



# Bayou Bienvenue Central Wetland Unit:

## Wetland Restoration and Hazard Mitigation Proposal

### For Creating a Sustainable and Disaster Resilient Environment







Prepared for:  
Southeastern Louisiana Flood Protection Authority - East (SLFPA - E)  
St. Bernard Parish, Louisiana

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*This report was prepared for the Southeastern Louisiana Flood Protection Authority - East (SLFPA - E). It is intended that the report together with its recommendations would be adopted by the SLFPA-E Board and in so doing be considered for funding for wetland restoration of Bayou Bienvenue Central Wetland Unit.*





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*More than a sigh in the wind*



**Bayou Bienvenue Central Wetland Unit:  
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Creating a Sustainable and Disaster Resilient Environment**

“ To sustain a coastal ecosystem that supports and protects the environment, economy, and culture of southern Louisiana, and that contributes greatly to the economy and well-being of the nation.”<sup>1</sup>

Reconstruction of the St. Bernard Parish cypress swamp and marshes is among the most effective approach to mitigating seasonal storms while insuring the integrity of existing storm protection infrastructure such as the levees. Louisiana’s marshes are valuable nursery areas and habitat for birds, mammals, fish and people. Marshes have many functions. They provide a livelihood for those who live in the region and recreation for those who visit. The plants bind the sediment together. As plants die or are removed by either natural processes or human intervention, land loss is accelerated and habitat diminished. Coastal marsh and wetlands serve to remove pollutants thus improving water quality and they also offer aesthetic and recreation values. As storm water runoff flows through the swamp and marsh, pollutant removal is achieved through settling and biological uptake within the wetland. Flow through the root systems forces the vegetation to remove nutrients and dissolved pollutants from the storm water.<sup>2</sup> The vitality of marsh plants is extremely important to sustain healthy marshes. The key to the regeneration of marshes is to restore them under planned conditions—such as importation of sediment and increase freshwater content—that are favorable to plant growth.

### **Report Objectives:**

This report was prepared for the Southeastern Louisiana Flood Protection Authority - East (SLFPA - E). It is intended that the report together with its recommendations would be adopted by the SLFPA-E Board and in so doing be considered for funding for swamp and marsh restoration of Bayou Bienvenue Central Wetland Area in St. Bernard Parish.

The objective of this report is to present the background and rationale for rebuilding the inland marsh and Cypress swamp in what is now primarily open, brackish water between the Mississippi River Gulf Outlet (MRGO) and the Gulf Intracoastal Water Way (GIWW) in St. Bernard Parish, north of the community of Chalmette. Rebuilding the marsh and swamp is part of a larger strategy of rebuilding and strengthening the coastal flood defense system for the region.

Wetlands are found in regions throughout the United States

from Florida and the Mexico Gulf Coast, in the Mid-West and Great Lakes, and the Pacific Coast, all the way to Alaska. 53 percent of the Nation’s population is located in coastal counties representing 17 percent of the Nation’s land area. Wetlands serve a critical function as wildlife habitat, contributing to water quality, recreational uses, and an array of economic and cultural benefits. In regions such as the Mexican Gulf Coast of the USA, wetlands—healthy wetlands—provide a protective function for coastal urban and rural communities against floods and storm surges<sup>3</sup>. In the aftermath of hurricanes Katrina and Rita (August-September 2005) the reconstruction of cypress swamp and marshes are viewed as integral to a comprehensive and effective strategies for storm protection in coastal Louisiana.

### **Introduction:**

The area of study is located in St. Bernard Parish situated east of the City of New Orleans in what is now Arabi and Chalmette was a relatively safe location for human settlement protected from hurricane flooding by a natural buffer of cypress swamp and marsh. The inland cypress swamp and marsh play an important role to disperse wind-driven waves and flooding caused by strong tropical storms. This wetland buffer of swamp supported diverse habitat of fish and wildlife suited the settlers who came to the area in the early 18th century. As urbanization, commerce, and industry developed over the next several centuries this once vibrant coastal ecology was altered and weakened by a variety of actions resulting is what is today brackish, open water where cypress swamp and extensive marshes once thrived. Much of the freshwater marsh and its cypress trees have died as a result of saltwater intrusion<sup>4</sup>. Engineering projects have altered the natural hydrology characterized y gradual saltwater intrusion with attendant decreases in sediment, nutrient, and freshwater input. Additional habitat losses were the result of a variety of human actions that modified and greatly dimensioned the storm protective capacity of the wetlands. With actions to close the Mississippi River Gulf Outlet, water salinity increases may slow and even be reversed. The potential drop of salinity levels will be crucial in the eventual process of re-establishing cypress and marsh vegetation together placement of sediment and other actions in creating favorable conditions for habitat restoration.

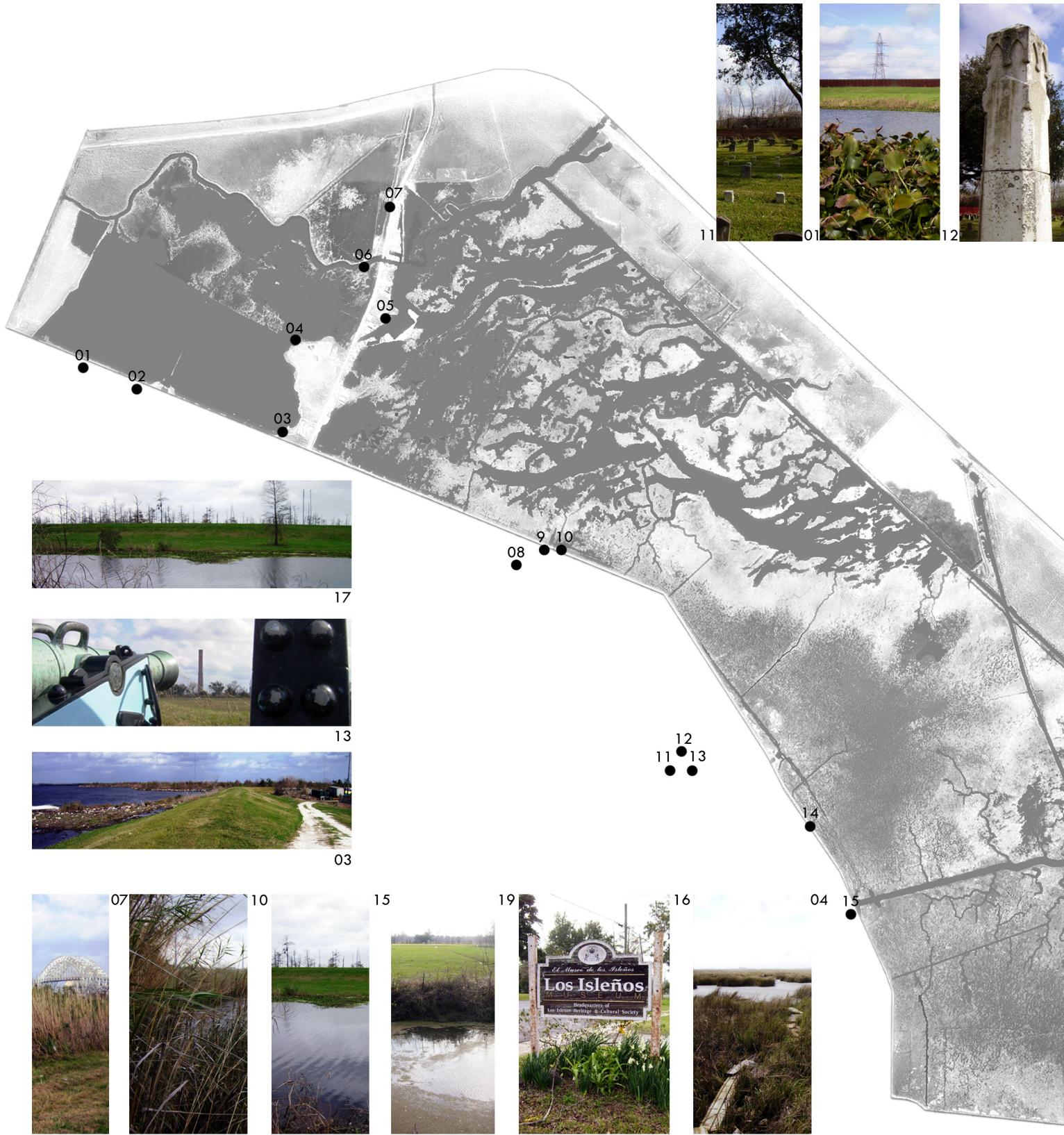
Land ownership is an issue that must be addressed when considering swamp and habitat restoration in the Bayou Bienvenue Central Wetland study area. Much of the area is under private ownership. While public investment on private land may be in question, the public benefits are compelling justification in terms of the potential of reducing loss of lives and property due to hurricane events. There is legal precedence that would allay concerns of concurrent issues of liability where public action advances the greater society’s good. For instances, where

1 Coast 2050: Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority, Louisiana Department of Natural Resources (1998)

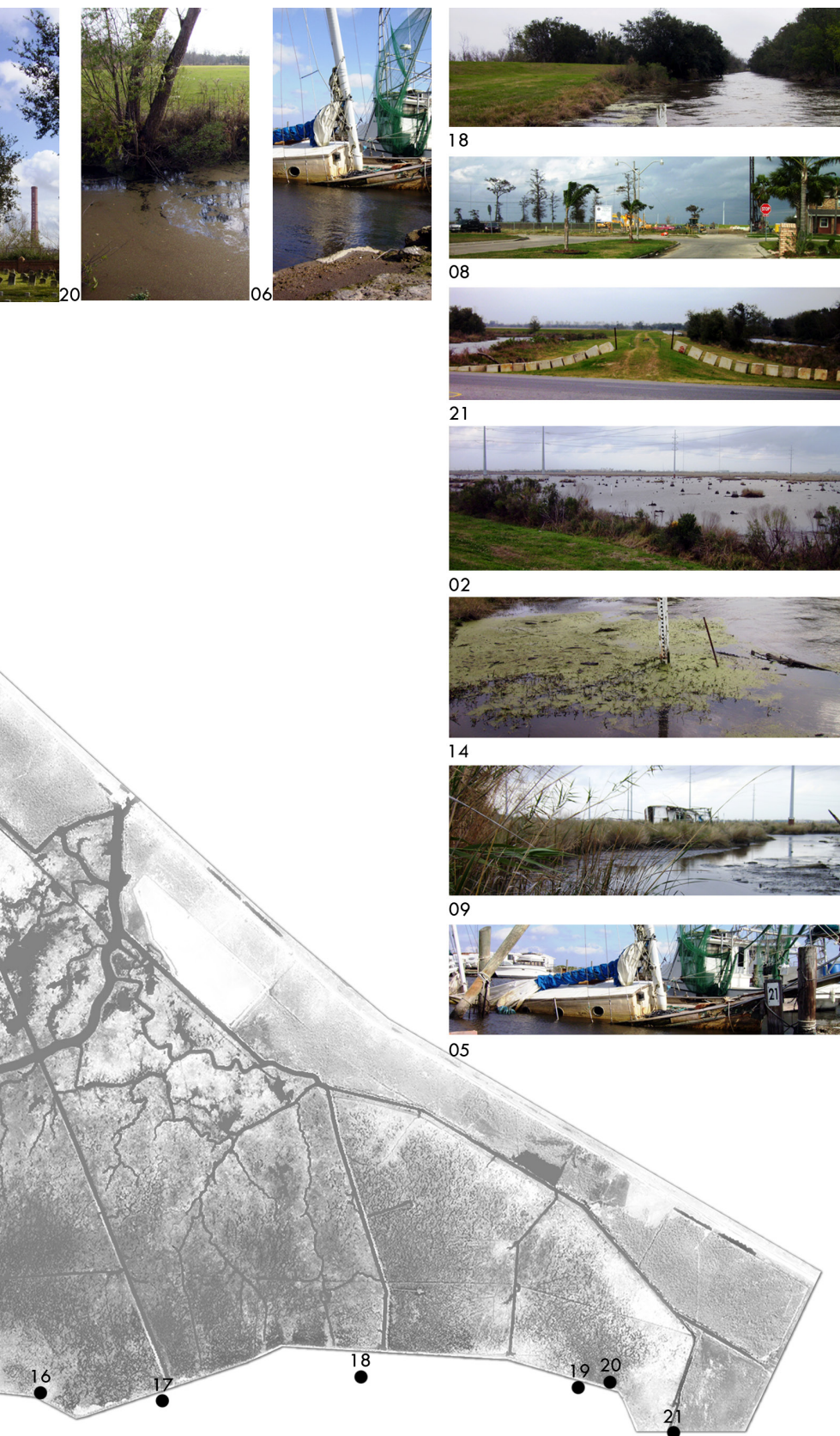
2 California Storm Water BMP Handbook 1 of 9, New Development and Redevelopment January 2003 [www.cabmphandbooks.com](http://www.cabmphandbooks.com)

