; however, gaps have formed in the ridges in many places creating open water ponds and streams due to tidal exchange and scouring. Without restoration measures, these open water areas will continue to expand further exposing the inland areas to greater flooding and scour from storm events.



Previous Planning Efforts

Previous planning efforts related to the restoration of the Bayou La Loutre ridges date back to 2006. In addition to inclusion in the 2012 CPRA Master Plan, the project has also been submitted for federal funding through

CWPPRA and has been suggested as a coast-wide need by the LPBF. This project is also a component of the BMLC's Master Plan. The length of proposed ridge restoration measures has differed between these previous planning efforts, as well as the anticipated marsh creation benefits and cost estimates.

Recommended Solution

Based on field data, it was recommended in CWPPRA's PPL26 that the ridges be built up an elevation of four (4) feet using material from bucket dredging the bayou, with the ridges having a 3:1 slope on the bayou side and 2:1 slope on the marsh side. To minimize impacts on existing healthy marsh, it was proposed to build the ridges in the shallow water of the bayou rather than building atop existing ridges. Following construction, 50% of the newly created ridge would include vegetative plantings. Due to funding constraints, it is recommended to split the project into distinct phases, with cost, need, and projected benefits dictating the order of construction. Based on previous planning efforts and geography, the project was broken down into three (3) distinct phases described below, with an additional amendment for marsh creation in Lena Lagoon included.

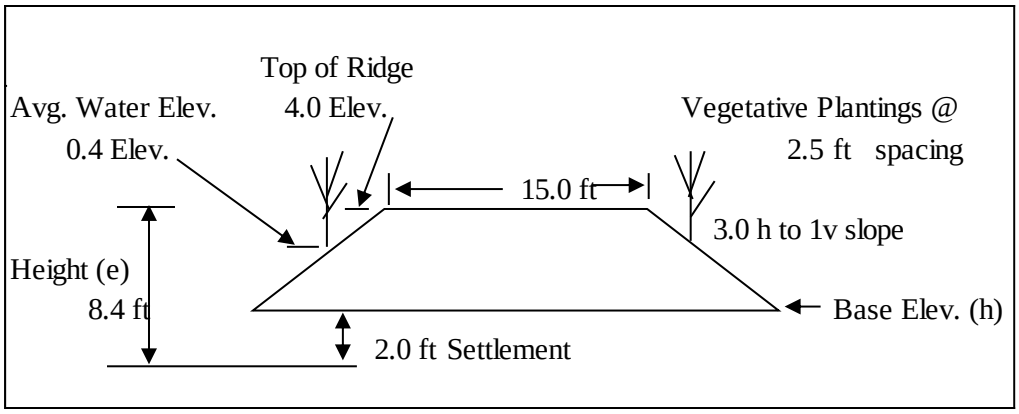


Figure amended from CWPPRA design

West Phase - The West Phase runs along the western shore of Bayou La Loutre from Yscloskey to south of Hopedale. It aligns with the northern extent of ridge restoration measures outlined in the 2012 CPRA Master Plan and terminates at the northern extent of the plans submitted in CWPPRA's PPL26. It is 3.51 miles in length and is segmented where canals are present.

It is anticipated this reach would provide storm surge protection for the Yscloskey, Hopedale, and Shell Beach areas and would protect northern interior marshlands from further degradation and saltwater intrusion. It would bolster the western and southern shores and reduce erosion impacts of boat traffic from further spreading southward. At the end of construction activities, 22.7 acres of marsh including 6.4 acres of ridges should be created in this phase.

Funding Strategy and Sources *- Currently this project is being requested under the CWPPRA program. Should this fail, a request will be made to CPRA to handle this phase of the project.*

Central Phase - The Central phase follows the alignment proposed in CWPPRA's PPL26 and runs along the western and southern shore of Bayou La Loutre from the end of the West Phase until the canal exiting Bayou Saint Malo. It is 5.39 miles in length and is segmented where canals are present. It includes 0.36 miles along the now closed MRGO.

Due to its west-east lateral orientation, it is anticipated this reach would provide storm surge protection from southern storms; protect northern interior marshlands from further degradation and salinity intrusions; and would rebuild the western and southern shorelines eroded by boat traffic. At the end of construction activities, 34.9 acres of marsh and 9.8 acres of ridges should be created in this phase.

Lena Lagoon Marsh Creation Amendment – Included in the Central Phase is an additional amendment outlined in CWPPRA's PPL26 which calls for marsh creation in Lena Lagoon from sediment dredged from Lake Borgne or possibly via LDSP if an existing corridor and infrastructure is in place at time of construction. The amendment would create 129 acres of marsh and nourish an additional 254 acres and is expected to protect Bayou La Loutre from future storm events.

Funding Strategy and Sources *- As with the West phase this segment can and will be requested from CPRA as a project should CWPPRA fall through as a funding source.*

East Phase – The East Phase runs along the western and southern shore of Bayou La Loutre and aligns with the Central Phase to the west and continues for 11.31 miles until Bayou La Loutre forks near the Gulf of Mexico. It aligns with the southern edge of ridge restoration measures outlined in the 2012 CPRA Master Plan and is segmented where canals are present.

It is anticipated this reach would provide the greatest benefit to the northern interior marshlands and would help prevent further fragmentation as a result of storm surge and wave action. It would rebuild the western and southern shorelines, with 73.2 acres of marsh and 20.6 acres of ridges created at the end of construction activities.

Funding Strategy and Sources *- This project will be one of the first four requested of CPRA. In order to proceed expeditiously the design, management, and other upfront costs can be shared between CPRA and the Parish using the Parish's allocation of economic damages funding from the RESTORE Act. Once the design is complete more of the cost share can be moved to CPRA to be executed under their standard process.*

Projected Costs

Preliminary construction costing was performed based on recent field data collected for the Bayou La Loutre Ridge Restoration project found in CWPPRA's PPL 26 and professional judgement. Planning, engineering, and design (P/E&D), construction management (CM), and operation and maintenance (O&M) costs were derived based on estimated construction costs and were prepared using methodologies outlined in the 2012 CPRA Master Plan. It is important to note construction costs for the West and East phases were built upon field data collected for the Central phase and future planning efforts may be required to further refine these details.

Phase	Length [mi]	Average Width [ft]	Construction	w/25% Contingency	P/E&D	Construction Management	O&M	$/LF	Total
West	3.51	133.37	$ 2,404,000	$ 3,005,000	$ 240,000	$ 120,000	$ 480,000	$129.74	**$ 3,845,000**
Central	5.39	261.53	$ 3,687,000	$ 4,609,000	$ 369,000	$ 184,000	$ 740,000	$129.55	**$ 5,902,000**
East	11.31	244.54	$ 7,725,000	$ 9,656,000	$ 772,000	$ 386,000	$ 1,540,000	$129.37	**$ 12,354,000**
Lena Lagoon	364.76 ac	-	$ 13,281,000	$ 15,937,000	$ 1,328,000	$ 664,000	$ 2,660,000	$36,410 / ac	**$ 20,589,000**
							Total Ridge Restoration		**$ 22,101,000**
							Total w/ Lena Lagoon		**$ 42,690,000**

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

This project is included in the Master Plan and synergizes with the Lake Borgne rim project Shell Beach South Marsh Creation (PO-168) which was approved in PPL24 and is designed based upon projects 001.RC.01 and 001.MC.07a (Lake Borgne MC) presented in the State's 2012 Master Plan and components of the MRGO Ecosystem Restoration Plan.

Potential Risks, Mitigation Measures, and Permitting Requirements

Before construction, pipelines will have to be identified and due to the high probability of encountering archaeological sites, it is likely a cultural resource survey will have to be performed. In addition, required permits will include a CUP and section 404 Permit. It is not anticipated this project would incur any adverse impacts to local hydrology as existing gaps along the ridges would be maintained, and it also expected that this project would not pose a problem for future modifications to the MRGO.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Project Name

Lake Lery Rim Restoration and Marsh Creation (Phases 2 and 3)

Project Priority

Tier 1

Current Status

Phase 1 is under construction

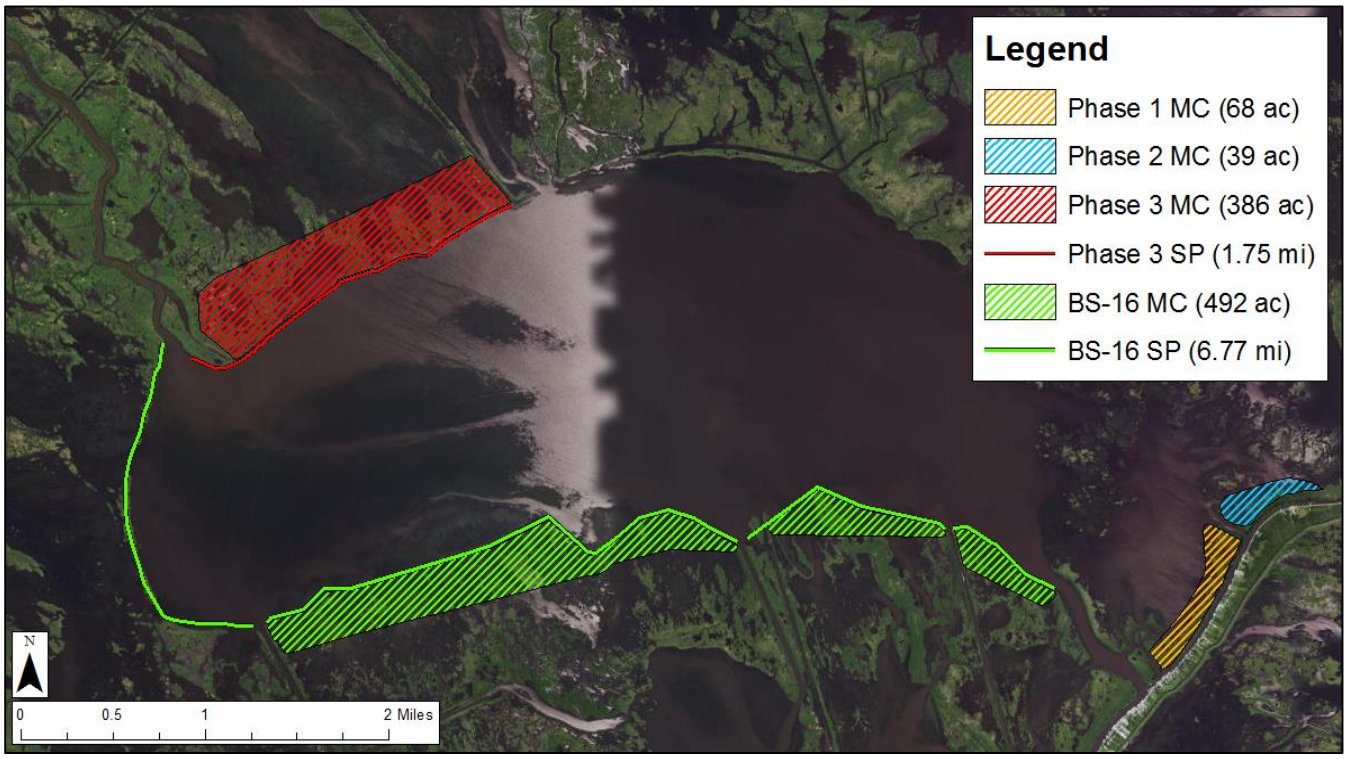
Project Location

Lake Lery, St. Bernard Parish

Problem

Much of the shoreline of Lake Lery and the surrounding wetlands were heavily damaged in 2005 by Hurricane Katrina. In the years following this storm, wind-induced waves within the lake have begun to cause further damage to the lake's already eroded shorelines with the northwestern edge seeing the greatest rate of shoreline retreat. Currently, the northwestern shoreline has become so damaged that the interior emergent marshes that are still intact are being exposed to damaging waves, further exacerbating increased losses of emergent marsh habitat. Even with the benefits of the Caernarvon Diversion Structure, without some type of restoration in this area these marshes may not be able to fully recover.

In addition, the most eastern reaches of Lake Lery near the western levee of Bayou Terre Aux Bouefs and Delacroix have faded throughout the years and nourishment is required to protect vital infrastructure behind the area.



Previous Planning Efforts

Recent restorations efforts include the South Lake Lery Shoreline and Marsh Restoration project (BS-16) as well the Lake Lery East Shoreline and Marsh Restoration project (BS-17), which are both currently undergoing construction. Initially, BS-17 was intended to include two restoration sites, with the southern site totaling approximately 68 acres (herein referred to as Phase 1) and the northern site totaling approximately 30 acres. However, due to unforeseen construction difficulties, only the southern site has been under construction to date.

Recommended Solution

Building from the methodologies incorporated in BS-16 and BS-17, this project proposes to dredge material from the Lake Lery water bottom and pump that material into contained marsh creation cells along the northwest and eastern reaches of the Lake Lery shorelines.

Due to funding and need (based on erosion rates), it is recommended to split the projects into distinct phases, with cost, need, and projected benefits dictating the order of construction. Based on design elements and projected costs, the project was broken down into the following phases.

Phase 2 - Phase 2 would restore areas near the western natural levee of Bayou Terre Aux Bouefs and continues from the northern extent of BS-17. It extends the northern area of restoration of BS-17 to coincide with the current tidal levee found on the eastern side of Bayou Terre Aux Bouefs and would create 29 acres of marsh while nourishing another 10 acres. Unlike Phase 3, it is not anticipated a shoreline embankment or alternative shoreline protection scheme would be required due to the relatively-sheltered location of the area.

Another benefit associated with this phase, from a constructability standpoint, is that geotechnical surveys, planning, and engineering design have already been performed for the majority of this site, and usable borrow areas and piping corridors have already been approved in the past (P20141578).

Phase 3 – Phase 3 encompasses the northwestern part of Lake Lery that has been subject to the greatest extent of shoreline retreat recently. The shoreline embankment of the phase, required to prevent damage to the proposed marsh creation cell, runs parallel to the shoreline for 1.75 miles from the Plaquemines and St. Bernard Parish boundary line and stops at the Gulf South Pipelines canal. The embankment would be created out of material dredged from the water bottom of Lake Lery and have a 50-ft crown width and be built to 3 ft. The lake side shoreline would have a gentle 5:1 embankment side slope which will provide a broader surface to establish and support smooth cordgrass and bullwhip plantings and also reduce wave impact erosion on the embankment. The backside marsh-side slope of the shoreline embankment would be 4:1 to reduce the volume of fill material required and still provide adequate slop stability and bearing capacity. A cross-section of the embankment is found below.

Included in Phase 3 is the marsh creation of 177 acres and the marsh nourishment of an additional 209 acres from near the edge of the embankment to approximately 2000 ft behind the existing shoreline.

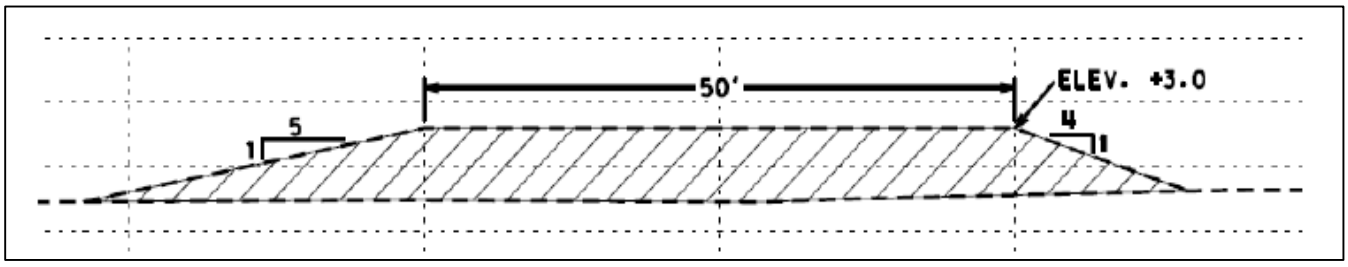


Figure taken from NRCS design

Projected Costs

Preliminary construction costing was performed based on recent field data and project bids collected for projects BS-16 and BS-17. P/E&D, CM, and O&M costs were derived based on estimated construction costs and were prepared using methodologies outlined in the 2012 CPRA Master Plan.

Phase	Acreage	Construction	w/25% Contignecy	P/E&D	Construction Management	O&M	Total
Phase 2	38.89	$ 2,404,000	$ 3,005,000	$ 240,000	$ 120,000	$ 480,000	**$ 3,845,000**
Phase 3	386.35	$ 13,564,000	$ 16,955,000	$ 1,356,000	$ 678,000	$ 2,710,000	**$ 21,699,000**
						Total	**$ 25,544,000**

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

This project is congruent with project BS-16 (South Lake Lery Shoreline and Marsh Restoration), which restored the shorelines and created marsh along the western and southern boundaries of Lake Lery; and project BS-17 (Lake Lery Rim Establishment and Marsh Creation), which was designed to provide net benefits to the southeastern portion of the Lake Lery shoreline. It is similar in scope to project 001.CO.01 (South Lake Lery Marsh Creation) of the 2012 CPRA Master Plan.

Potential Risks, Mitigation Measures, and Permitting Requirements

Geotechnical concerns relative to the ability of the borrow to stack and hold in place to contain the slurry will have to be addressed as part of the design process. There are pipelines in the immediate vicinity of the projects so pipeline right-of-way agreements will need to be performed for all respective companies. In addition, required permits will include a CUP and section 404 Permit and cultural resources survey.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Funding Strategy and Sources *– This project constitutes a reasonable request to CPRA. Given that there is a large scale ongoing project this scope should dovetail well with the ongoing program.*

Project Name

Bayou Terre Aux Bouefs Ridge Restoration (North and South Phases) and Armoring of Bayou Gentilly

Project Priority

Tier 1

Current Status

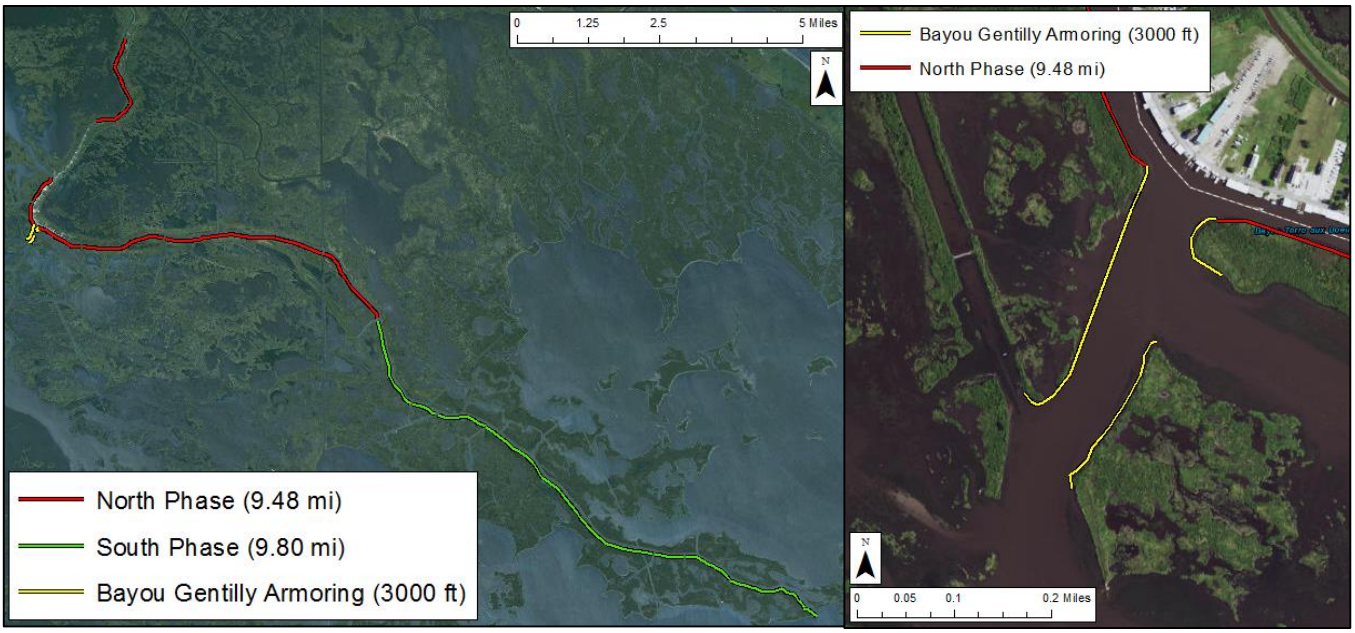
The North Phase is pending a CAP 206 request via the USACE

Project Location

Bayou Terre Aux Bouefs, St. Bernard and Plaquemines Parishes

Problem

The historic Terre Aux Bouefs Ridges occurring alongside Bayou Terre Aux Bouefs, are fading through natural subsidence and shoreline erosion due to boat traffic and may have been adversely impacted by the MRGO channel. Historically, the elevated ridges and its vegetation have provided natural protection for areas further inland such as Delacroix by damping storm surge energy; however, gaps have formed in the ridges in many places, creating open water ponds and streams due to tidal exchange and scouring. Without restoration measures, these open water areas will continue to expand as the bayou continues to widen, exposing the further inland areas to greater risks associated with highly erosional storm events.



Previous Planning Efforts

This project was screened in the 2012 MRGO Ecosystem Restoration Plan, where the proposed ridge restoration measures included stacking sediment along existing ridges to a height conducive to the propagation of upland habitat, but was removed from further consideration as it was determined the negative impacts to existing upland and marsh habitats were greater than the ecosystem benefits created. Though solicited in the past, it has never been selected for further evaluation by the CWPPRA Task Force. It was submitted as a new project for inclusion in the 2017 CPRA Master Plan and is currently being evaluated. There are also concerns that raising the Bayou Terre Aux Bouefs ridges may create a hydrologic barrier inhibiting the movement of

freshwater and sediment to areas targeted for benefit from CPRA planned and current diversions. However, designing the ridges to be segmented where hydrologic exchange nodes are present should allow for hydrologic continuity.

Recommended Solution

Though no engineering field data has recently been collected regarding the current conditions of the ridges, it is recommended to follow similar construction methodologies proposed in CWPPRA's PPL26 for the ridge restoration of Bayou La Loutre. Following this methodology, the ridges would be built up an elevation of four (4) feet using material from bucket dredging the bayou, with a 3:1 slope on the bayou side and 2:1 slope on the side facing the marsh. To minimize impacts on existing healthy marsh, it is proposed to build into the shallow water of the bayou. Following construction, 50% of the newly created ridge is to include vegetative plantings. Protecting the shoreline from erosion where there are gaps in the existing ridge, such as exists at Bayou Terre Aux Bouefs and Bayou Gentilly, is also recommended. Due to funding, it is recommended that the project be split into distinct phases, with cost, priority need, and projected benefits dictating the order of construction. Based on previous planning efforts and professional judgement, the project was broken down into the following two (2) distinct phases.

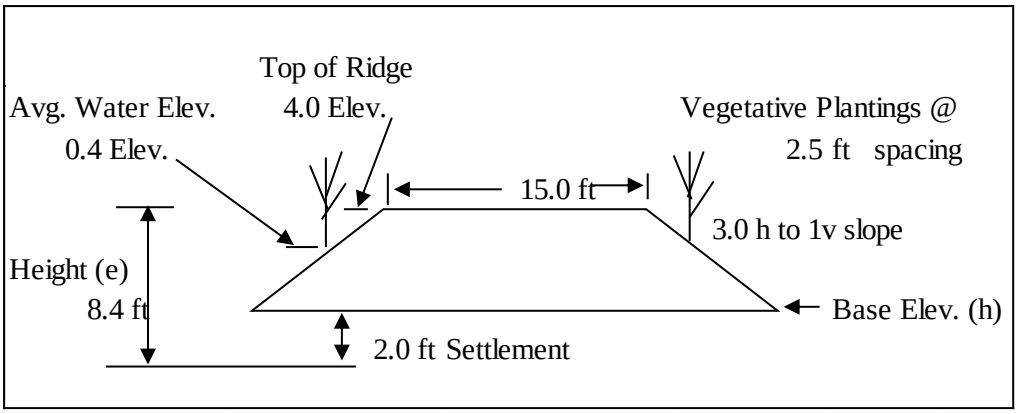


Figure amended from CWPPRA design

North Phase - The North Phase runs along the western shore of Bayou Terre Aux Bouefs from south of Reggio, bypasses the Lake Lery East Shoreline and Marsh Restoration project (BS-17), and terminates near the entrance to Petain Lagoon. It is 9.48 miles long and is segmented where canals are present, allowing for hydrologic continuity.

As project BS-17 bisects the North phase, it creates two mini-reaches which both promote different benefits. The smaller segment above Delacroix would widen and restore broken marshland occurring to the west of Bayou Terre Aux Bouefs (similar in scope to BS-17) and would provide additional erosion protection and reduce potential flooding events along Delacroix Highway. The northern reach would provide the greatest storm surge protection from southern storms for Delacroix; protect northern interior marshlands from further degradation and salinity intrusions; and would rebuild the eroding western and southern shoreline.

At the end of construction activities, 61.4 acres of marsh including 17.2 acres of ridges would be created in this phase.