3 (Conserving America’s Wetlands 2006: Council on Environmental Quality April 2006)

4 Bourne, J. K. Louisiana’s Vanishing Wetlands: Going, Going... Science, 289(5486), 1860-1863. (2000).







**Figure 1.** Imagery of Study Area Showing the Variety of Landscape Character and Physical Conditions.

1. Florida Walk Canal with floodwall beyond
2. Wetland side of floodwall
3. Northward atop natural levee
4. Path into wetland from Paris Road
5. Sunken shrimp boat in marina
6. Abandoned property remains in marina
7. Paris Rd. Bridge across Intracoastal Waterway (ICWW)
8. Val Reiss Park being renovated from Palmisano Blvd.
9. Capsized boat remnant from Katrina
10. Native marsh grasses abundant near open water
11. Chalmette National Cemetery
12. National Cemetery with St. Bernard smoke stack beyond
13. Calmette Battlefield canon with St. Bernard smoke stack beyond
14. Freshwater Forty Arpent Canal
15. Lake Borgne Canal in Violet
16. Cultural center - Los Isles Museum
17. Forty Arpent Canal with Deteriorating Cypress swamp beyond
18. Live Oak groves along Forty Arpent Canal
19. Agriculture and livestock along Bayou Rd.
20. Duckweed as a freshwater indicator in Bayou Terre aux Boeufs
21. No unauthorized access along New Canal

recreation facilities such as trails or boating are constructed by public agencies on private land, Louisiana State laws provide for liability to be the responsibility of the state.

This report will present a proposal towards re-establishing healthy marsh, tree, and swamp habitats within what is now open, brackish water of the Bayou Bienvenue Central Wetlands Area. The purposes of rebuilding this wetland system include:

1. Reduce storm surge impacts to minimize losses of life and property.
2. Improve water quality to sustain healthy habitats.
3. Improve fisheries and wildlife for economic and recreational benefits.
4. Increase bird habitat to enhance wildlife diversity throughout the year
5. Provide recreation and educational opportunities.
6. Enhance economic opportunities and property values of the area.

The following sections of this report will provide the background, rationale, and process for rebuilding the marsh and swamp habitats within the Bayou Bienvenue Central Wetlands Area. The object is to provide the governmental decision makers and stakeholders of St. Bernard Parish and the region with a “picture” of what is both possible and feasible in terms of creating a sustainable and disaster resilient tree and wetland environment. The proposal assumes that the rebuilding of the natural wetlands system is part of a larger set of actions that include de-commissioning of the Mississippi River Gulf Outlet.

## History and Background

### History:

The Frenchman Bienville was charged with finding the optimal location for a new city that would afford strategic military advantages in protecting the future port city of New Orleans while providing advantageous river access to the vast North American interior. Of equal importance the location had to be adequate in facilitating maritime commerce by providing safe and convenient transport of goods to and from Europe by way of the Gulf of Mexico via Lake Pontchartrain and the Mississippi River. The natives had been living in the rich coastal marshes an intricate web of wetlands that a future city of New Orleans would be situated. They advised Bienville to locate and build his new city of Louisiana on the high ground of the natural levee formed by the Mississippi River. The natural levee and areas of high ground were made higher than the nearby surrounding low swamp lands by the annual deposit of silt from the Mississippi River. This meandering high ground was a natural levee, built up over eons of annual flooding and deposition of silt and debris. Bienville located the new city in what is now called the French Quarter on the natural levee. As the town

prospered and grew, successive new development continued to follow the natural levee or high ground, approximately representing the 20 percent of New Orleans that sustained minor or no flooding during Hurricane Katrina. As The Crescent City continued to grow and prosper urbanization gradually crept into the cypress swamp and marshes which were also on lower lying terrain that often experienced seasonal flooding during heavy rains and the periodic hurricane storms that annually buffeted the Mexican Gulf Coast.

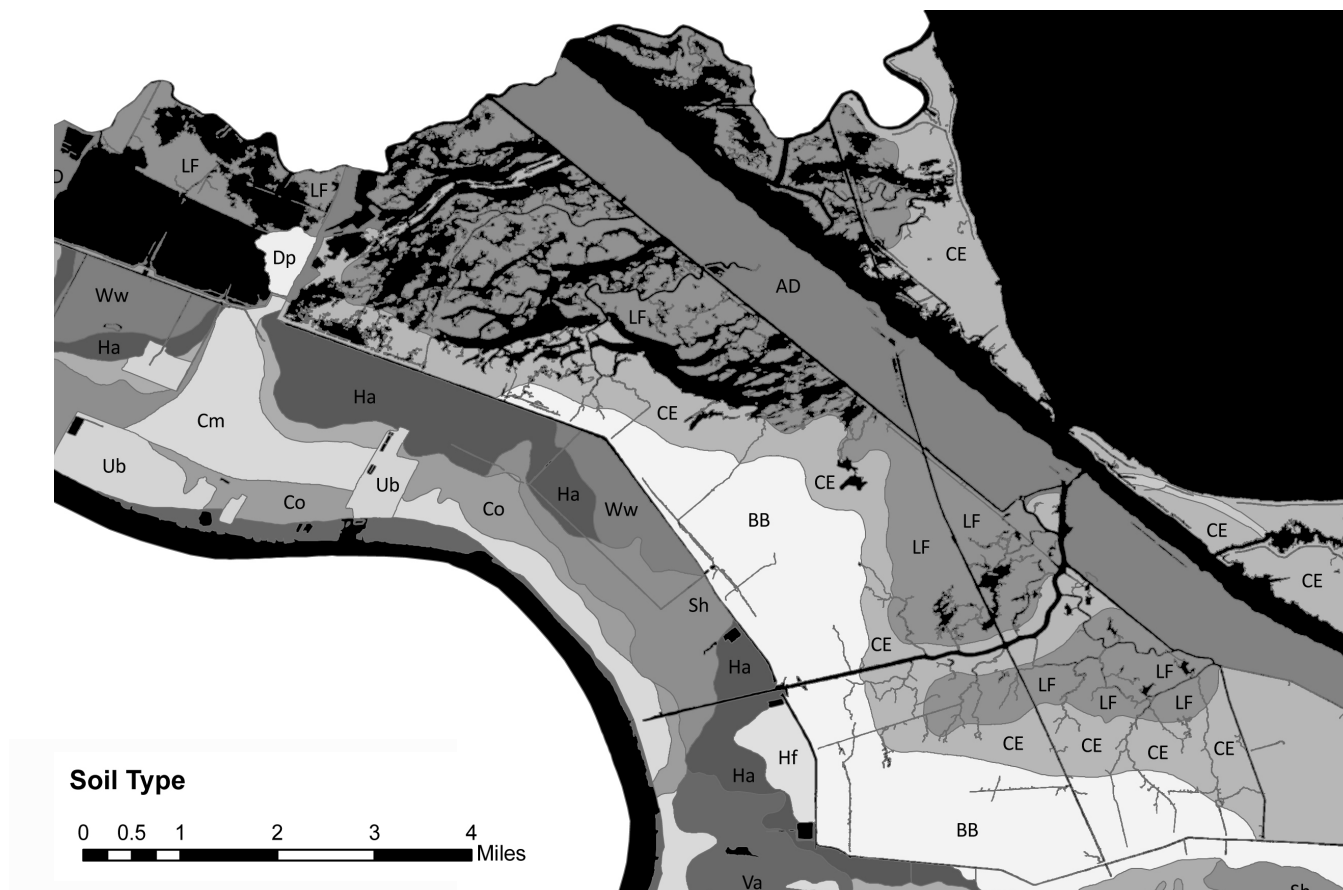
St. Bernard—what is now St. Bernard Parish—was established with the immigration of settlers from France, Spain, Britain, and Canada’s Acadia. The settlers came mostly to farm and trap. Cotton was introduced in 1740 on plantations. The region was transferred to the United States in 1803 and in 1815 St. Bernard was the site of the Battle of New Orleans followed by the establishment of the United States National Cemetery near Chalmette. After the Civil War the economy of the parish changed from a plantation-based economy to small farms and lumbering (cypress). Since the 1920s the economy gradually made the shifted to an urban-industrial economy including oil and gas related and sugar refining. Commercial and sport fishing were also a viable economic activity in the parish. (see *Los Islenos Cultural Timeline in Appendix IV*)

### Water Resources:

The surface water regime of St. Bernard Parish consists of the movement of freshwater and saltwater masses through the region as a result of the interaction between the discharge of the Mississippi River, regional precipitation, winds, and tides. The hydrologic regime was increasingly modified from its natural, pre-18th century conditions by man-made actions involved with human settlement activity, a variety of infrastructure constructions, commerce, and resource extraction.

Under natural conditions, the Mississippi River flowed through the wetland to the Gulf of Mexico via distributary channels. Rainfall and Mississippi River floodwaters flowed through these channels and slowly through the swamps and marshes. The wetland vegetation and the shallow inter-distributary channels slowed the drainage movement and stored the freshwater for gradual release into the tidewaters. Water levels and salinity changed gradually throughout the yearly cycles of rainfall and tidal conditions. Man-made modifications including the building of levees, the construction of new channels and altering natural channels by deepening or straightening, logging, navigational improvements, segmentation of the wetlands, oil and gas related activities (such as constructing access roads, pipeline construction, and exploration and drilling), and urbanization modified that natural water movement, levels, and salinity together had a dramatic impact on the surface water regimes. These impacts greatly reduced water quality and increased salinity. The overall effect has been the rapid alteration of a stable hydrologic system into a system having greater water level fluctuations, reduced water quality, and increased salinity.





**Figure 2.** Adapted from the USDA Soil Survey prepared for St. Bernard Parish.

### Soils:

St. Bernard Parish is entirely within the Mississippi River Delta. The natural high ground and levees consist primarily of firm, loamy and clayey soils. These soils vary from poorly drained to somewhat poorly drained. Information on soils for this report was compiled from the USDA Soil Survey of St. Bernard Parish. A brief summary/description of each soil for Soil Survey Report USDA follows below.

The soils in the parish fall under several categories that include:

1. Soils on natural levees that are protected from flooding.
2. Soils in marshes and swamps that frequently flood and pond.
3. Soils in former swamps that are drained and protected from flooding.
4. Soils on spoil banks and sandy ridges that are frequently flooded.

The soils found within the study area are found on level, poorly drained and somewhat poorly drained terrain. These soils that have a clayey and loamy surface and are found on natural levees of the Mississippi River and its distributaries generally protected from flooding except during tropical storm events such as Katrina in 2005. Wetness, flooding from backwaters,

and the shrinking and swelling of the subsoil are primary limitations for urban use (USDA St. Bernard Soil Survey). A brief description of each soil unit found within the study area follows:

**AD - Aqueuts, dredged, frequently flooded soils** poorly drained forming in hydraulically deposited fill material dredged from nearby marshes during the construction and maintenance of waterways. This soil unit is slightly saline. They are stratified throughout with mucky, clayey, loamy and sandy layers. The soils are found on terrain with a less than one percent slope.

This soil unit is firm in the upper layer and slightly fluid to very fluid in the lower layers. This soil is flooded for long periods of time by high tides during storms with seasonal high water table ranges from the surface to 1.5 feet. The soils have low strength characteristics with subsidence potential ranging from medium to high.

Aquent soils are well suited for habitat for wetland wildlife including a variety of waterfowl, alligators and mammals. Native vegetation species include eastern *Baccharis*, marsh hay cord grass, salt marsh bulrush, and sump weed.

**BB – Barbary clay** is a mineral soil found on level, very poorly drained and very fluid terrain. It is found in broad, ponded, freshwater swamps with slopes less than one percent.

The surface layer of this soil is a dark gray color, very fluid clay about six inches thick. The underlying material to a depth of sixty inches is gray, slightly fluid clay in the upper part and greenish ray, slightly fluid in the lower layer. In some areas the surface layer is muck; in other areas buried logs are in the underlying material. This soil is flooded by freshwater most of the time and is saturated throughout the year. In some locations the soils are occasionally flooded by salt water during storms. During non-flood periods the seasonal high water table ranges from one foot above the surface to one-half foot below the surface. This soil has moderate subsidence potential. The natural vegetation of the Barbary soil consists of water-tolerant trees and aquatic understory species. Common tree species include Bald Cypress, Black Willow, and Water Tupelo. Understory species include Alligator weed, Butterweed, Button brush, Duckweed, Pickerl weed, and Water Hyacinth. This soil supports habitat for wetland wildlife including crawfish, ducks, squirrels, alligators, wading birds, and furbearers. White-tailed deer, rabbits, raccoon, muskrat, and otter are also found.

CE – Clovelly muck is an organic soil, very poorly drained, very fluid, and slightly saline. It is found in brackish marshes and is flooded and ponded most of the time. The terrain of this soil is flat, with a less than one percent slope.

The surface layer of this soil is dark brown, very fluid muck, and fifty inches thick. A seventy-inch thick layer is found underneath, is gray, very fluid clay. Clovelly soil is flooded most of the time by brackish water and is wet throughout the year. This soil is covered by as much as five feet of water during tidal storms. Water is found above the surface during most of the year. During periods of sustained north winds and low tides the water table drops to about one-half foot below the surface. This soil has low strength and poor traffic carrying characteristics. Permeability is rapid in the organic layer and very slow in the underlying clayey material. Subsidence potential is high.

Much of the areas of this soil are habitat for wetland wildlife and for recreation such as hunting and fishing. The natural vegetation consists primarily of Marsh Hay, Cord Grass, Olney Bulrush, Big Cord Grass, Dwarf Spikesedge, Marsh Morning Glory, Salt Marsh Bulrush, Widgenon Grass, and Sump Weed.

DP – Dumps including refuse and sanitary landfill located in mostly swamps and marshes. These areas consist of successive layers of compacted refuse and thin soil layers. Thickness of these layers can range from five to more than thirty feet. Uses other than as refuse landfill are very limited with numerous problems that preclude other uses.

LF – Lafitte muck is an organic soil, very poorly drained, slightly saline, and very fluid. It is found on very level terrain with a less than one percent slope.

The surface layer is very dark grayish brown, very fluid muck of about twelve inches thickness. The next layer extends more

than fifty inches, is dark brown, very fluid muck in the upper layer and black, very fluid muck in the lower area. The underlying layer is very dark gray, very fluid, muck clay.

This soil is flooded most of the time by brackish water and is wet throughout the year. During storms the soil is covered by as much as five feet of water. Water is perched above the surface most of the year. During periods of sustained north winds and low tides the water table drops to about one-half foot below the surface. Subsidence potential is high and if drained, the organic material—on drying—initially shrinks to about half the original thickness and then further subsides as a result of compaction and oxidation. Permeability is very slow.

The natural vegetation consists mainly of Marsh Hay Cord Grass, Olney Bulrush, Marsh Morning Glory, Big Cord Grass, and Sump Weed. The Lafitte soils are habitat for wetland wildlife and for extensive forms of recreation such as hunting and fishing. The soil supports habitat for large numbers of geese and furbearers such as mink, muskrat, otter, and raccoon.

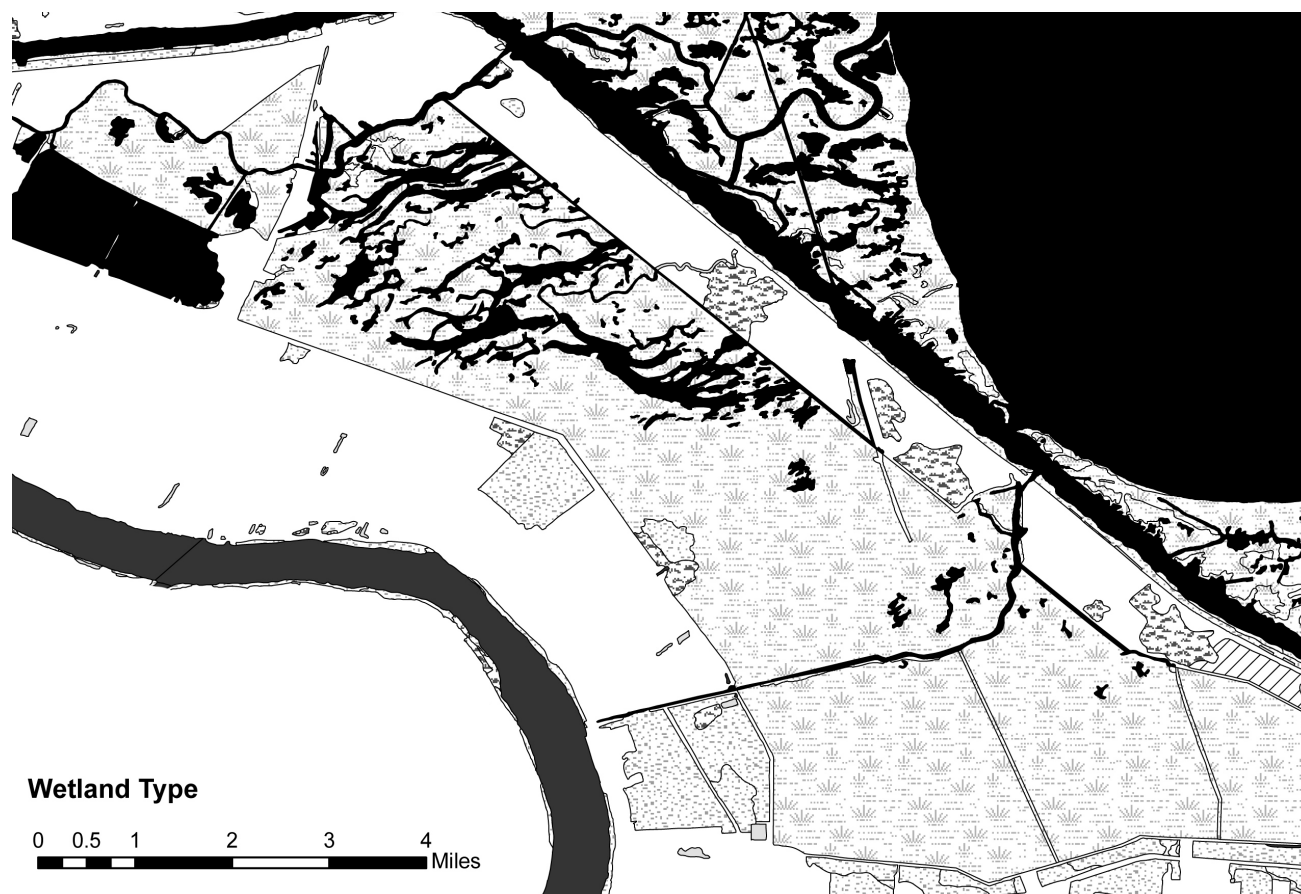
### Wetland Types:

1. Estuarine and Marine Deep Water are marine environments whose ph, salinity, and water levels vary, depending on the river or other water runoff sources that feed the estuary and the ocean from which it derives its salinity. Deepwater marine, tidal habitats, and adjacent tidal wetlands are usually semi-enclosed by land (or man-made levee systems) that may have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.<sup>5</sup>



5 Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm> (Version 04DEC1998).





**Figure 3.** Adapted from the USDA Wetland prepared for St. Bernard Parish.

2. Estuarine and Marine Wetland and Marsh include areas that are inundated or saturated by surface water or groundwater of salinity characteristic of near shore Gulf of Mexico ambient water at a frequency and duration sufficient to support, and that under normal circumstances do support, saline emergent vegetation.

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- ◻ Freshwater Emergent Wetland
- ◻ Freshwater Forested/Shrub Wetland
- ◻ Freshwater Pond
- Lake
- ▨ Other
- Riverine



3. Freshwater Emergent Wetland are areas inundated or saturated by surface water or groundwater of negligible to very low salinity at a frequency and duration sufficient to support, freshwater emergent vegetation. Freshwater emergent wetlands also are characterized by interstitial water salinity that is normally less than 2 ppt. There are two subtypes of freshwater emergent wetlands: floating and attached. Floating wetlands are those areas where the wetland surface substrate is detached and is floating above the underlying deltaic plain (also called "buoyant" and "flotant"). Attached wetlands are those areas where the



vegetation is attached to the wetland surface and is contiguous with the underlying wetland substrate and can be submerged or emergent.

4. Freshwater Forested and Shrub Wetland include bottomland hardwood swamps continuously flooded cypress-tupelo swamps seasonally flooded cypress-tupelo swamps. Non-forested or marsh wetlands include floating freshwater emergent wetlands, attached freshwater emergent wetlands, brackish marshes, and

salt (saline) marshes.<sup>6</sup>



5. Lake is an inland body of water, a terrain feature generally fed by a river or surface drainage from adjacent land. Lakes are temporary over geologic time, as they slowly fill in with sediments or spill out of the basin containing them.



6. Other includes miscellaneous marginal or transitional habitats. Farmed wetland, saline seep and other miscellaneous wetland.



7. Riverine or river is a natural watercourse usually freshwater flowing toward an ocean, a lake, or another river. A river is a component of the larger hydrological cycle generally the result of precipitation and surface runoff.



## Urbanization and Wetland Land Loss Timeline

The process of water quality degradation, land conversion, and land loss in St. Bernard Parish is closely tied to urban growth, transportation development, natural resource development, and flood management infrastructure construction. From the time of the early French settlement of New Orleans until the early 1920s the area was relatively safe protected from hurricane flooding by a natural buffer of marshes and Cypress swamps. As the natural landscape of the City of New Orleans and other parishes neighboring St. Bernard were drained, filled, harvested, and built upon the resiliency of the region to sustain impacts from seasonal tropical storms was reduced. The natural protective qualities of inland marshes and tree-covered swamps became increasingly marginalized as urban expansion, oil and gas development, waterway construction, and storm protection infrastructure expanded and transformed the region.

What was once dense Cypress, freshwater swamp is brackish, open water. The degradation of the natural protection elements of Cypress swamp and wetlands together with rising sea levels and general land subsidence of coastal Louisiana has made urban development vulnerable to tropical storms. The process of urban development with attendant land conversion and land loss began with the early selection of what is now New Orleans by the French to the present day involved a process of incremental—some times small and other times large—changes. Early settlement occurred on the higher ground—natural levee—adjacent to the Mississippi River. As urban expansion occurred adjacent lower-lying swampland were drained and filled. With urban development came economic and resource development and the conversion or development of more and more marginal lands for human uses. And, as urban development inched across the natural landscape a variety of flood and storm mitigation infrastructure were needed including the building of canals, levees, pumps, and flood walls.

<sup>6</sup> State of Louisiana, Title 33 Environmental Quality, Part IX. Water Quality Subpart 1. Water Pollution Control Chapter 11. Surface Water Quality Standards §1105. Definitions





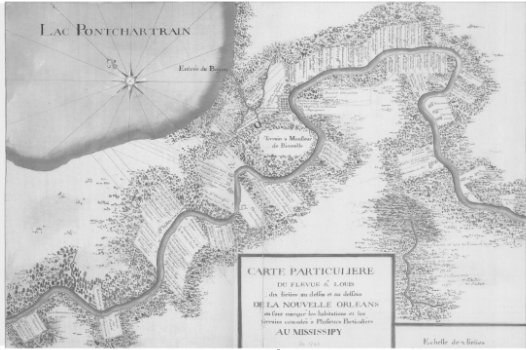
**Figure 4.** Shows what the vegetation of a typical healthy, more or less intact Cypress swamp looks like.