Funding Strategy and Sources *- This project would be a reasonable complement to the CAP 206 request in the South Phase. CPRA will be difficult to approach given the lack of inclusion in the recent master plan. However, an additional request under 206 or one of the other USACE programs or a request under CWPPRA under a future round sponsored by the USACE would be advisable.*

South Phase – The South Phase runs along the western and southern shore of Bayou Terre Aux Bouefs and aligns with the Central Phase to the west and continues until the ridge begins to become noticeably less pronounced near Pumpkin Bay and Drum Bay. It is 9.80 miles long and is segmented where canals are present, allowing for hydrologic continuity.

It is anticipated this reach would provide the greatest benefit to the northern interior marshlands and would help prevent further fragmentation as a result of storm surge and wave action. It would rebuild the eroding western and southern shoreline, with 63.4 acres of marsh including 17.8 acres of ridges created at the end of construction activities.

Funding Strategy and Sources *- This project is currently included in the CAP 206 request. CPRA will be asked to lend support to this project in the form of follow up with USACE representatives. Should the 206 project prove fruitless future CWPRRA rounds would be a good match.*

Bayou Gentilly Armoring – It is also recommended that the shoreline erosion measures (e.g., rock armoring) be installed at the intersection of Bayou Terre Aux Bouefs and Bayou Gentilly to prevent any additional erosion. Currently, that area has eroded and is subjecting Delacroix Island to significant wave energies.

Funding Strategy and Sources *– This project is a good fit to attract funding via GOMESA, due to its resiliency component, and would also compete well for NRDA and RESTORE Act funding.*

Projected Costs

Preliminary construction costing was performed based on recent field data collected for the Bayou La Loutre Ridge Restoration project found in CWPPRA's PPL26 and professional judgement. P/E&D, CM, and O&M costs were derived based on estimated construction costs and were prepared using methodologies outlined in the 2012 CPRA Master Plan. It is important to note construction costs were built upon recent bathymetry depths collected along Bayou La Loutre and future planning efforts may be required to further refine these details.

Phase	Length [mi]	Average Width [ft]	Construction	w/25% Contingency	P/E&D	Construction Management	O&M	$/LF	Total
North	9.48	262.64	$ 6,477,000	$ 8,097,000	$ 648,000	$ 324,000	$ 1,295,000	$129.40	**$ 10,364,000**
South	9.80	382.47	$ 6,696,000	$ 8,369,000	$ 670,000	$ 335,000	$ 1,339,000	$129.41	**$ 10,713,000**
							Total Ridge Restoration		**$ 21,077,000**

Phase	Length [ft]	Construction	w/25% Contingency	P/E&D	Construction Management	O&M	Total
Bayou Gentilly	3000	$ 4,650,000	$ 5,812,500	$ 465,000	$ 232,500	$ 697,500	**$ 7,207,500**

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

This project was not included in the 2012 CPRA Master Plan, though it is being evaluated for inclusion in the 2017 update. The footprint of this project connects with CIAP project BS-17, abutting the boundaries of BS-17 to the north and south along Bayou Terre Aux Bouefs and is consistent with ridge restoration concepts found in the CPRA Master Plan (such as 001.RC.01- Bayou La Loutre Ridge Restoration), the LPBF Multiple Lines of Defense Strategy, and the MRGO Restoration Plan.

Potential Risks, Mitigation Measures, and Permitting Requirements

The largest risk to this project is potential for resource agencies to require mitigation for any existing wetlands that may be impacted by rebuilding the ridge. Before construction, pipelines will have to be identified, and due to the high probability of encountering archeological sites, a cultural resource survey will have to be performed. In addition, required permits will include a CUP and section 404 Permit. Depending on the dredging and filling approach, costs associated with mitigation may also be incurred. It is not anticipated this project would incur any adverse impacts to local hydrology as existing gaps along the ridges would be maintained and as the hydrologic connections will remain open, sediment and freshwater from the Caernarvon Diversion will still be able to reach the area.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Project Name

Point Aux Marchettes
Shoreline Protection and Terracing

Project Priority

Tier 1

Current Status

The project was submitted for consideration under CWPPRA PPL 26 (2016) but did not advance

Project Location

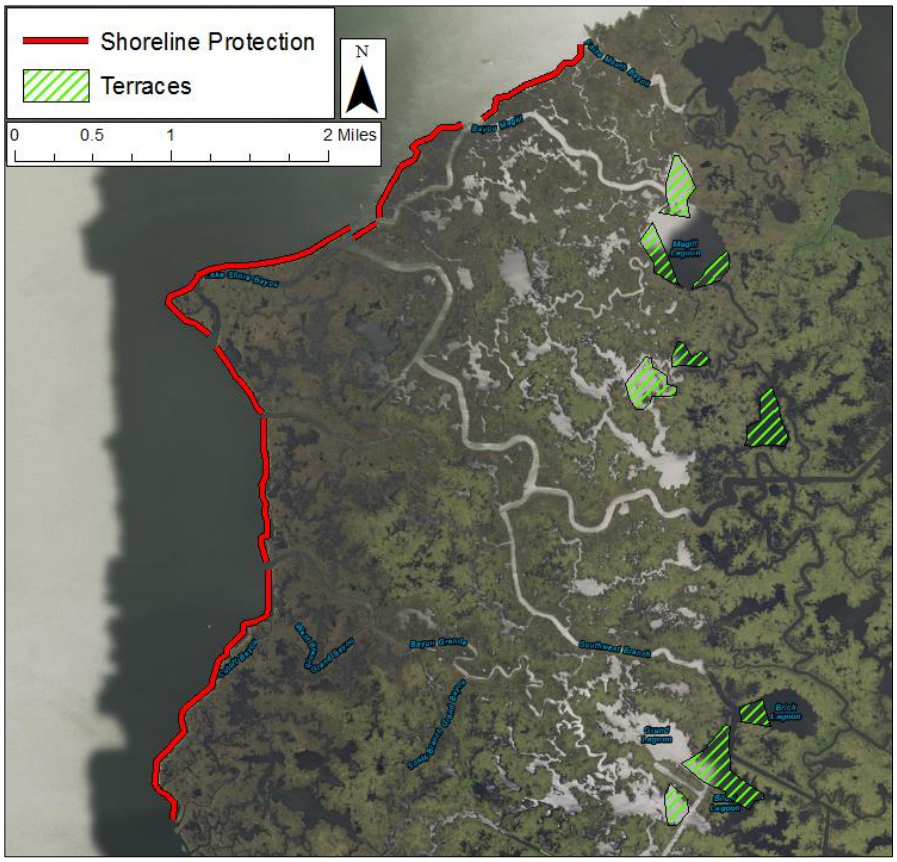
Western shoreline of the Biloxi Marsh complex

Problem

Shoreline erosion has destroyed over 600 acres of marsh in the subject area since 1998 and is projected to continue at a rate of anywhere between 10 feet/year to 95 feet/year going forward. The shoreline along the subject area is particularly valuable because it protects approximately 500 acres of marsh in the Biloxi Marsh Wildlife Management Area and serves as critical habitat for a number of wildlife species. Wave energy from Lake Borgne threatens the shoreline along this critical section of the complex and will continue to degrade the interior ridges and marsh if protective measures are not implemented immediately.

Previous Planning Efforts

The proposed project was initially scoped by the US Fish and Wildlife Service as part of the CWPPRA PPL 26 process. The project is also a high priority for the Biloxi Marsh Lands Corporation.



Recommended Solution

The proposed project would: (1) protect approximately 41,000 linear feet of critical shoreline; (2) protect approximately 522 acres of highly productive brackish marsh habitat; and (3) create 100 acres of marsh terraces in targeted open water areas. Additionally, the project would create or improve habitat for rare species, species of concern, and/or endangered species. Such species include the *Least Bittern, Black Rail, Mottled Duck, Brown Pelican, King Rail, Louisiana Eyed Silkmoth, and Saltwater Topminnow.*

Projected Costs

From preliminary estimates generated under CWPPRA PPL 26, it is estimated this project would cost approximately $20-25 million.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

The proposed project is consistent with the 2012 CPRA Master Plan (which included the construction of 57,000 ft of rock breakwaters along the eastern shore of Lake Borgne) and other regional and local coastal restoration efforts. This project, combined with the Central and East Phases of Bayou La Loutre Ridge Restoration to the south and North and South Shell Beach Marsh Creation efforts to the west, would help create a buffered environment for much of the Biloxi Marsh complex.

Potential Risks, Mitigation Measures, and Permitting Requirements

The proposed project would require a CUP and would include potential issues such as existing oil/gas pipelines in the Lake Borgne area and disturbance of critical habitat of the Atlantic Sturgeon.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Funding Strategy and Sources *- This project will likely be up for consideration under the CWPPRA program again in 2017. Should this fail, this project constitutes a reasonable request to CPRA.*

Project Priority

Tier 2

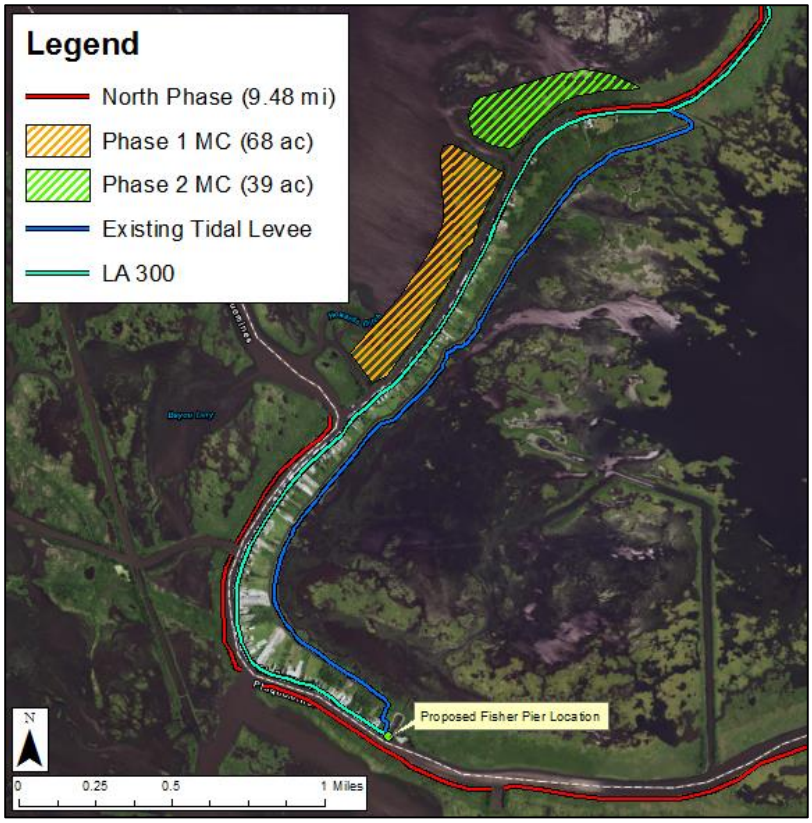
Current Status

Improvements to LA 300 are set to begin before the end of 2016

Project Location

Delacroix Island, St. Bernard Parish

Problem



As noted in the 2012 St. Bernard Master Plan, Delacroix Island is an important resource to the future of St. Bernard Parish.

It is a critical economic, cultural and social component of the parish, serving as a link between the levee-protected centralized business centers, where most of the parish's population, businesses and commercial and industrial development is concentrated, and the outer marshes and bayous, whose renewable and non-renewable resources contribute greatly to the economy of the parish, state and nation. In addition, it is also well suited as a strategic staging area for rapid and sustained response to emergency situations, such as boating accidents, petroleum well blowouts and oil and hazardous materials spills in the surrounding estuarine marsh environment, the Chandeleur Sound, the Breton Sound, and nearshore Gulf east of the Chandeleur Islands.

The area is also subject to flooding from storm surge and will require management, restoration, and flood protection measures if the area is to remain viable. Land loss and rising sea level will challenge the future viability of Delacroix Island and necessitate on-going adjustments in local coastal and flood protection measures and implementation of best management for infrastructure development.

With its configuration of boat launching and docking facilities, seafood off-loading areas, intricate network of tidal channels, and close proximity to prime natural resource harvesting areas and inshore oil and gas fields, Delacroix Island already possesses important infrastructure and assets, and further economic development and coastal protection activities, would prove to enhance services available for the area's inhabitants as well as provide additional revenue streams for the parish.

Previous Planning Efforts

The importance of overall protection and restoration measures regarding Delacroix Island has been called out in previous reports and plans such as the 2012 St. Bernard Master Plan.