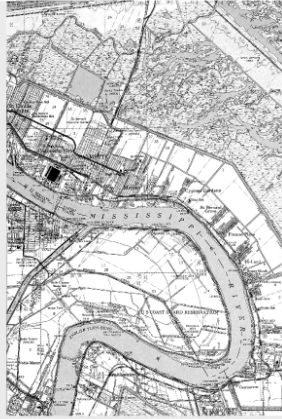
**Figure 5.** With the construction of the Mississippi River Gulf Outlet (MRGO) and the Gulf Intracoastal Water Way (GIWW) and landscape conversion activities of urban development, oil and gas exploration, and levee construction most of the pre-1920s Cypress swamp and marshes have been destroyed.



New Orleans and Surrounding Parishes



St. Bernard Parish



1723

1798

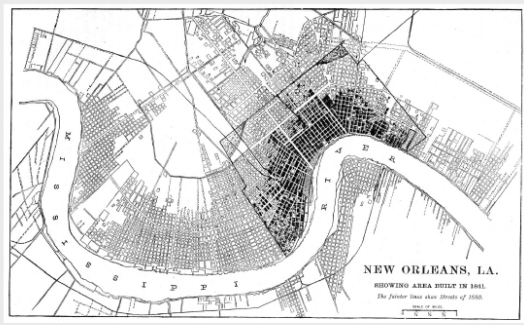
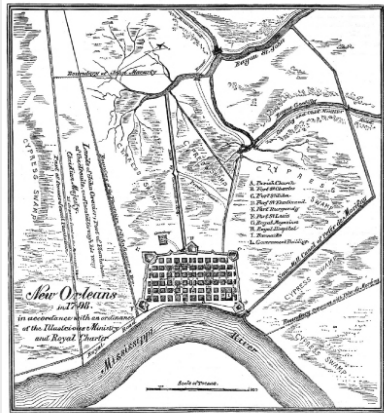
1816

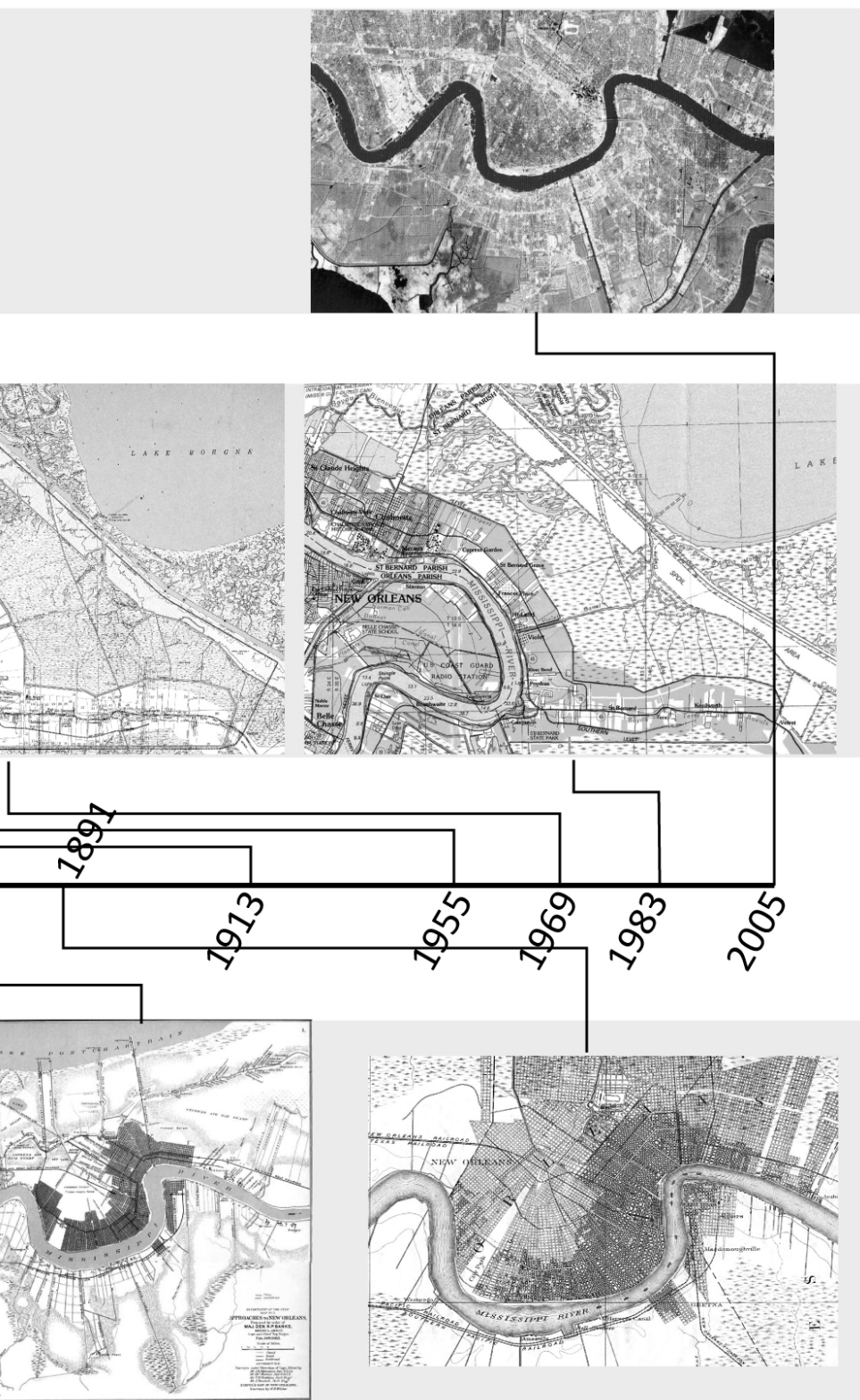
1841

1860

1863

Growth of New Orleans





**Figure 6.** Timeline of urban growth, land conversion, and land loss in New Orleans and vicinity. Presents a snapshot of land development in the New Orleans area with four frames of development in the study area adjacent to Chalmette presented in the center of the figure.



The communities bordering the swamp and marshes have lost the natural protective defense (of healthy marsh and Cypress swamp) from tropical storm wind and flooding with the transformation of the inland swamp and marsh environment into large stretches of open, brackish water. The vulnerability of the upper St. Bernard Parish to the impact from tropical storms has reached catastrophic proportions as experienced from Hurricane Katrina that made landfall on August 29, 2005. The weakened wetland buffer was unable to afford sufficient protection from the wind driven waves that funneled up the MRGO and GIWW channels from the Gulf to flood the parish and the surrounding New Orleans region. The scale and dimensions of flooding that occurred in 2005 are well documented. The loss of structures and property from Hurricane Katrina are abundantly evident today. The impact of the Hurricane Katrina (loss of life, damage and loss of property, and economic losses) was exacerbated by the funneling effect of the hurricane's storm surge that travelled along the Mississippi River Gulf Outlet (MRGO) and the Gulf Intracoastal Water Way (GIWW). The two channels together with the levee systems built along their banks created a funnel-like mechanism that intensified the hurricane-generated surge, directing the elevated water into the Chalmette area and into New Orleans. With the construction of the GIWW and MRGO during the mid-20th century together with the loss of many thousands of acres of swamps, trees, and marshes; land subsidence; extensive open brackish water a system of natural storm-mitigation conditions made the area increasingly vulnerable to tropical storms. Existing flood management infrastructure strategies do not represent a sustainable approach to storm protection considering more holistic systems that include structural as well as non-structural elements: marsh, tree, and swamp restoration together with water detention systems (Colton). The system would also have greater resiliency to manage the threats from storms by providing redundancy or backup systems of a non-structural nature such as marsh and tree restoration.

The area between Chalmette and the Mississippi Gulf Outlet is predominately open, brackish water. It is proposed to re-establish the marsh and Cypress swamp system, a proposal that would realize multiple benefits. There are numerous benefits to be derived from this proposal fall into the following, main categories:

1. Creation of a physical vegetative barrier to reduce damage and loss of lives from potential tropical storm wind and storm surge.
2. Improve water quality.
3. Increase wildlife habitat of environmental, economic, and recreational benefit.
4. Provide variety of educational and recreational venues for communities in the immediate area and region.

## **Bayou Bienvenue Central Wetland Restoration and Hazard Mitigation Proposal**

Hazard mitigation and community rebuilding when considered together make it possible for local government to better protect its citizens from the disastrous impacts of reoccurring natural hazards such as from tropical storms. Rebuilding marsh and Cypress swamps and improving water quality of an area's wetlands is a proactive and cost-effective approach to prepare for future impacts from storm and flooding hazards. Wetland and swamp restoration can contribute to a community's long term goals of providing a safe living and working environment necessary for future economic stability.

In locations where tropical storms occur, government at all levels endeavors to deal with seasonal phenomenon in a variety of ways. Government is responsible for protecting property and lives, of its citizens. It carries out this responsibility utilizing a variety of strategies including collecting historical records of hazardous events, developing early warning systems and emergency response plans, providing and maintaining hazard reduction or protection infrastructure (such as levees) to reduce the degree of impact of inevitable hazardous events. In the case of natural hazards associated with tropical storms and seasonal flooding, government entities have an additional set of tools to minimize and mitigate disastrous impacts through the promulgation of building codes and subdivision ordinances. The assumption, in writing these guidelines, is that people living in at-risk regions place a value on reducing their vulnerability from the potential impacts from natural hazards.

Trees and wetlands provide natural defense against tropical storm surge by slowing or reducing the energy of waves before they break on levees or higher ground. Louisiana's inland wetland and Cypress swamps can significantly diminish wind stress as well as reduce wave energy or storm surge elevations. Trees and wetlands can be used to shelter levees and communities to decrease impacts from storm surge by acting as a physical obstruction.

### **The significant underlying ideas imbedded in the proposal presented in this report are:**

1. There is a role for non-structural approaches as part of a comprehensive approach to flood and storm protection (such as a system of reconstructed wetlands and greenway corridors with water detention capacity).
2. Non-structural approaches are not intended to replace but rather to provide redundancy or backup to structural infrastructure systems (such as canals, pumps, and levees).
3. These non-structural approaches to flood management are sustainable over a long time period requirement minimal to no maintenance.

By incorporating non-structural approaches in comprehensive storm protection for St. Bernard Parish would also be creating



sustainable storm and flood protection. The system would also have greater resiliency to manage the threats from storms by providing redundancy or backup systems that in effect would be removing building structures directly out of harm's way.

#### **Proposal Explained and Strategies for Accomplishment:**

Strategies for implementing marsh and Cypress swamp restoration may incorporate several proven methods that include: building up and raising the soil level through creation of terraces with sediment transported from various sources (dredging, filling, pumping, and other means), vegetative planting, promoting conditions conducive to growth of submerged aquatic vegetation, and water quality control management. The exact methods will be developed when the project is funded and professional service firms are contracted.

Figure 5 is an illustrative plan depicting proposed marsh and Cypress swamp restoration proposal. The proposal contains a number of elements that together provide multiple environmental, economic, and social benefits that include:

1. Creation of a physical vegetative barrier to reduce damage and loss of lives from potential tropical storm wind and storm surge.
2. Improve water quality.
3. Increase wildlife habitat of environmental, economic, and recreational benefit.
4. Provide variety of educational and recreational venues for communities in the immediate area and region.

#### **Plan Narrative and Description:**

Figure 7 depicts, in photo-imagery, the restoration of the central wetlands area. The proposal includes the restoration of native marsh and Cypress habitats for storm protection and support of diverse wildlife; high quality open water for recreation and potentially economic benefit; and recreation and outdoor education facilities including boardwalk trails and visitor center. The habitat and open water elements shown in the illustrative plan were arranged using—in combination and for reference—historical aerial photography and maps and soil survey information. Actual habitat and vegetative species recommendations will require on the ground field surveys with positioning of elevated soil areas determined on the practicalities of source materials and methods of placement. The goal for habitat restoration is to mimic the patterned and distribution of plant species typical to the inland wetland region.

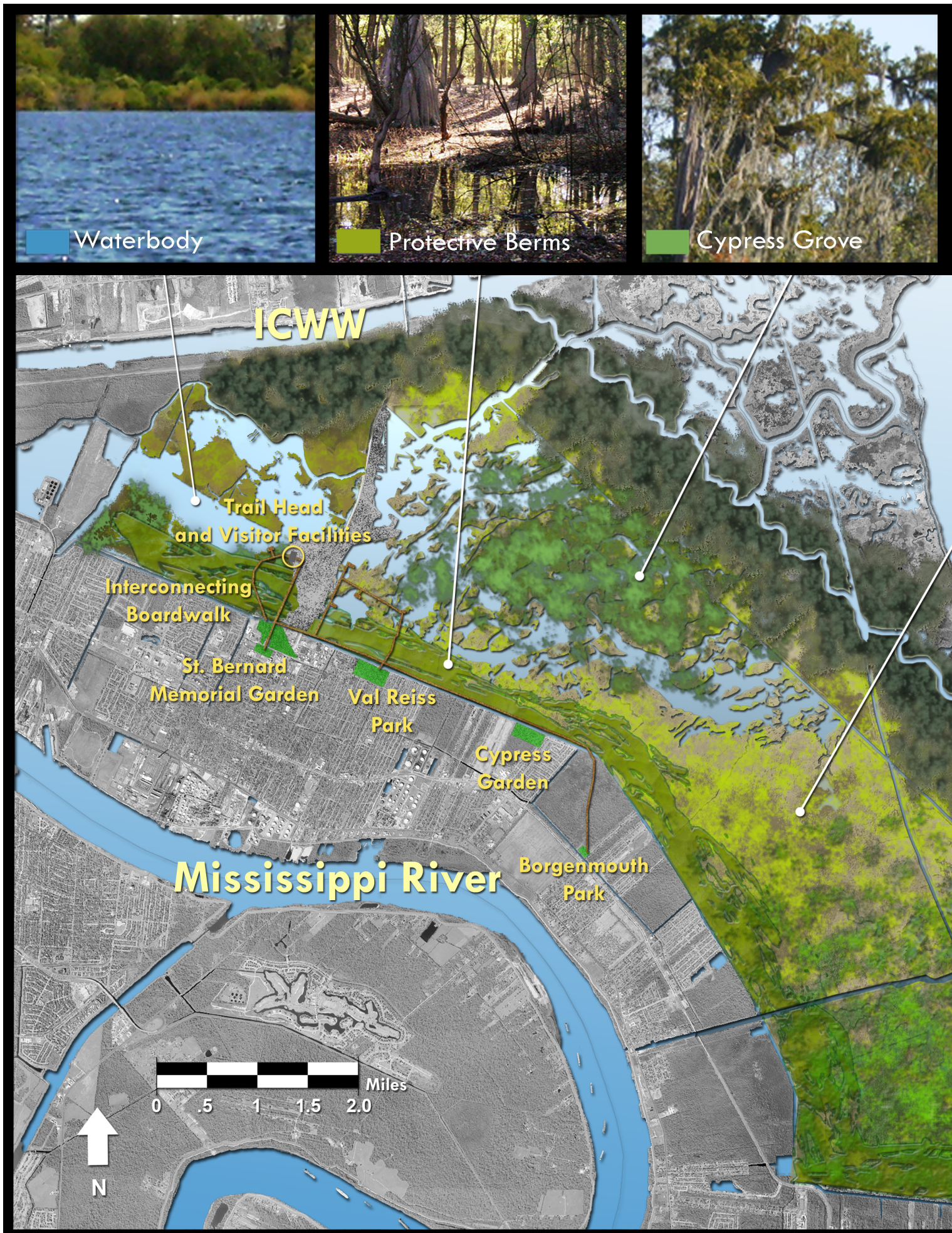
#### **Plan Narrative and Description:**

1. Vegetative habitats
  - a. Cypress swamp
  - b. Marsh
  - c. Wetland

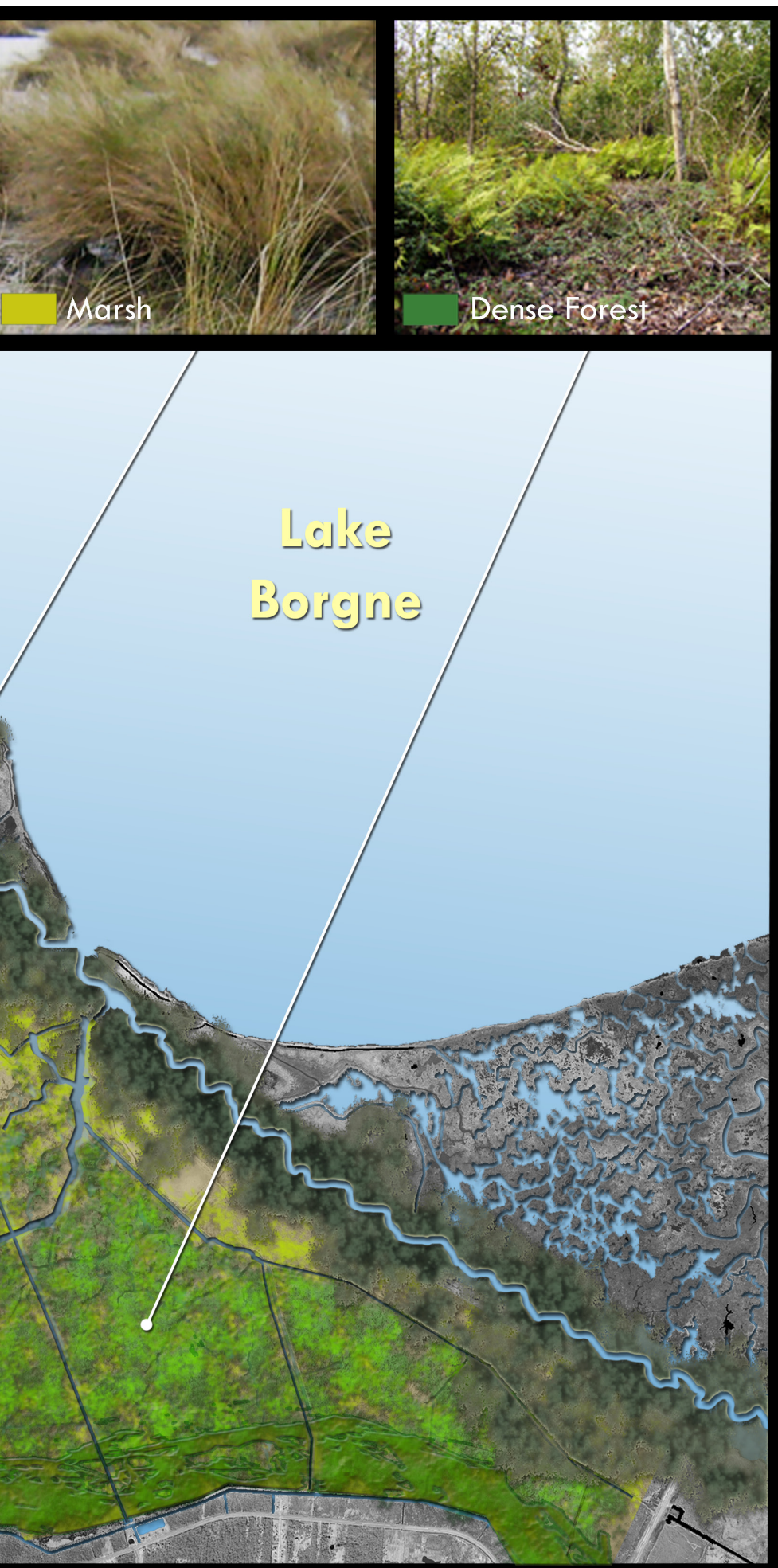
#### **2. Recreation and Outdoor Education Facilities including:**

- a. Public use access
- b. Boardwalk and trails
- c. Visitor center
- d. Public boating and access
- e. Integration with existing and proposed neighborhood parks
- f. Outdoor classroom/amphitheater



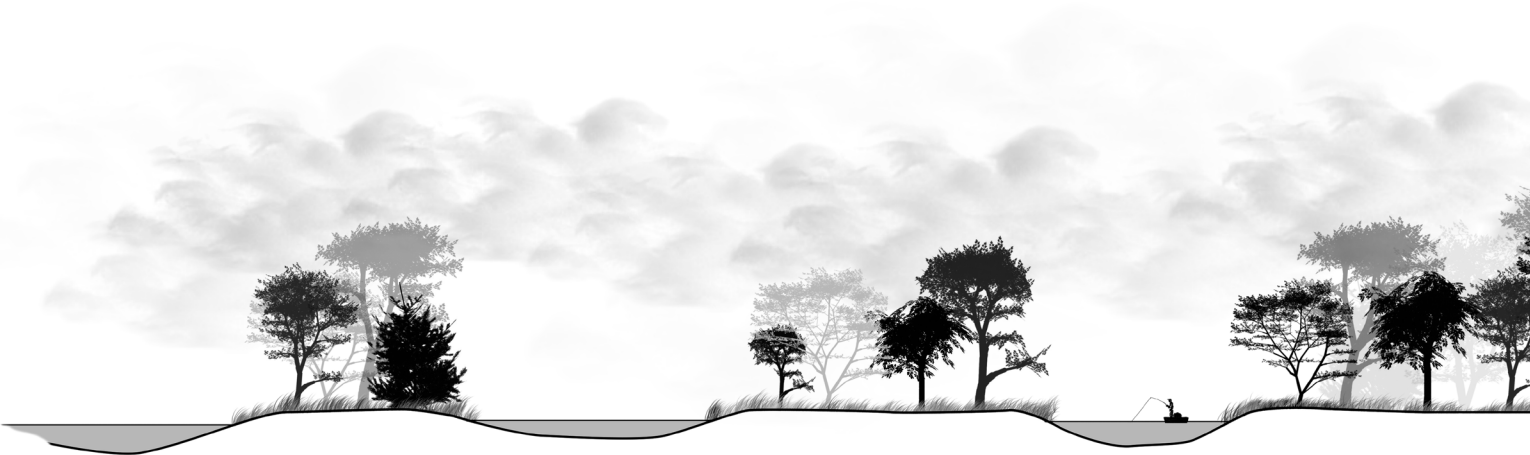
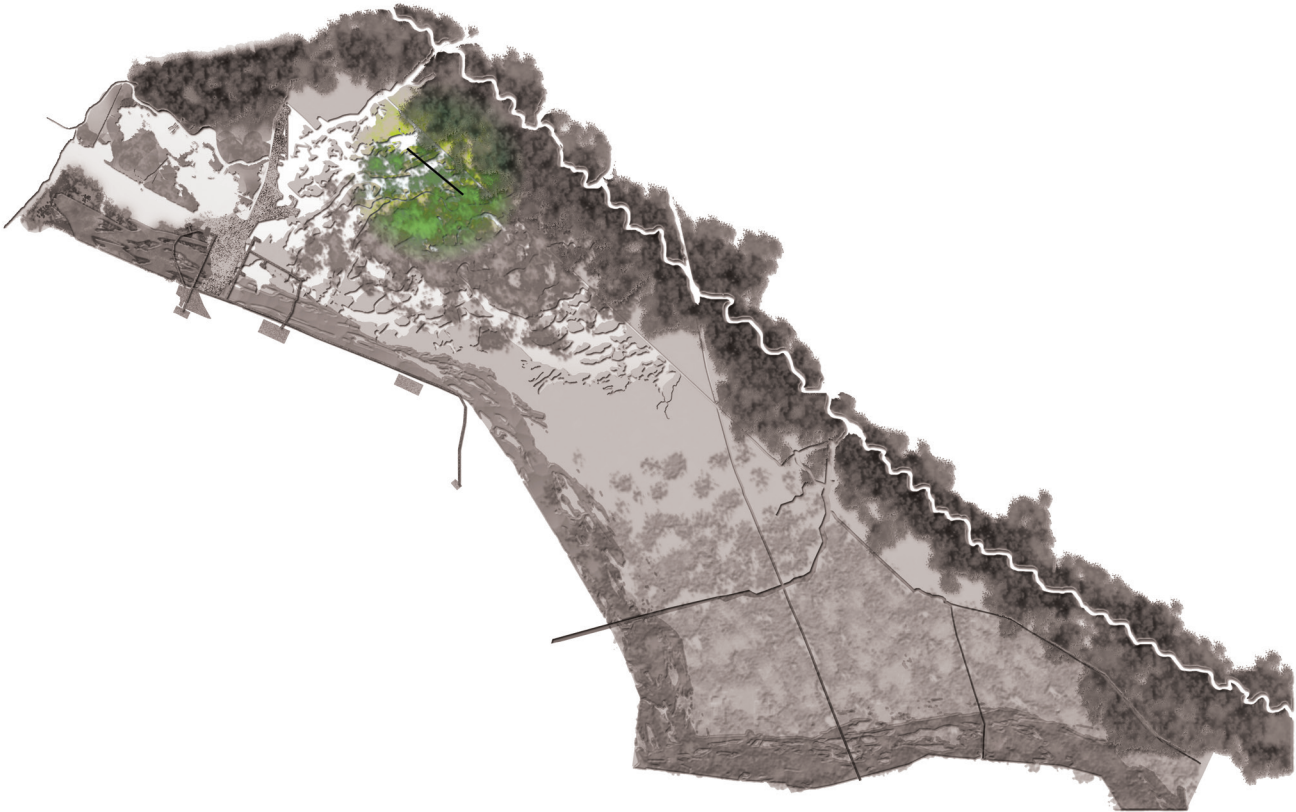