Recommended Solution

Based on forecasted funding sources, anticipated need, and available data, it is recommended to split up the overall Delacroix Island protection and restoration scheme into narrowly-defined components, which should allow for faster implementation and easier constructability. In this strategy, the resiliency plan was split up in discrete components involving: (1) the existing tidal levee protecting the eastern side of Delacroix Island, (2) LA 300, the state highway which connects Delacroix Island to the upper reaches of the Parish, and (3) a component involving growing the economic, tourism, and recreational capabilities of Delacroix Island.

LA 300 Component - LA 300 connects the upper reaches of the Parish to local fishing villages and is the only vehicular route which provides access to Delacroix Island. As such, protection and maintenance of this thoroughfare is critical, both for protecting the livelihoods and industry built out of Delacroix Island and for providing a means of egress in the event of emergency.

Abutting Bayou Terre Aux Bouefs to the western side, select portions of LA 300 sit dangerously low, often times becomes inundated after large rain or storm events, and various sections suggest that existing bulkheads are no longer functioning properly at adequately preventing erosional forces from further eroding away at the road foundation. The LaDOTD currently has plans to renovate specific sections of road that have been identified. SBPG is interested in coordinating with the LaDOTD to raise sections of LA 300 where needed.

Projected Benefits - This component would raise low-lying sections of LA 300 to prevent flooding and further erosional impacts.

Projected Costs – This project should not have any associated costs required of the Parish.

Potential Risks, Mitigation Measures, and Permitting Requirements – As LaDOTD is acting as the lead, it is not expected that SBPG will be incurring any potential risks or will have to produce relevant permits for this component.

Funding Strategy and Sources *- This component will be funded via LaDOTD.*

Economic, Tourism, and Recreational Component - The Louisiana coast, in general, is very popular for recreation, especially activities such as fishing, sight-seeing, boating, camping, and bird watching. Continued redevelopment of marinas, overnight accommodations, boat ramps and bait shops, fishing charter boat operations, ecotourism guide operations, and other water-oriented activities in St. Bernard Parish will further provide opportunities for residents from the parish, the GNO Metropolitan Area, and tourists to access the wetlands and waterways for recreation and education.

With Louisiana currently experiencing one of the higher wildlife-associated recreation participation rates of the nation according to periodic surveys published by the U.S. Fisheries and Wildlife Service, Delacroix Island, with its unique position as one of the southernmost boat launches, is a prime candidate where further development of the existing infrastructure, facilities, and programs could return immediate economic benefits for the Parish and its citizens.

In this submittal, a plan detailing the implementation of a proposed fishing pier in Delacroix is described herein, as part of the “Recreational Fishing Pier and Public Seafood Market/Pavilion” project.

Projected Benefits - This component would serve to bring in additional money, job opportunities, and traffic into the Parish, and depending on the development strategy, could also serve to restore local environmental issues.

Projected Costs - Project costs would be dictated by the location and nature of the development scheme proposed in a more comprehensive planning effort.

Potential Risks, Mitigation Measures, and Permitting Requirements - Risks, mitigation measures, and permitting requirements would be dictated by the location and nature of the development scheme proposed in a more comprehensive planning effort.

Funding Strategy and Sources *- Given the oyster fishery, recreational opportunities, and historical context, this component would candidate to compete for funding via the RESTORE Act.*

Tidal Levee Component - The existing back levee located on the eastern side of Delacroix Island, constructed mainly as a tidal surge barrier, may be experiencing the effects of subsidence and sea-level rise, in addition to coastal erosion effects, causing the levee to lose its effectiveness in protecting Delacroix Island from inundation.

Upon inspection, the back levee appears to be in very good condition as (1) there are no apparent washouts or erosional areas on the flood or protected sides of the levee, (2) the toe of the flood side has significant mixed scrub-shrub vegetation growth present, and (3) most of the adjacent area is marsh. In the past, armoring the front edge of the flood side via placement of rock or rubble stone has been proposed, but due to the current healthy condition of the levee and extensive and prohibitive wetland mitigation costs that would likely result, other protective measures may warrant consideration.

Many times armoring is done on the back side of the levee to prevent erosion to the levee when an over-topping event is incurred, as seen with Hurricane Katrina; however, any placement of material on the levee, be it flood side, protected side, or crown, is problematic as it increases the cost of future lifts as the armoring must be removed in order to do so. Furthermore, armoring can cause levee failures if the soils are too weak to support the additional weight of the rocks/rubble.

At this time, it is expected the most economical, readily available, and beneficial method would be maintaining the flood side toe of the levee with robust vegetation and through possible implementation of utilizing living shoreline products in areas of adjacent open water. Should armoring the back levee be desired, it would need to be initiated with a comprehensive geotechnical, wave/surge modeling, and engineering analysis to ensure that such a project does not do more harm than good.

Projected Benefits - This component would make the back levee more resilient in in the face of severe erosional events and could reduce the inundation of Delacroix Island during future storm events.

Projected Costs - After identifying the conditions of the flood side toe and surveying the existing vegetation, it is expected that the plantings should not have large associated costs and would be a good candidate for volunteering opportunities. At an estimated cost of $300/ft, projected costs for providing adequate protection

for the entirety of the 2.75 mile levee via living shoreline products could be expected to near $4.5M. The cost for a comprehensive engineering evaluation such as this likely falls within the $400-600K range, which would inform the ultimate advisability, feasibility, and cost of any armoring effort.

Potential Risks, Mitigation Measures, and Permitting Requirements - There are no known risks associated with the additional plantings of this component; however, work on the flood side of the levee, be it armoring the levee or installing living shoreline products, would require permits and may incur mitigation costs depending on the impact to wetlands during installation and construction.

Funding Strategy and Sources *– It is expected that this component may be eligible for funding via the Direct Component of the RESTORE Act under the scope of coastal flood protection and related infrastructure. Another good fit for the levee component would be the NOAA Regional Coastal Resilience program.*

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

The armoring of the tidal back levee was submitted for inclusion into the 2017 Master Plan, but will not be included in the update due to inconsistencies in scope with the principles and objectives of the master plan. The components proposed herein for Delacroix Island interplay well with some of the other proposed projects, namely the Armoring of Bayou Gentilly, the North Phase of the Bayou Terre Aux Bouefs Ridge Restoration, Phases 1 and 2 of the Lake Lery Rim Restoration and Marsh Creation, and the Recreational Fishing Pier and Public Seafood Market/Pavilion projects.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

It can be safely be said that Delacroix Island was one of the areas most impacted by the Deepwater Horizon oil spill. Due to its overwhelming reliance on the Gulf for much of its revenue, much of the area became financially burdened until well after the cleanup efforts were completed. In addition, many of the wetlands that protect Delacroix Island and serve as a buffer for strong storm events were irreconcilably affected, thus threatening the future well-being of Delacroix Island. These components would allow Delacroix Island to financially recover some of its lost revenue and bolster the existing defenses of the area, providing a positive outlook for its overall viability.

Project Name

Oyster Barrier Reef Installations (in accordance with 2012 CPRA Master Plan)

Project Priority

Tier 2

Current Status

Ongoing construction efforts for the Living Shoreline Demonstration (PO-0148) and Biloxi Marsh Living Shoreline (PO-0174) projects are underway to show what potential reef strategies are most effective in reducing shoreline recession and supporting good oyster recruitment and survival.

Project Location

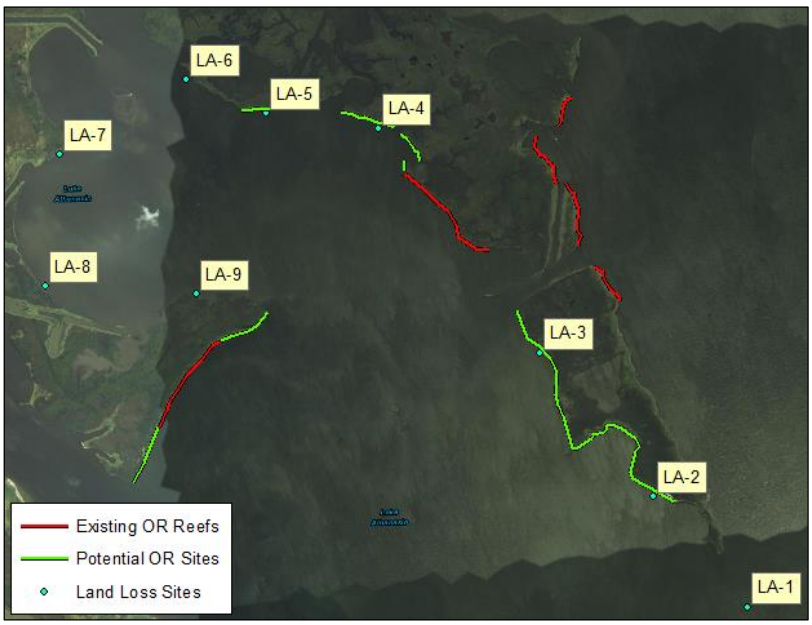
Parish-wide shorelines

Problem

The shoreline along the Breton and Chandeleur Sounds are among the first to receive high energy waves from oncoming storm surges and serve as protective buffers for further inland marshes. However, without an active deltaic supply of sediment, these areas annually suffer net land losses from erosion, subsidence, and sea level rise. With the progression of continued land loss, further inland marshes will be subject to greater risks associated with highly erosional storm events. As such, new and old technologies alike are being constructed to slow down the rate of land loss, with hopes of even potentially rebuilding previously lost land.

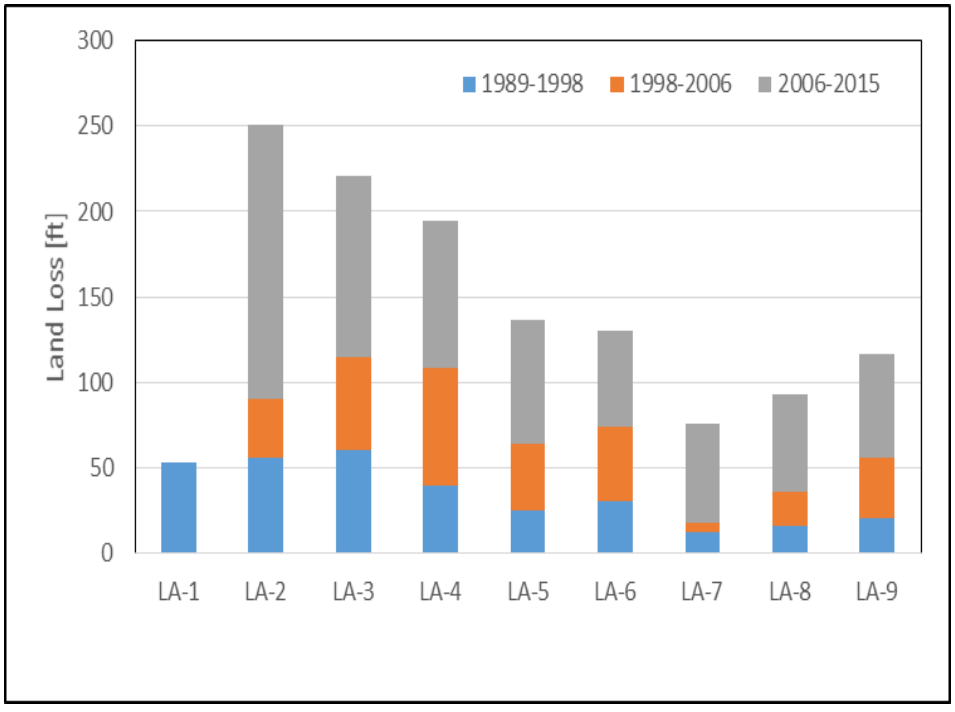
While there are a multitude of approaches used for shoreline protection, recent focus on the use of natural and self-sustaining systems has promoted the development of oyster barrier reef systems as they may combat marsh erosion by altering water flow patterns, attenuating wave forces, and trapping and stabilizing sediment. Of particular value is that oyster reefs may provide a long-term sustainable solution as they can be self-sustaining, and can produce a hard structure of calcium carbonate, allowing individual oysters to bond together and build and re-build biogenic carbonate reefs in estuaries.

Lake Athanasio / Lake Eloi – Various undertakings by numerous agencies utilizing different oyster barrier reef methodologies have been undertaken for the Lake Athanasio and Lake Eloi areas, though recording, monitoring, and sufficient documentation may be lacking and unreported. Below is a table listing the well-documented projects by project lead, date of construction, reef technology, location, and length. In all projects The Nature Conservancy (TNC) acted as project lead.



An imagery review of the shoreline from 1989 to 2016 illustrates the limits and extent of the shoreline retreat seen in the Lake Athanasio area with the southern and eastern shorelines showing the greatest rates of land loss. Though subsidence and sea-level rise have some factor in the erosion rates, these southern and eastern shorelines also receive more wave energy than the relatively sheltered western and northern reaches of Lake Athanasio; therefore, these areas would likely be good candidates for oyster barrier reef projects. Recent salinity values suggest these areas would also be feasible for oyster viability and propagation as well. The figure and table below show the existing oyster reef projects, land loss sites and corresponding rates used in the desktop analysis, and suitable sites for further oyster reef implementation.