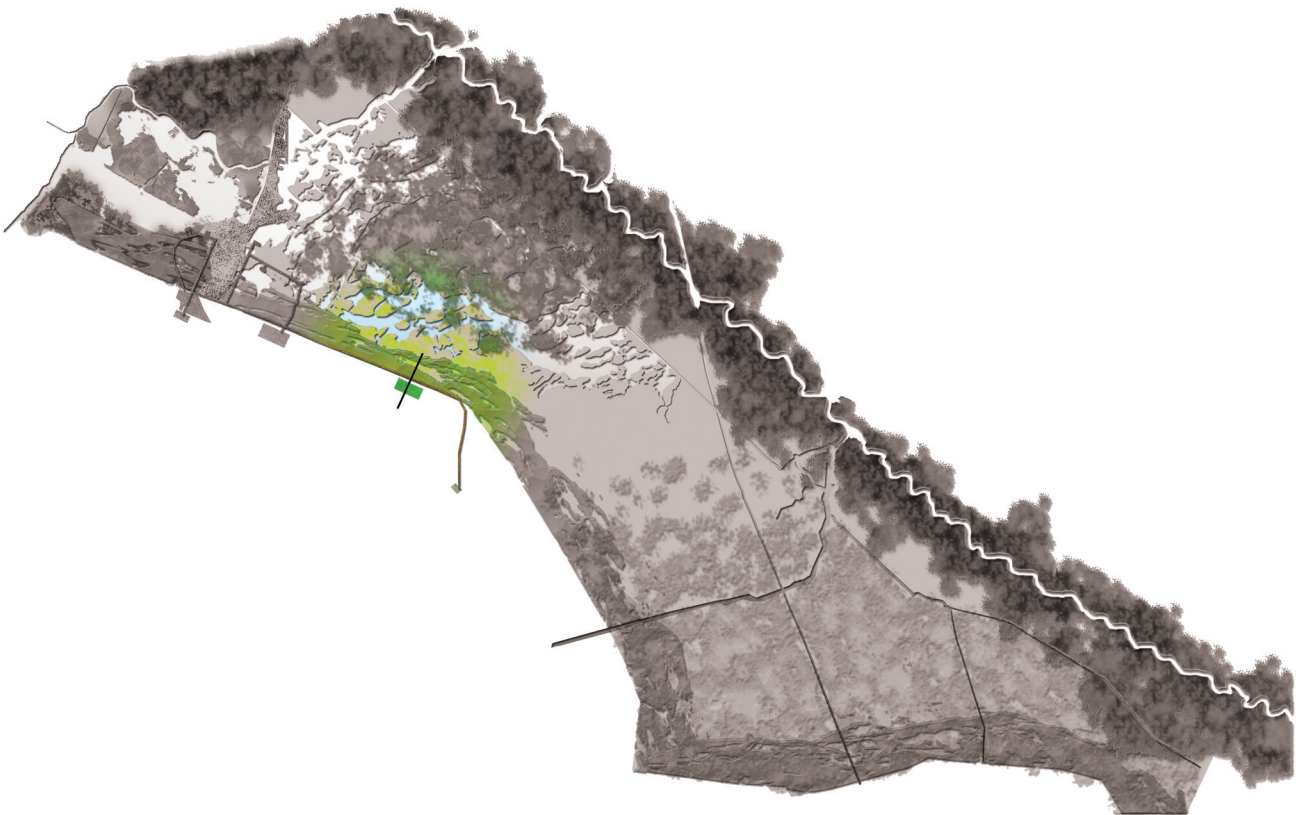
**Figure 7.** Illustrative Plan of Proposal of Bayous Bienvenue-Ducross Marsh and Swamp Re-vegetation.





**Figure 8.** Typical cross-section created to show the intended topographic configuration with areas of soil placement for creating desired elevation above water line that would support woody wetland and tree species. Open areas of water would be interspersed between the elevated soil embankment providing for boating access and potential temporary detention of seasonal storm water.

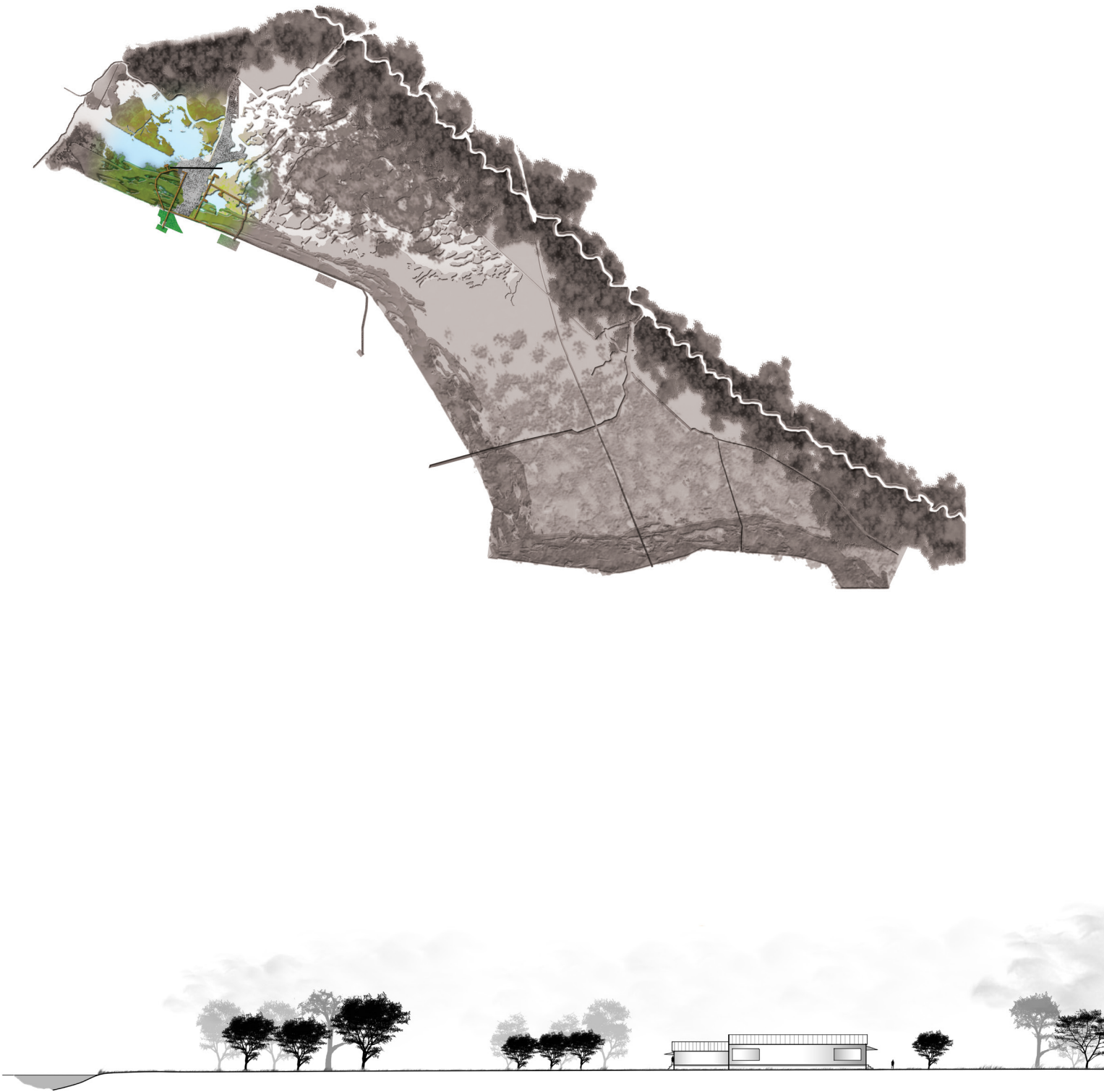






**Figure 9.** Illustrative cross section shows opportunities for additional berms and supplemental additions to levees to support upland habitat as well as provide continuity of proposed boardwalk trails. New soil embankment should be strategically placed to provide protection of the existing levee system. The new embankment would be planted with tree and wetland species to provide a degree of storm surge protection to the levees with plant species selected to support diverse wildlife populations.

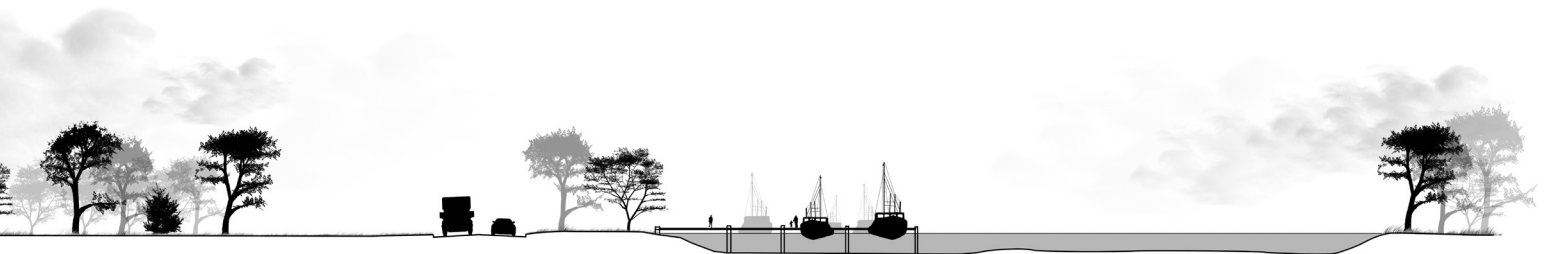






**Figure 10.** Illustrates possible location of various recreation and education facilities including:

- a. Visitor and educational center. The proposed location of the is on an existing spoil embankment accessible from Paris Road or LA 47 connecting Chalmette to Orleans East.
- b. Boardwalk and trails providing visitor access for recreation and education purposes into the marsh with access from neighborhoods and development adjacent to the proposed marsh and wetland area.
- c. Public boating and access throughout the marsh and wetland.
- d. Integration with existing and proposed neighborhood parks.
- e. Outdoor classroom/amphitheater.





**Figure 10a.** Visitor and educational center. The proposed location of the is on an existing spoil embankment accessible from Paris Road or LA 47 connecting Chalmette to Orleans East.



**Figure 10b1.** Boardwalk and trails providing visitor access for recreation and education purposes into the marsh with access from neighborhoods and development adjacent to the proposed marsh and wetland area.





**Figure 10b2.** Boardwalk and trails providing visitor access for recreation and education purposes into the marsh with access from neighborhoods and development adjacent to the proposed marsh and wetland area.



**Figure 10c.** Public boating and access throughout the marsh and wetland.



**Figure 10d.** Integration with existing and proposed neighborhood parks.

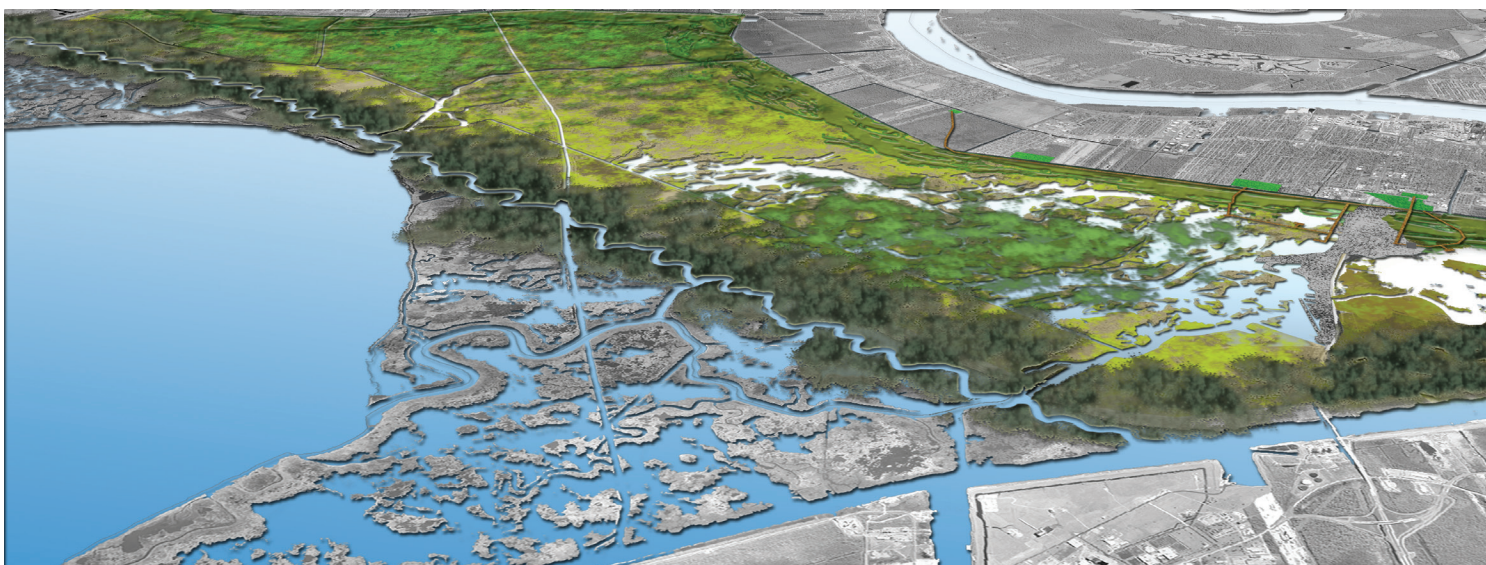


**Figure 10e.** Outdoor classroom/amphitheater.





**Figure 11a.** Existing wetlands system in St. Bernard Parish.



**Figure 11b.** After proposal showing an alternate approach for rebuilding storm protective wetlands and tree buffer as part of the decommissioning of MRGO.



## Appendix

- I.      Players:
  - State and Federal Liaison / Public Interest / Non-Profit
  - Local Players
  - State Players
    - CWPPRA's Restoration Projects
  - Federal Players
- II.     Strategies
- III.    How to Improve Water Quality
- IV.    Los Islenos Cultural Timeline







**Figure 1.** Decentralized Players with Common Goals. Diagram includes the State and Federal Liaison / Public Interest / Non-Profit Players who surround the Local, State, and Federal Players

## I. Players:

### State and Federal Liaison / Public Interest / Non-Profit

As noted by the Coalition to Restore Coastal Louisiana (1998), restoration requires a single coastal plan with a clear, over arching strategic vision, a process for ensuring effective public input to restoration planning, and integration of restoration projects into the overall coastal management system.

#### 1. American Fisheries Society

*"The mission of the American Fisheries Society is to improve the conservation and sustainability of fishery resources and aquatic ecosystems by advancing fisheries and aquatic science and promoting the development of fisheries professionals."*

#### 2. American Rivers

*"American Rivers is the only national organization standing up for healthy rivers so our communities can thrive. Through national advocacy, innovative solutions and our growing network of strategic partners, we protect and promote our rivers as valuable assets that are vital to our health, safety and quality of life. Founded in 1973, American Rivers has more than 65,000 members and supporters nationwide, with offices in Washington, DC and the Mid-Atlantic, Northeast, Midwest, Southeast, California and Northwest regions."*

#### 3. America's WETLAND

*"In the largest public awareness initiative in its history, Louisiana is leading America's WETLAND: Campaign to Save Coastal Louisiana. The America's WETLAND Foundation through the Campaign is raising awareness of the impact of Louisiana's wetland loss and increase support for efforts to conserve and save coastal Louisiana."*

4. [www.brownmarsh.net](http://www.brownmarsh.net) (Salt Marsh Dieback in Louisiana, Brown Marsh Data Information Management System, investigators Dianne M. Lindstedt and Erick M. Swenson for Louisiana Sea Grant College Program, Coastal Ecology Institute, National Oceanic and Atmospheric Administration U.S. Department of Commerce, and Louisiana Department of Natural Resources, 2001 – 2006)

*"The research approach, in response to Governor Mike Foster's Executive Proclamation on October 23, 2003 declaring salt water marsh dieback in Louisiana a State of Emergency, led scientific teams to address five areas. These general areas include status and trends, causes, nutria, remediation and synthesis. The remediation team investigated various ways to restore stresses and destroyed marshes including seed collection, broadcast seeding, vegetative planting, fiber mats, sediment application, and engineering options."*

#### 5. Center for Planning Excellence

*"The Center for Planning Excellence (CPEX) is a non-profit organization that coordinates urban, rural and regional planning efforts in Louisiana. We provide best-practice planning models, innovative policy ideas, and technical assistance to individual communities that wish to create and enact master plans dealing with transportation and infrastructure needs, equitable housing opportunities, environmental issues, and quality design for the built environment. CPEX brings community members and leaders together and provides guidance as they work toward a shared vision for future growth and development."*

#### 6. Center for Watershed Protection

*"Arguably the nation's leading stormwater clearinghouse, the Center is known for distilling stormwater research, developing state and regional stormwater design manuals, and helping communities build post-construction stormwater programs. The Center has worked directly with numerous local and state agencies to provide effective stormwater solutions in geographically diverse settings around the country."*

#### 7. Coalition to Restore Coastal Louisiana

*"The idea for the Coalition to Restore Coastal Louisiana began in 1985 when a handful of far-sighted scientists, activists and policy advisors recognized that Louisiana's coast was the most important coastal area in the country and called for the creation of an organization to protect and restore these vanishing wetlands. Officially incorporated in 1988 the Coalition continues to represent the participation of many different interests from among businesses, local governments, scientists and concerned citizens from the conservation and religious communities."*

#### 8. Coastal Conservation Association

*"The stated purpose of CCA is to advise and educate the public on conservation of marine resources. The objective of CCA is to conserve, promote and enhance the present and future availability of these coastal resources for the benefit and enjoyment of the general public."*

#### 9. Ducks Unlimited

*"Ducks Unlimited conserves, restores and manages wetlands and associated habitats for North America's waterfowl. These habitats also benefit other wildlife and people."*

#### 10. Ecological Society of America

*"The Ecological Society of America (ESA) is a nonpartisan, nonprofit organization of scientists founded in 1915 to: promote ecological science by improving communication among ecologists; raise the public's level of awareness of the importance of ecological science; increase the resources available for the*



conduct of ecological science; and ensure the appropriate use of ecological science in environmental decision making by enhancing communication between the ecological community and policy-makers.”

#### 11. Environmental Defense Fund

“Environmental Defense Fund is a leading national non-profit organization representing more than 500,000 members. Since 1967, we have linked science, economics and law to create innovative, equitable and cost-effective solutions to society’s most urgent environmental problems.”

#### 12. Gulf Intracoastal Canal Association

“The mission of the Gulf Intracoastal Canal Association is to ensure the Gulf Intracoastal Waterway is maintained, operated and improved to provide the safest, most efficient, economical and environmentally-sound water transportation route in our nation, serving petrochemical facilities, refineries, farms, mines, ports, commercial fisheries, recreation and more. “

#### 13. Gulf Restoration Network

“The Gulf Restoration Network (GRN) is a network of environmental, social justice, and citizens’ groups and individuals committed to restoring the Gulf of Mexico to an ecologically and biologically sustainable condition. The GRN was formed in 1994 to raise awareness of environmental issues in Gulf States and to increase communication and coordination of member activities across the region. We are playing a pivotal role in providing our members and partners with the technical information, Gulf-wide networking opportunities, and communication that empowers local communities to successfully address the environmental threats that they face. “

#### 14. Lake Pontchartrain Basin Foundation

“As the public’s independent voice, the Lake Pontchartrain Basin Foundation is dedicated to restoring and preserving the water quality and habitats of the entire Lake Pontchartrain Basin. Through coordination of restoration activities, education, advocacy, monitoring of the regulatory process, and citizen action, LPBF works in partnership with all segments of the community to reclaim the Basin for this and future generations”

#### 15. Louisiana Coastal Area (LCA)

“A Science and Technology Program has been executed as a partnership between the State of Louisiana, the US Army Corps of Engineers, the US Geological Survey, and other Federal agencies for the purpose of improving Louisiana Coastal Area program performance.”

#### 16. Louisiana Environmental Action Network (LEAN)

“The purpose of the Louisiana Environmental Action Network (LEAN) is to foster cooperation and communication between individual citizens and corporate and government organizations in an effort to assess and mend the environmental problems in Louisiana. LEAN’s goal is the creation and maintenance of a cleaner and healthier environment for all of the inhabitants of this state.”

#### 17. Louisiana Land and Water Foundation

“The Louisiana Land and Water Foundation, a non-profit public charitable organization, was formed to help preserve, educate and rehabilitate Louisiana lands. Which includes all Louisiana: waters, lands, parks, beautification projects and wildlife.”

#### 18. Louisiana Ornithological Society (LOS)

“The Louisiana Ornithological Society (LOS) was organized in 1947 to gather and disseminate accurate information concerning the bird life of the western hemisphere and of Louisiana; to promote interest in and appreciation of the value of birds, both aesthetic and economic, which will ensure wiser conservation of our bird life; to promote opportunity for acquaintance and fellowship among those interested in nature; and to issue, at such times as possible or practicable, publications as a means of furthering these ends.”

#### 19. Louisiana Speaks

“Louisiana Speaks is a long-term planning initiative of the Louisiana Recovery Authority (LRA) that is supported with private funds provided through the LRA Support Foundation. In the wake of the destruction caused by Hurricanes Katrina and Rita, the Louisiana Speaks initiative works toward the development of a sustainable, long-term vision for South Louisiana. This work combines the efforts of local, state and federal partners along with many experts, stakeholders and citizens into a comprehensive approach that will guide recovery and growth over the next 50 years.”

#### 20. Louisiana Water Environment Association (LWEA)

“The Louisiana Water Environment Association (LWEA), a member association of the Water Environment Federation (WEF), is an open organization dedicated to the protection, promotion and enhancement of the water environment through: meeting the needs of our members for professional growth and development; and sharing information, expertise and resources with our members, the public and others on water environment issues.”