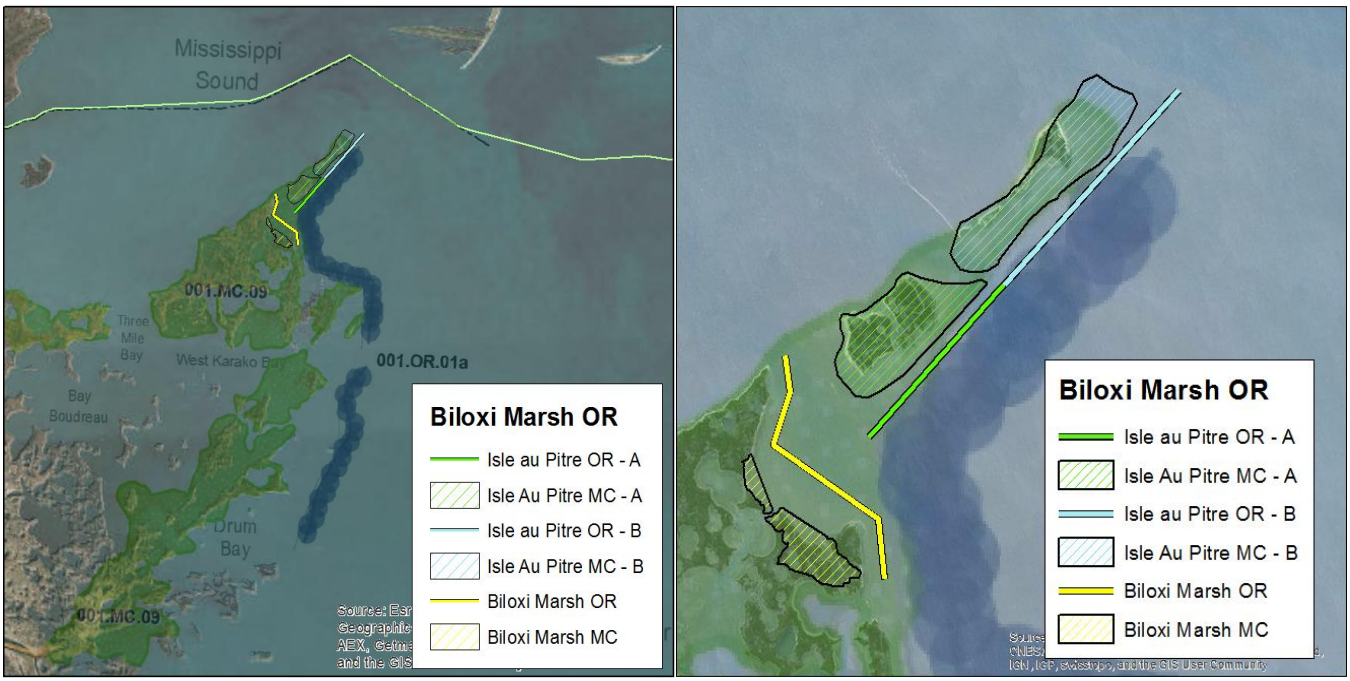
Project Lead	Date Constructed	Reef Technology	Approximate Location	Length [mi]
TNC	Mar-12	ReefBlk	29°45'23.8"N, 89°26'25.8"W	1.11
TNC	May-14	OysterBreak	29°44'40.9"N, 89°28'06.4"W	0.50
CRCL, TNC	TBD-16	Bagged Oyster Shells	29°45'21.1"N, 89°26'56.6"W	0.50



<u>Lake Machais / Lake Fortuna</u> – To date, the only documented oyster barrier reef project constructed in the Lake Machais and Lake Fortuna region was constructed by TNC in March 2012 and consists of 1.89 miles of protection via ReefBlk technology at approximately 29°40'25.9"N, 89°31'42.2"W.

In a study comparing the effectiveness of current oyster reef barriers in the Gulf of Mexico region, several sites in the Lake Machais and Lake Fortuna areas were modeled for feasibility and effectiveness of utilizing oyster barrier reefs (La Peyre et al., 2015). In the study, it was determined sites along the eastern shores of Lake Machais and Lake Fortuna would likely be suitable for project implementation due to higher shoreline exposures (which would corresponding with the greatest reduction in marsh edge erosion) and favorable oyster habitats of those areas. The most suitable areas found in the study were sites located on the eastern shoreline of Lake Machais and Lake Fortuna though select sites located along the western boundaries were also found to be fair locations.

Biloxi Marsh – Previous planning efforts related to the restoration of the Biloxi Marsh/Oyster Bay have been undertaken. In addition to inclusion in the 2012 CPRA Master Plan, related projects have also been submitted for inclusion to federal funding through the CWPPRA Task Force. The length and location of proposed oyster barrier reefs have differed in these previous planning efforts, in addition to the anticipated marsh creation benefits and cost estimates. The main details of the previous planning efforts can be found in the table below, and the location of the proposed efforts (superimposed over corresponding 2012 CPRA Master Plan projects) can be found in the below figures.



Source Material	Date	Agency	Proposed Features	Cost
CWPPRA PPL26 (Biloxi Marsh Oyster Reef and Marsh Creation: Option A)	2016	EPA	-Creation of **2.8 miles of oyster barrier reef** substrate along the northern top portion of Biloxi Marsh -Creation and nourishment of 263 acres of emergent marsh with dredged material from Chandeleur Sound	$21.00M
CWPPRA PPL26 (Isle au Pitre Oyster Reef and Marsh Creation: Option A)	2016	EPA	-Creation of **1.80 miles of oyster barrier reef** along the southern half of Isle Au Pitre -Creation and nourishment of 535 acres of emergent marsh with dredged material from an offshore borrow site.	$25.00M
CWPPRA PPL26 (Isle au Pitre Oyster Reef and Marsh Creation: Option B)	2016	EPA	-Creation of **2.51 miles of oyster barrier reef** along the northern half of Isle Au Pitre -Creation and nourishment of 617 acres of emergent marsh with dredged material from an offshore borrow site.	$30.00M
2012 CPRA Master Plan (001.OR.01a)	2012	CPRA	-Creation of **22.40 miles of oyster barrier reef** along the eastern shore of Biloxi Marsh -Anticipated creation of between 231-257 acres of marsh after 50 years.	$83.75M

Recommended Solution

More monitoring on the long-term effects of already-built structures is needed to properly access the feasibility and effectiveness of the variety of different oyster reef structures that currently exist, but recent research illustrates that oyster barrier reefs, as a whole, reduced shoreline retreat by an average of 1 m yr^{-1} for shorelines in moderate- and high-exposed areas (La Peyre et al., 2015). It is important to note shoreline retreat was only reduced and not reversed (due to subsidence and sea-level rise), hence, oyster barrier reefs may need to be implemented in conjunction with other restoration approaches to prevent no land loss rates.

Projected Costs

Based on previous projects and recent bid submittals, a price of $300/ft is a reasonable estimate to cost out future oyster reefs projects. As such, a one mile stretch of constructed oyster reefs for protection could be expected to cost near $1.6M and a five mile stretch of protection could be expected to cost near $8M.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

In the 2012 CPRA Master Plan, five oyster barrier reef projects were considered for inclusion, but only one (1) project (001.OR.01a) was selected for implementation. The recent CWPPRA projects found in the Biloxi Marsh are all designed based upon the Biloxi Marsh Oyster Reef project (001.OR01a) presented in the State's 2012 Master Plan and synergize with the Biloxi Marsh Creation project (001.MC.09) to create new wetland habitat, restored degraded marsh, and reduce wave erosion. No projects regarding the Lake Athanasio or Lake Machais areas were found in the 2012 CPRA Master Plan, though oyster barrier reef projects in those areas may be able to coincide with the Biloxi Marsh Living Shoreline and Living Shoreline Demo projects.

Potential Risks, Mitigation Measures, and Permitting Requirements

It is critical that any project of this nature use the correct product and place it in the correct location otherwise the project will not be successful. There will have to be significant review of ongoing efforts by the design team to ensure the correct solution is applied for each area of concern. Drawing from permits for the living shoreline demonstration project (PO-0148), pipelines and existing oyster leases will need to be identified. In addition, dredging and sub-sequent backfilling operations will likely need to enacted and permitted for based on the water bottom depths of the selected project sites.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

Although the Biloxi marsh, Lake Athanasio, and Lake Machais areas not receive the heaviest impact of oil contamination as a result of the oil spill, it is expected this project would help reduce erosion rates to select areas where vegetation was inhibited.

Funding Strategy and Sources *– There are several funding options that this particular set of projects could fall under. Included in this list are the Section 14, Section 103, Section 111, and Section 206 Army Corps CAPs. Inclusion in a CWPRRA project request would also be a possibility. In addition to public funds there are several private programs as well as USFWS programs and potential partnerships with local oyster interests which should be explored.*

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Project Name

St. Bernard Parish Harbor of Refuge

Project Priority

Tier 2

Current Status

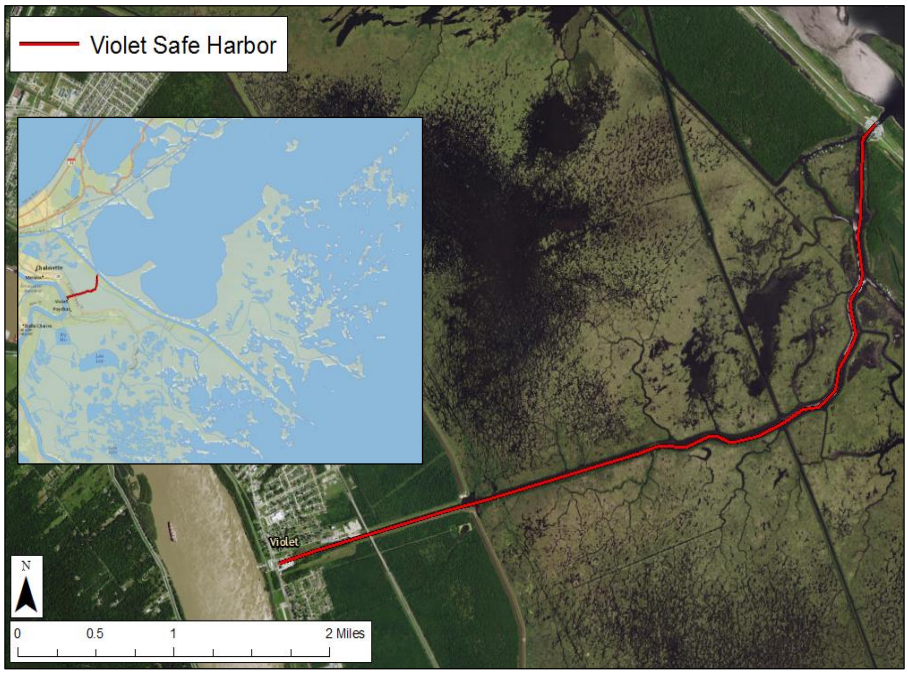
Side sonar is complete and debris removal is going up for bid in 60 days. It is expected this project should be completed by early 2017.

Project Location

The Violet Canal from L.A. Hwy. 46 (St. Bernard Highway) at the Mississippi River to the Bayou Dupre Flood Control Structure located at the Gulf Outlet on Lake Borgne (approximately 28,000').

Problem

Hurricanes Katrina and Rita flooded, destroyed, damaged, and floated an estimated half a million boats, trucks, busses and aircraft in Louisiana along with thousands of docks, piers, boathouses and pilings. While several hundred thousand vessels have been removed by insurance companies, other large boats and Coast Guard registered vehicles were left as abandoned and submerged where they currently still cause unsafe nautical navigational conditions for pleasure and commercial boaters in the Violet Canal.



Previous Planning Efforts

N/A

Recommended Solution

Prepare plans and specifications for the SBPG to administer public advertisement and bid for the removal of such debris including designated damaged piers, docks, boathouses, piles, crab traps and abandoned/wrecked vessels from the said canal limits and based on the survey/side scan sonar results of above and below water surface and actual field observations from above water. Plans and specifications will include: spatial locations and photos of said debris/removal vessels, coordination with legal and the Louisiana Department of Wildlife and Fisheries (LDWF) on vessel abandonment, cross-sections of canal, removal methods, disposal methods and sites, environmental requirements, permit requirements, estimated quantities of all debris, and project specifications.

Projected Benefits

Once completed, this project would allow for safe navigational conditions along the entirety of Violet Canal, which would reduce the likelihood of vessel accidents while also increasing tourist and recreational traffic.

Projected Costs

From gathered estimates of probable costs from contractors, it is estimated this project would cost between $500K to $1M to clear the canal of all posed hazards.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

N/A

Potential Risks, Mitigation Measures, and Permitting Requirements

It is not expected the Parish would incur any significant risks or require mitigation measures or permits for this project.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Funding Strategy and Sources *- United States Department of Housing and Urban Development is providing project funding through the Community Development Block Grant (CDBG) program.*

Project Name

Recreational Fishing Pier and Public Seafood Market/Pavilion

Project Priority

Tier 2

Current Status

This project is currently in the early planning phase

Project Location

Shell Beach and Delacroix

Problem

St. Bernard Parish is home to some of the most dynamic recreational fishing in the state of Louisiana. However, there are very few areas available for the public to safely fish from the shore. There is also limited available space for commercial fishermen to engage in the sale of fresh seafood or for the general public to congregate near the water for family gatherings or other events.

Previous Planning Efforts

N/A

Recommended Solution

The proposed project includes the construction of two fishing piers (one at Shell Beach and one at Delacroix). These sites were selected near popular fishing destinations where citizens will be able to enjoy a good fishing experience while remaining safely onshore. Additionally, the project includes the construction of a public

seafood market and pavilion at the opposite end of Shell Beach, where citizens would have an opportunity to purchase seafood directly from commercial fishermen or have family gatherings and other events near the water.

Projected Benefits

This project would bring tourism to the furthest extents of the Parish, highlighting the strengths of St. Bernard's fishing industry while also providing expected economic benefits.

Projected Costs

A preliminary estimate of $1M has been proposed for this project.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

N/A

Potential Risks, Mitigation Measures, and Permitting Requirements

This project would not be expected to incur any significant risks or require mitigation measures or permits.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

Following the oil spill, the seafood industry of the Parish, from recreational to industrial to commercial components, was immediately decimated, with some areas taking years to recover. In that time period, St. Bernard Parish (in addition to Louisiana as a whole) saw a sizeable loss in its overall business share of the seafood industry, as both fish stocks and trust in the decontaminated product faced a slow recovery. This project would help illustrate that the seafood industry of the Parish is once again thriving and would spur economic growth to the areas hardest hit from the spill.

Funding Strategy and Sources *- As an economic driver in a rural area this project would be a good fit for Economic Development Agency and USDA rural development program funding. This project would also be able seek via funding under the Direct Component of the RESTORE Act as it promotes tourism via recreational fishing and also promotes the consumption of seafood harvested from the Gulf Coast Region.*

Project Name

Paris Road Corridor Welcome Center and Streetscape Enhancement

Project Priority

Tier 2

Current Status

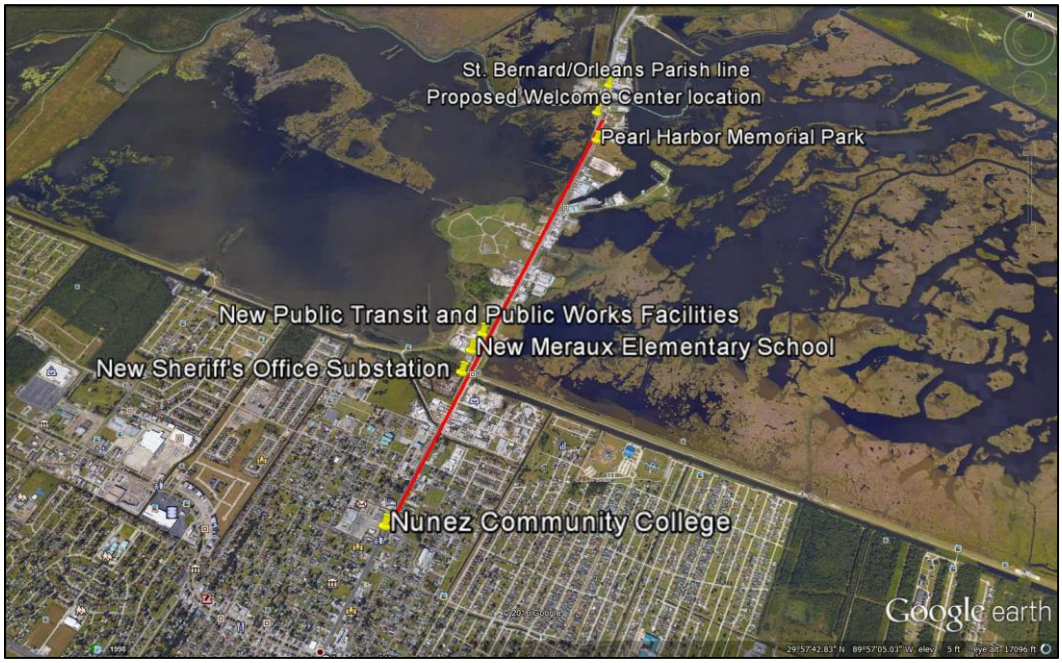
This project is currently in the early planning phase, though the Parish has secured a site for the new welcome center

Project Location

Paris Road between the St. Bernard/Orleans Parish line and Nunez Community College

Problem

Paris Road runs through the Central Wetlands Unit (CWU) of St. Bernard Parish and connects Chalmette to the federal interstate system, and is one of only three thoroughfares connecting St. Bernard Parish to New Orleans with the other two entrances including St. Claude Avenue and Judge Perez Drive. While the other two entrances have been enhanced in some way (a significant streetscape enhancement project is currently underway along St. Claude and both the St. Claude and Judge Perez Drive entrances are located near the Jackson Barracks Louisiana National Guard facility which has recently undergone renovations. However, the Paris Road entrance remains the only point of entry in St. Bernard Parish that has not been enhanced in some way during the Hurricane Katrina recovery, and the current presence of industrial and commercial facilities accentuated along the route illustrate the area has been developed in the absence of a well-conceived plan.



In different respects, the geographic location of Paris Road is both an asset and a liability. The thoroughfare was constructed through the marshes of the CWU and across Bayou Bienvenue, officially designated a part of the Louisiana Natural and Scenic Bayous System, allowing drivers a skyline view of the downtown New Orleans through the marsh on the western side of the CWU. A number of newly-constructed public facilities line the Paris Road corridor, including a Sheriff's Office substation and state-of-the-art elementary school, and

Nunez Community College also recently completed construction of its new administration building along Paris Road. In addition, the Pearl Harbor Memorial Park, one of the few Pearl Harbor memorials in the lower 48 states, is also located on the eastern side of Paris Road.

Rendering of the St. Claude Avenue Streetscape Enhancement Project

However, despite its scenic location and the significant amount of public investment that has occurred along Paris Road since Hurricane Katrina, the overall appearance of the thoroughfare remains substandard, largely due to the predominance of industrial and commercial facilities along the corridor. Such facilities include concrete recycling facilities, mechanic shops, scrap metal yards, and the like. Marine debris from the 2005, 2008, and 2012 hurricane seasons is scattered throughout the marshes adjacent to the thoroughfare, detracting from the natural beauty of the CWU and Bayou Bienvenue. The SBPG also maintains its waste transfer station on the west side of Paris Road.

To move the corridor forward and help promote the coastal resources available within the Parish, the SBPG is interested in accentuating the natural features and updated public facilities along Paris Road while also mitigating some of the unsightly consequences associated with industrial and commercial activity in the area. The purpose of this endeavor will be to beautify this entrance into the Parish and provide a suitable space for a welcome center. Ideally, existing public spaces and rights-of-way would be utilized to the extent possible. The SBPG is interested in engaging a number of public and private partners along Paris Road in order to scope, fund, and execute the project.

Previous Planning Efforts

The Paris Road Gateway, in which the corridor would become the focal point for marketing coastal related assets of the St. Bernard – Orleans Parish region to tourists and the public at large, was first proposed in the St. Bernard Coastal Restoration Plan (2012). In the Restoration Plan, multiple strategies were suggested, including a visitor center and museum complex describing the history of the area and the resiliency of its people. Also included was waterfront development such as restaurants and docking for commercial and recreational fishing boats, in addition to other businesses that would serve and promote recreational interests.
Currently, SBPG has set aside over $1 million in FEMA Public Assistance (PA) funds for the construction of a welcome center. A site for the new facility has since been identified and secured. Additionally, streetscape enhancement along Paris Road was included in the 2014 SBPG Comprehensive Master Plan.

Recommended Solution

SBPG proposes to leverage FEMA PA funds and utilize the site it has already secured along Paris Road to construct a welcome center. The streetscape enhancement component of the project would include new lighting, landscaping, trees, and signage, as suggested in the 2014 SBPG Comprehensive Master Plan. This portion of the project would be consistent with what is currently being installed along the St. Claude corridor.

Finally, SBPG proposes a complete sweep of all marine debris within one-hundred (100) feet of the western shoulder of Paris Road.

Projected Benefits

With its construction, it is anticipated the project will increase awareness that St. Bernard Parish is a fun outdoor destination with an abundance of safe seafood, water and nature based activities to be enjoyed by the entire family, promote St. Bernard Parish as a unique and authentic coastal Louisiana destination, and assist in elevating the positive images of the state and Parish from a visitor perspective.

Projected Costs

A preliminary estimate of $4M has been proposed for this project.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

The 2012 CPRA Master Plan did not include any land development projects in either implementation period, but this project does align with other similar projects located within the Parish including the CWU and Forty Arpent Canal Access and Enhancement Project.

Potential Risks, Mitigation Measures, and Permitting Requirements

Risks, mitigation measures, and permitting requirements would be dictated by the location and nature of the development scheme proposed in a more comprehensive planning effort.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

Following the oil spill, much of the Parish suffered economically as St. Bernard's overall revenue fell, due mainly to its reliance on water-related activities as a sizable percentage of its overall capital-generation stream. The Parish was forced to engage in the cleanup efforts and saw a drop in the normal tourism dollars as people travelled elsewhere. This project would help increase awareness of the activities and industries offered by St. Bernard Parish, helping to spur the overall economic recovery of the area while also highlighting the coastal issues currently affecting not just the Parish, but also the entire Gulf.

Funding Strategy and Sources *– This project will create a number of benefits ranging from multi modal and non-vehicular traffic access to roadway beautification. Transportation Alternative Program (TAP) funds through the state, as well as funding through some of the USDA and EDA programs, should be explored. This project may also be a good fit for several components of the RESTORE Act, namely the Spill Impact Component, as it is anticipated this project would contribute to the overall economic recovery to the area.*

Project Name

Central Wetlands Cypress Reforestation

Project Priority

Tier 3

Current Status

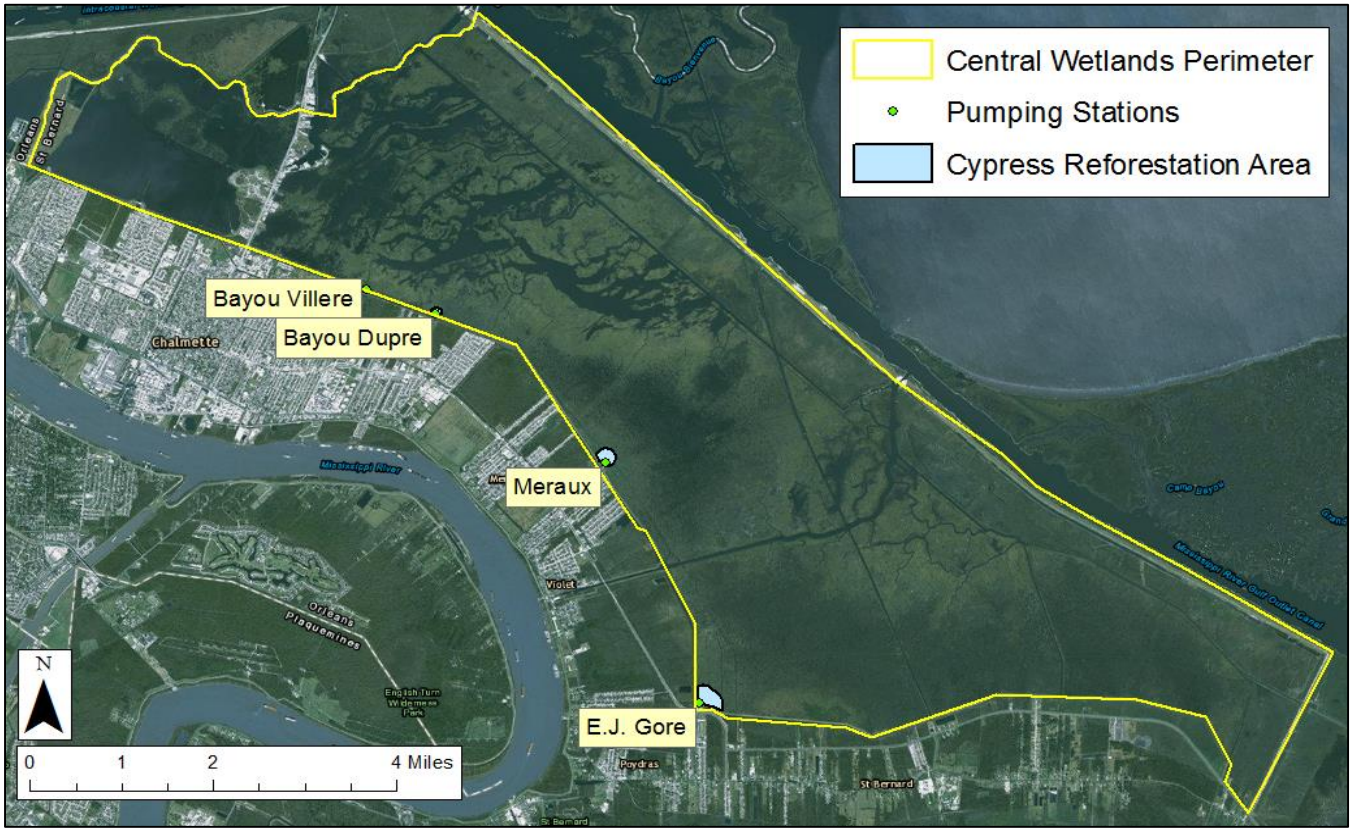
Efforts to reforest favorable sections of the CWU are ongoing including reintroducing freshwater via the effluent of several wastewater treatment plants such as the Riverbend Treatment Facility (PO-0073-1)

Project Location

CWU, St. Bernard Parish

Problem

Before the construction of the MRGO, the CWU, a 29,140-acre semi-impounded unit, was made up of a combination of bald cypress and water tupelo swamps, in addition to fresh marsh and bottomland hardwood forests, which provided natural storm surge protection. However, as a result of the MRGO construction, sea-level rise, subsidence of the land, and recent storm events, much of the area has turned into open water and ghost swamps, with increased salinities in the surface water and soil proving to be the largest factor in wetland loss.



Previous Planning Efforts

A two-year study (Recommendations for Restoration: CWU, Louisiana) was recently concluded in July 2015 where the LPBF collected bathymetric, surface salinity, soil salinity and vegetation data, and developed a series of recommendations for the restoration of the CWU, including swamp reforestation.

A partnership with between the Coalition to Restore Coastal Louisiana, the Restore the Earth Foundation, and the LPBF recently celebrated success planting 10,000 baldcypress trees in the Caernarvon Freshwater Diversion Outfall Coastal Forest. This project, mostly manned through volunteers, provided valuable lessons learned throughout the restoration process, including the need for nutria protection tubes with young saplings and the importance of replanting on stable, vegetated land.

Recommended Solution

As per the recommendations produced in the LPBF study, cypress reforestation projects should only be conducted where the soil salinities of less than 2 ppt can be sustained, due to adverse effects to bald cypress growth and survival at higher salinities. Recent data suggests that surface water salinity levels may be decreasing after the closure of the MRGO, but soil salinities continue to lag behind. In regards to the CWU, the western edge of the CWU generally measured fresher soil salinity levels than the eastern edge, due to fresh surface water availability at the Violet Siphon and levee pump stations. Owing to the fresher salinities near the pump stations along the western edge of the CWU, this area is recommended for possible swamp forest restoration projects to occur near the Bayou Dupre, Meraux, and E.J. Gore pump stations, with a possibility of restoring 5 acres, 17 acres, and 31 swamp forest acres at those locations, respectively.

Projected Benefits

This project would increase the biodiversity and ecological value of the surrounding areas and restore parts of the CWU to previous providing limited storm surge protection and flood water storage during storm events. In addition, this project could help promote awareness for coastal issues.

Projected Costs

It is anticipated this project should not have large associated costs and would be a good candidate for volunteering opportunities. Similar undertaken projects have utilized volunteers for the plantings using donated cypress saplings by the St. Bernard Wetlands Foundation as well as the Restore the Earth Foundation.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

This project was not analyzed for or included in the Master Plan due to its small scale nature. The 2012 CPRA Master Plan did not include any reforestation projects in either implementation period, but this project does align with other cypress reforestation projects including the aforementioned Caernarvon Freshwater Diversion Outfall Coastal Forest and recent efforts of the LPBF and Restore the Mississippi River Delta Coalition which recently planted cypress saplings next to the HSDRRS levee wall in St. Bernard State Park.

Potential Risks, Mitigation Measures, and Permitting Requirements

Due to the low impactful nature of this project, it is not anticipated this project would entail costly potential risks to plan for, necessitate mitigation measures, or require extensive permits.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Funding Strategy and Sources *– This project presents the opportunity to couple public input with private volunteer and foundation efforts and resources. Partnering with the LPBF and other local and national private nonprofits would seem to be a good fit in generating volunteer labor, funding, and resources.*

Project Name

Caernarvon to Verret Floodwall Reforestation

Project Priority

Tier 3

Current Status

The LBPF has been planting cypress trees in the immediate floodwall area since winter of 2013

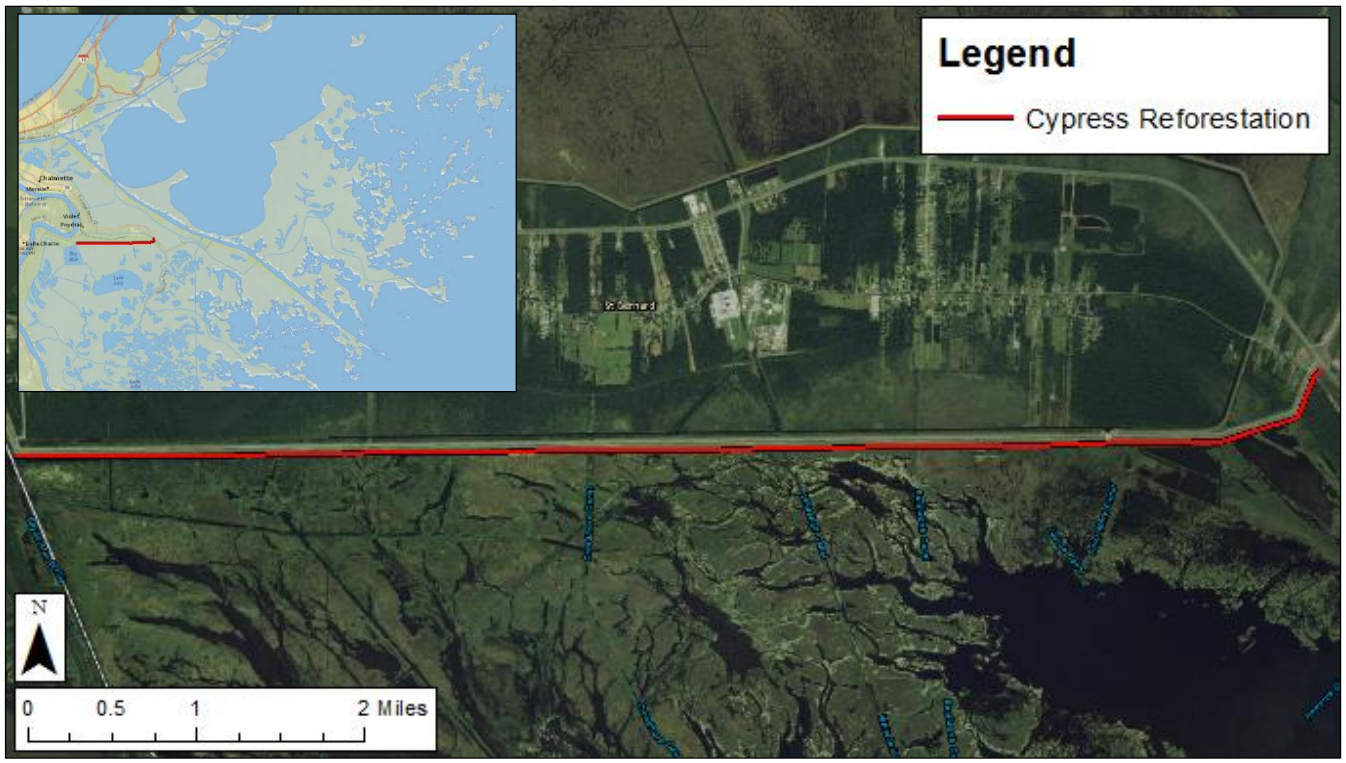
Project Location

Outside of the HSDRRS levee system from Caernarvon to Verret, St. Bernard Parish.

Problem

The hurricane and storm damage risk reduction system (HSDRRS) in St. Bernard Parish, often referred to as the Chalmette Loop or the St. Bernard System, consists of approximately 23 miles of floodwall, from Bayou Bienvenue's intersection with the MRGO in the northeast to the Caernarvon Canal's confluence with the Mississippi River near the Plaquemines Parish line. Completed in 2012, this system currently defends against a storm surge that has a 1 percent chance of occurring in any given year, or a 100-year storm surge.

However, this HSDRRS itself has protection itself from the marshes located directly north of Lake Lery which serve as a storm surge buffer for the 8-mile southern portion of HSDRRS levee from Caernarvon to Verret. These marshlands seem to have been richly established with species of willow and cypress on the interior, thus requiring little need for further reforestation which would incur high mitigation costs for little further protection. However, various outer sections of the marsh, which directly abut the toe of the levee system, currently are unforested, potentially exposing the HSDRRS levees to scour from storms. The mere potential for establishing and propagating natural barriers to wave and surge transgression, as well as the multitude of other benefits provided by coastal forested wetlands, suggest that restoration efforts for this area should focus on reforestation of the HSDRRS levee toe in this area.



Previous Planning Efforts

Assessing the protective surge benefits provided by forested wetlands has been difficult to quantify, though it has been the topic of several high profile, recent reports from other regions of the world (Danielsen et al. 2005; Dahdouh-Guebas et al. 2005). It has been shown in the past that mangroves can reduce normal wave height by 1/5 over a distance of 100 m (Mazda et al. 1997) and 150 m of Rhizophora – dominated forest has been shown to dissipate wave energy by 50% (Brinkman et al. 1997) and recent evidence suggests that complexes of forested wetlands and marsh suppress surge by at least 4.2–9.4 cm/km (Krauss et al. 2009). In addition, a recent modeling effort that replaced the wetlands destroyed by the Mississippi River Gulf Outlet demonstrated that flooding of Orleans and St. Bernard Parishes by Hurricane Katrina would have been reduced by 80% in the presence of those wetlands (Shaffer et al. 2009a; van Heerden et al. 2009).

Recommended Solution

The relative hardiness of cypress trees compared to other upland and bottomland hardwood forest species, with respect to resisting hurricane-force winds, has been studied extensively, (Gresham et al. 1991; Hook et al. 1991; Putz and Sharitz 1991; Duever and McCollom 1993; Sharitz et al. 1993; Loope et al. 1994; Doyle et al. 1995; Chambers et al. 2007; Shaffer et al. 2009b) illustrating the importance this species has for coastal Louisiana applications. In addition, cypress trees provide habitat for insects and animals, and as their tangled root masses grow, the plants establish themselves in the soil, limiting erosion while filtering water in the swamp.

In general, successful establishment of baldcypress wetlands in coastal Louisiana is only achievable when projects are coupled with reliable freshwater sources, as studies have shown that cypress trees do not fare well in salinities greater than 2 parts per thousand (ppt). One such reliable source of freshwater is the St. Mary Pump Station (29°51'14.2"N, 89°47'44.5"W) located approximately one mile southwest of Verret and south of Jourdan Canal which now provides the majority of drainage within the incorporated limits of St. Bernard Parish. Recent surface water salinity values obtained from the Coastwide Reference Monitoring System (CRMS), Hydrocoast maps constructed by the LPBF, and recent field excursions suggest that much of the marsh area in question should be suitable for cypress reforestation, as the surface water salinity values are lower than 2 ppt, meeting the recommendations of the LPBF.

The first step in this project should be the identification of prime candidate areas for reforestation (in addition to areas immediately adjacent and downstream of the St. Mary Pump Station) via field excursions. Following this, reforestation should occur utilizing lessons learned from previous cypress reforestation projects, such as planting spacing, using protective sleeves to prevent damage from nutria, and other proven successful measures.

Projected Benefits

This project would minimize future scour erosion of the toe of the HSDRRS levee, help restore the area ecologically to historic levels of cypress forestation, and provide some level of added storm surge protection once the trees reach maturity.

Projected Costs

The associated costs for this project would be mostly driven by whether the project is implemented by volunteer or commercial means and whether the trees for planting are purchased or donated. Similar undertaken projects have found success in lowering costs by utilizing volunteers and using donated cypress saplings by the St. Bernard Wetlands Foundation as well as the Restore the Earth Foundation. However, planting via volunteer means would likely add several additional years to project completion, as opposed to using commercial entities for conducting the plantings.

Depending on the method of project implementation, delineated areas of need, and the required amount of trees required for proper tree densities, the project costs could range from $100K (10% project completion) to $1.5M (100% project completion) using volunteer and commercial means respectively.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

The 2012 CPRA Master Plan did not include any reforestation projects. However, this type of project was below the large-scale level of analysis used to evaluate projects. Additionally, the Master Plan does recognize the benefit of multiple lines of defense and supports creating wetlands adjacent to protection systems. The proposed project does align with other cypress reforestation projects in the area including the Caernarvon Freshwater Diversion Outfall Coastal Forest and recent efforts of the LPBF and Restore the Mississippi River Delta Coalition, which recently planted cypress saplings next to the HSDRRS levee wall in St. Bernard State Park.

Potential Risks, Mitigation Measures, and Permitting Requirements

Due to the low impactful nature of this project, it is not anticipated this project would entail costly potential risks to plan for, necessitate mitigation measures. However, because the plantings would occur on and/or adjacent to a federally authorized project there would need to be significant coordination with the USACE.

As described in ETL 1110-2-583, the USACE has standards regarding the guidelines for landscape planting and vegetation management measures for federal levees which dictates the requirements for a vegetation-free zone (for access requirements and preventing roots from encroaching on the levee system). Before beginning this project, consultation with USACE should occur in which the exact dimensions of the vegetation-free zone are specified as to verify the plantings would reside within acceptable boundaries.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Funding Strategy and Sources *– As with other re-forestation related projects and as noted above, the partnership with local non-profit entities and volunteer organizations should be explored.*

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Project Name

Black Mangrove Shoreline Protection Demonstration Project

Project Priority

Tier 3

Current Status

This project is currently in the early planning phase with an initial site visit scheduled for August 2016. A NOAA Coastal Resiliency Grant application is planned for submittal

Project Location

Biloxi Marsh

Problem

The Biloxi Marsh area functions as a landbridge preventing wave action and storm surge from impacting interior marshes and also provides essential fish habitat and functions as a barrier that controls salinity between adjacent saline and brackish marsh environments; however, due to erosion caused by wave action and storm surge events, the exterior of the Biloxi Marsh is rapidly deteriorating. This increases the likelihood of further deterioration of the interior marshes, ultimately resulting in increased storm surge heights in the Mississippi Sound and Lake Borgne. Protecting the exterior of the Biloxi Marsh is critical to maintaining the integrity of the interior marsh and maintaining the overall functionality of the landbridge.

Previous Planning Efforts

The LPBF recommended in its Multiple Lines of Defense Strategy (2006) that the exterior of the Biloxi Marsh area be protected via artificial oyster reefs, rock armoring, and marsh creation. However, such methods are often cost prohibitive and difficult to sustain. Other more affordable and sustainable means of protecting the Biloxi Marsh are therefore worthy of further exploration.

Recommended Solution

Black mangrove plants perform a number of valuable functions, including: (1) filtering and trapping sediment; (2) cleansing excess nutrients and pollutants; (3) reducing wave energy; (4) providing nursery habitat for crustaceans and fish; (5) providing food for young marine habitat; and (6) providing nesting habitat for birds (Houck & Neill 2009). The intricate root system of the black mangrove provides a woody shoreline structure that is highly resilient, making the plant ideal for shoreline protection efforts.

Black mangroves are sensitive to freezing temperatures and require certain soil and hydrological conditions in order to thrive. This has historically made the establishment of black mangrove stands in the Biloxi Marsh area challenging. However, the plants have adapted to conditions further north than in previous decades, and some stands have already naturally grown along the exterior of the Biloxi Marsh. The range expansion of the black mangrove in coastal Louisiana has been the subject of various studies (Alleman & Hester 2011; Pickens & Hester 2010). The proposed project involves engaging some of the leading experts on black mangroves and scoping a large-scale planting effort along the eastern exterior of the Biloxi Marsh. Additionally, the project involves utilizing volunteers to collect propagules and establishing a local greenhouse for growing black mangroves to an ideal size for use in future plantings,

A healthy black mangrove stand at Gardner Island, St. Bernard Parish

Projected Costs

Based on a previous project conducted by the Coalition to Restore Coastal Louisiana at Port Fourchon, it is anticipated this project would entail a budget between $50K to $100K.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

The project is consistent with the 2012 Master Plan and other similar regional projects, including the ongoing Living Shoreline project (PO-148) and the forthcoming Biloxi Marsh Living Shoreline project (PO-174).

Potential Risks, Mitigation Measures, and Permitting Requirements

Due to the low impactful nature of this project, it is not anticipated this project would entail costly potential risks to plan for, necessitate mitigation measures, or require extensive permits.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

Depending on the location of plantings, this project has the potential to restore areas where oil washed ashore and reduced healthy stands of vegetation.

Funding Strategy and Sources *- Continued partnership with LPBF and other organizations as well as discussions with LDWF should be critical in pressing this project forward.*

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Project Name

Derelict Crab Trap Removal Program

Project Priority

Tier 3

Current Status

It is anticipated a NOAA Marine Debris Removal Grant will be applied to for this project around September 2016

Project Location

Parish-wide

Problem

The Magnuson-Stevens Act defines essential fish habitat as "those waters and substrate necessary to fish for spawning, feeding, breeding, or growth to maturity" (Gulf of Mexico Fishery Management Council 1998, 4). Given the importance of essential fish habitat to various protected species and managed stocks, including the diamondback terrapin, red drum, and grouper, it is critical that stakeholders mitigate potential adverse impacts where possible. The purpose of the proposed St. Bernard Parish Comprehensive Ghost Trap Removal Program is to sustain essential fish habitat by removing derelict crab traps from coastal estuaries in St. Bernard Parish, Louisiana.

The blue crab is one of the most abundant and lucrative fisheries in Louisiana. According to the LDWF, the average annual landing of blue crabs in the state is 44.8 million pounds ($34.7 million value) (Bourgeois, Marx & Semon 2014, 15). Louisiana has accounted for 62% of all blue crab landings in the Gulf of Mexico region since 1968 (Bourgeois, et al. 2014, 16).The abundance of blue crabs in Louisiana has enticed an average of over 8,000 commercial and recreational crab fishers to obtain crab gear licenses each year (Bourgeois, et al., 20 and 25).

It is estimated that crab fishers in Louisiana lose as many as 45,000 crab traps per year (Guillory & Perret 1998). Such "ghost" crab traps are typically lost due to weather conditions or equipment malfunctions. Ghost traps are spread throughout essential fish habitat and have the capacity to trap and kill various protected species and managed stocks while "ghost" fishing. Recent studies of ghost traps in Louisiana have indicated that 65% of all ghost traps are actively ghost fishing and that the diamondback terrapin, 19 different species of finfish (including red drum and grouper), and other aquatic wildlife are all subject to being trapped and killed by ghost traps (Anderson & Alford 2014; Bourgeois, et al. 2014, 28).

Ghost traps are a significant threat to essential fish habitat in the estuaries of coastal Louisiana. The proposed program will mitigate the potential adverse impacts associated with ghost traps by actively facilitating their removal. SBPG will work closely with LDWF and the LPBF, a local nongovernmental organization that has extensive experience with ghost trap identification and removal, to ensure that the program is implemented in the most effective and efficient manner possible.

Previous Planning Efforts

Small scale sweeps have been completed by teams of researchers, but a large-scale sweep of the Parish has yet to be performed and hosted by the SBPG.

Recommended Solution

LDWF, SBPG, and the LPBF will share existing data and engage stakeholders in order to identify ghost trap target sites throughout St. Bernard Parish and develop a schedule (including closure dates) for conducting sweeps. The team will subsequently engage stakeholders and volunteers to perform ghost trap removal in accordance with the established schedule and target areas. Previous ghost trap sweeps conducted by LDWF and LPBF will be used as models for all program sweeps.

Projected Costs

Based on forecasted costs completed by the LPBF, it is anticipated this program would cost around $50K per sweep. Depending on the number of sweeps required, this program would likely run from a low estimate of $50K to a more conservative estimate of $150K.

Consistency with CPRA Master Plan and other Ongoing Regional Efforts

(1) Protected species such as the diamondback terrapin have been threatened by ghost traps for decades (Davis 1942). In fact, most terrapin specialists believe that ghost traps are the single greatest threat to the species (Butler & Heinrich 2005). Managed stocks such as red drum and grouper are also threatened by the presence of ghost traps. The proposed program will mitigate the potential adverse impacts associated with ghost traps by facilitating their removal. (2) The program will consist of multiple ghost trap removal sweeps conducted over the course of three years. Such sweeps will be based on ghost trap surveys conducted by LDWF, SBPG, and the LPBF. Local stakeholders, including commercial and recreational fishers, will also be engaged for the purpose of identifying and removing ghost traps. (3) The measurable impacts of the project will be based on the total number of ghost traps removed from local waterways. The goal of the program is to remove at least 5,000 traps per year over the course of three years.

Potential Risks, Mitigation Measures, and Permitting Requirements

Due to the low impactful nature of this project, it is not anticipated this project would entail costly potential risks to plan for, necessitate mitigation measures, or require extensive permits.

Restoration of Areas Impacted by Deepwater Horizon Oil Spill

N/A

Funding Strategy and Sources *- Continued partnership with LDWF as well as LPBF should be prioritized. In addition the possibility of utilizing economic/job creation funds from CDBG as well as LWCF should be explored.*

Literature Cited

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List of Abbreviations

BMLC	Biloxi Marsh Land Corporation
BOEM	Bureau of Energy Management
BUDMAT	Beneficial Use of Dredged Material
CAP	Continuing Authorities Program
CDBG	Community Development Block Grant
CIAP	Coastal Impact Assistance Program
CM	construction management
CUP	Coastal Use Permit
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
CWU	Central Wetland Unit
CZAC	Coastal Zone Advisory Committee
EDA	Economic Development Administration
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
GNO	Greater New Orleans
GOHSEP	Governor's Office of Homeland Security and Emergency Preparedness
GOMESA	Gulf of Mexico Energy Security Act
HMGP	Hazard Mitigation Grant Program
HSDRRS	Hurricane Storm Damage and Risk Reduction System
LA 300	Louisiana Highway 300
LaDOTD	Department of Transportation and Development
LDSP	Long Distance Sediment Pipeline
LDWF	Louisiana Department of Wildlife and Fisheries
LPBF	Lake Pontchartrain Basin Foundation
MRGO	Mississippi River Gulf Outlet
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
O&M	operation and maintenance
P/E&D	planning, engineering, and design
PA	Public Assistance
PDM	Pre-Disaster Mitigation
PPL	project priority list
RESTORE Act	Resources and Ecosystems Sustainability, Tourist Opportunities and Revived Economies of the Gulf Coast States Act
SBPG	St. Bernard Parish Government
TIGER	Transportation Investment Generating Economic Recovery
TNC	The Nature Conservancy
USACE	United States Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
WWTP	Wastewater Treatment Plant

Appendix A: CZAC Comments

St. Bernard Parish Government
8201 West Judge Perez Drive
Chalmette, Louisiana 70043

MEMORANDUM

DATE: 7/29/16

TO: Guy McInnis

CC: Ronnie Alonzo; John Lane; William McCartney; George Ricks; Alex Boudreau

FROM: Jerry Graves

RE: CZAC comments

A number of comments were received at the CZAC meeting last night. Board members were also given until Thursday, August 4th to submit written comments prior to the coastal strategy document going to the Council for review and approval on August 16th. The comments have been provided below:

- Point Aux Marchettes shoreline protection (previously proposed by the Fish and Wildlife Service as a CWPPRA project in 2016) should be added as a priority project (Monty Montelongo, III)
- Bayou Grande shoreline protection should be added as a priority project (Monty Montelongo, III)
- It is critical that all oyster leases are carefully considered during proposed dredge and fill activities (Robbie Campo)
- The central section of the northern bank of Lake Lery is prime for cypress reforestation and should be included in the *Caernarvon Reforestation* project (Jim Hasik)
- The west phase of *Bayou La Loutre Ridge Restoration* project should be considered a higher priority than the other two phases (Robbie Campo)

I don't anticipate that we will receive many more CZAC comments, but I will send a follow-up email after the August 4th deadline has passed.

Thanks.