## 21. Louisiana Wildlife Federation (LWF)

*"Welcome to the Louisiana Wildlife Federation (LWF). We are a statewide, non-profit conservation education and advocacy organization established in 1940 to "restore, preserve, develop and increase the birds, fish, game, forestry, wild flowers and all other wildlife resources of the State of Louisiana." LWF represents a broad constituency of conservationists including hunters, fishers, campers, birders, boaters, and other outdoor enthusiasts who believe in constructive conservation and protection of our state's natural resources and the quality of the environment."*

## 22. Louisiana Wildlife Rehabilitators Association (LAWRA)

*"The Louisiana Wildlife Rehabilitators Association (LAWRA), incorporated in 1997 as a 501(c)(3) conservation-minded non-profit, supports Louisiana's wildlife and provides resources and assistance for wildlife rehabilitators. LAWRA is comprised of wildlife rehabilitators, veterinarians, conservationists, and other professionals from around Louisiana, all committed to restoring the health, ensuring the welfare, and safeguarding the future of Louisiana's wildlife."*

## 23. Lower Mississippi Riverkeeper

*"The mission of Lower Mississippi Riverkeeper is to protect, preserve and restore the ecological integrity of the Mississippi River Basin for current users and future generations through advocacy and citizen action."*

## 24. MRGO Must Go Coalition

*"The MRGO Must Go Coalition consists of environmental, social justice and neighborhood groups: American Rivers, CA-WIC, Coalition to Restore Coastal Louisiana, Common Ground Relief, Environmental Defense Fund, Gulf Restoration Network, Holy Cross Neighborhood Association, Lake Pontchartrain Basin Foundation, Levees.org, Louisiana Environmental Action Network, Louisiana Wildlife Federation, Lower Mississippi Riverkeeper, Lower Ninth Center for Sustainable Economic Development, MQVN Community Development Corporation, National Audubon Society, National Wildlife Federation, Sierra Club - Delta Chapter."*

## 25. National Audubon Society

*"Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity."*

## 26. Natural Resources Conservation Service, Plant Materials Program

*"The NRCS Plant Materials Program selects conservation plants and develops innovative planting technology to solve the nation's most important resource concerns. The Program includes*

*a network of 27 Plant Materials Centers (PMCs) and associated Plant Materials Specialists serving all 50 states and territories. To date, the program has released over 600 conservation plants, most being grown by commercial growers. For over 70 years, PMCs and Specialists have provide essential and effective plant solutions for critical habitats, environmental concerns, management practices, and key farm and ranch programs."*

## 27. National Wildlife Federation

*"National Wildlife Federation inspires Americans to protect wildlife for our children's future. We provide resources for media through our Newsroom including press releases, fact sheets, and reports. We are joined in our effort to protect wildlife by our affiliated wildlife organizations located in 48 states and territories."*

## 28. The Nature Conservancy

*"The Nature Conservancy's mission is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. We have developed a strategic, science-based planning process, called Conservation by Design, which helps us identify the highest-priority places—landscapes and seascapes that, if conserved, promise to ensure biodiversity over the long term."*

## 29. People Protecting Animals and Their Habitats (PATH)

*"People Protecting Animals & Their Habitats-PATH advocates for the humane treatment of all animals, as well as the conservation and protection of areas that are vital to the survival of endangered or threatened species. We accomplish this by providing communities with educational and vocational opportunities that provide realistic and sustainable solutions that both improve the quality of animal's lives, and stop habitat destruction."*

## 30. Resource Environmental Solutions

*"Resource Environmental Solutions is a wetlands mitigation company specializing in wetland mitigation and bank management. As a mitigation bank, we acquire land, restore original wetland features and protect the land in perpetuity. This primary component of our business serves two functions: 1) restoration, enhancement and preservation of wetland ecosystems; and 2) sales of compensatory wetland mitigation credits to local developers and municipalities. Our efforts as a mitigation bank are both financially valuable to our investors and environmentally beneficial to surrounding communities."*

## 31. Restore America's Estuaries

*"Restore America's Estuaries is a national 501(c)(3) non-profit organization established in 1995. Our mission is to preserve the nation's network of estuaries by protecting and restoring the lands and waters essential to the richness and diversity of coastal life."*

### 32. Restore or Retreat, Inc.

*“Restore or Retreat (ROR) is a non-profit coastal advocacy group created by coastal Louisiana residents and stakeholders who recognize that the Barataria and Terrebonne basins are the two most rapidly eroding estuaries on earth, and that this erosion represents an economic and ecological crisis. With a growing membership of over 250 businesses and individuals, ROR seeks to identify and expedite the implementation of aggressive, large-scale restoration projects to protect this irreplaceable region.”*

### 33. Trust for Public Land (TPL)

*“The Trust for Public Land (TPL) is a national, nonprofit, land conservation organization that conserves land for people to enjoy as parks, community gardens, historic sites, rural lands, and other natural places, ensuring livable communities for generations to come.”*

### 34. Waterkeeper Alliance

*“Waterkeeper Alliance connects and supports local Waterkeeper programs to provide a voice for waterways and their communities worldwide. To champion clean water and strong communities, Waterkeeper Alliance: 1) Supports and empowers member Waterkeeper organizations to protect communities, ecosystems and water quality; 2) Promotes the Waterkeeper model for watershed protection worldwide; and 3) Advocates for issues common to Waterkeeper programs.”*

### 35. Wildlife Habitat Council (WHC)

*“The Wildlife Habitat Council (WHC) is a nonprofit, non lobbying 501(c)(3) group of corporations, conservation organizations, and individuals dedicated to restoring and enhancing wildlife habitat. Created in 1988, WHC helps large landowners, particularly corporations, manage their unused lands in an ecologically sensitive manner for the benefit of wildlife. More than 2 million acres in 48 states, Puerto Rico, and 16 other countries are managed for wildlife through WHC-assisted projects.”*

## Local Players

### 1. Lake Borgne Basin Levee District

### 2. Office of Coastal Zone Management (St. Bernard Parish Government)

*“The Office of Coastal Zone Management processes applications for Coastal Use Permits (CUPs) and serves as a liaison between St. Bernard Parish and all state and federal coastal wetlands regulatory agencies. All CUP applications received and processed by the office are advertised and publicly heard before Coastal Zone Advisory Committee (CZAC).”*

### 3. Orleans Levee District

### 4. St. Bernard Port, Harbor and Terminal District

## State Players

1. CPRA (Because of the devastation of hurricanes Katrina and Rita, in December 2005, the Louisiana Legislature restructured the State’s Wetland Conservation and Restoration Authority to form the Coastal Protection and Restoration Authority ,CPRA).

*“The CPRA is now established as the single state entity with authority to articulate a clear statement of priorities and to focus development and implementation efforts to achieve comprehensive coastal protection for Louisiana. The CPRA is working closely with other entities on coastal issues, including the state legislature, the Governor’s Advisory Commission on Coastal Protection, Restoration, and Conservation; the Louisiana Recovery Authority (LRA); and the LRA’s Louisiana Speaks regional planning process.*

*The Coastal Protection and Restoration Authority’s mandate is to develop, implement and enforce a comprehensive coastal protection and restoration master plan. For the first time in Louisiana’s history, this single state authority will integrate coastal restoration and hurricane protection by marshalling the expertise and resources of the Department of Natural Resources, the Department of Transportation and Development, and other state agencies, to speak with one clear voice for the future of Louisiana’s coast. Working with federal, state and local political subdivisions, including levee districts, the CPRA will work to establish a safe and sustainable coast that will protect our communities, the nation’s critical energy infrastructure, and our bountiful natural resources for generations to come. The CPRA of Louisiana was established by Act 8 of the 1st Extraordinary Session of 2005.*

*Agencies in the CPRA membership include the following: the secretaries of the Department of Natural Resources (DNR); the Department of Transportation and Development (DOTD); the Department of Environmental Quality; the Department of Wildlife and Fisheries; the Department of Economic Development; the commissioners of the Department of Agriculture and Forestry; the Department of Insurance; and the Division of Administration; the director of the state Office of Homeland Security and Emergency Preparedness; and the chair of the Governor’s Advisory Commission on Coastal Protection, Restoration, and Conservation. Additionally, the CPRA membership includes two executive board members of the Police Jury Association of Louisiana and three levee district presidents from coastal Louisiana.”*

2. Coast2050 (Louisiana Coastal Wetlands: Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority, Louisiana Department of Natural Resources, 1998)

*“To sustain a coastal ecosystem that supports and protects the environment, economy and culture of southern Louisiana,*



and that contributes greatly to the economy and well-being of the nation.”

Coast 2050 strategies include: (listed also on p. 37)

- Beneficial use of dredged material from maintenance operations
- Dedicated dredging for wetland creation
- Herbivory control (nutria, muskrats)
- Stabilization of major navigation channels
- Maintenance of bay and lake shoreline integrity
- Management of pump outfall for wetland benefits
- Vegetative planting
- Maintain or restore ridge functions
- Terracing (accompanied by vegetative planting, is an effective means of marsh habitat creation in areas with soils of suitable mineral content. Functions and values of terraces include nursery habitat, fetch reduction, and sediment trapping in addition to promoting conditions conducive to growth of submerged aquatic vegetation)

3. CWPPRA (Congress passed the Coastal Wetlands Planning, Protection and Restoration Act in 1990. It funds wetland enhancement projects nationwide, designating approximately \$60 million annually for work in Louisiana.)

CWPPRA's Restoration Projects (within Bayou Bienvenue Central Wetland Unit area of interest) <http://www.lacoast.gov/projects/list.asp>

- Lake Borgne and MRGO Shoreline Protection (PO-32)

Approved Date: 2003

Project Area: 465 acres

Approved Funds: \$1.35 M

Total Est. Cost: \$17.20 M

Net Benefit after 20 Years: 266 acres

Status: Engineering and Design

Project Type: Shoreline Protection

“The objective of this project is to preserve the marsh between Lake Borgne and the MRGO by preventing shoreline erosion. In order to accomplish this objective, an 18,500 linear foot rock dike will be constructed along the Lake Borgne shoreline from Doulluts Canal to Jahnckes Ditch. A 14,250 linear foot rock dike will also be constructed along the north bank of the MRGO from Doulluts Canal to Lena Lagoon. Both dikes will have a layer of armor stone placed on top of a crushed stone core resting on a layer of geotextile fabric. Any flotation channel needed will be excavated with the spoil being placed behind the rock dikes. Gaps may be constructed in the dikes to allow organisms and water to move freely.”

- Lake Borgne Shoreline Protection (PO-30)

Approved Date: 2001

Project Area: 192 acres

Approved Funds: \$18.40 M

Total Est. Cost: \$25.30 M

Net Benefit after 20 Years: 165 acres

Status: Construction

Project Type: Shoreline Protection

“The project’s objectives include: preventing and reducing Lake Borgne shoreline retreat in the areas adjacent to Old Shell Beach and Bayou Dupre in order to mitigate further joining of the lake and MRGO; reestablishing a sustainable lake rim; and preventing or reducing conversion of emergent marsh to open water. Continuous rock breakwaters will be constructed onshore approximately 17,000 feet from Doulluts Canal to Fort Bayou (Shell Beach) to provide shoreline protection. The protection will tie into the existing rock breakwater structure which surrounds the perimeter of Old Fort Beauregard (Fort Proctor). Additional onshore rock breakwaters will be constructed approximately 6,643 feet west and 4,418 feet southeast of Bayou Dupre. A back-to-back steel sheetpile structure will tie the proposed rock structures into the existing offshore U.S. Army Corps of Engineers rock breakwater along MRGO.”

- Lake Borgne Shoreline Protection at Bayou Dupre (PO-31)

Approved Date: 2002

Project Area: 98 acres

Cost: Not Available

Net Benefit after 20 Years: 83 acres

Status: Engineering and Design

Project Type: Shoreline Protection

“The project’s objectives include: preventing and reducing Lake Borgne shoreline retreat in the area adjacent to Bayou Dupre to mitigate further joining of the lake and MRGO; reestablishing a sustainable lake rim; preventing or reducing conversion of emergent marsh to open water; and creating a suitable area for the beneficial use of dredged material removed from MRGO. Continuous near shore rock breakwaters will be constructed 1.2 miles to the east and 1.6 miles to the west of Bayou Dupre. The breakwaters will tie into those already present along the north bank of MRGO and extend into the lake to the 2-foot contour depth line. There will be openings in the breakwaters at a minimum of every 1,000 feet, and offset breakwaters will be built in front of these openings.”

- Central Wetlands Pump Outfall

State Project Number: PO-08

Project Priority List (PPL): N/A

Project Type: Freshwater Diversion

Construction Completion Date: 1992

Description:

“This project is designed to provide freshwater, nutrients, and sediment associated with storm water runoff to an area of marsh near the Violet Siphon, PO-01.”

- Violet Freshwater Distribution (Deauthorized)

State Project Number: PO-09a

Project Priority List (PPL): 03

Federal Sponsor: Natural Resources Conservation Service (NRCS)

Project Type: Hydrologic Restoration

Construction Completion Date: Deauthorized

Description:

*"The objective of the outfall management plan was to optimize the use of freshwater and sediment supplied by the existing siphons by managing water flow through the area. This would be accomplished by reducing channelized flow and routing the diverted flow across marshes or through shallow water areas instead of through larger channels. This project was officially deauthorized by the Breaux Act Task Force in October of 2001."*

- Violet Siphon Diversion

State Project Number: PO-01

Project Priority List (PPL): N/A

Project Type: Freshwater Diversion

Construction Completion Date: 1992

Description:

*"The purpose of this project is to return into operation the existing siphon, and to enlarge the size of the diversion so that more sediment and freshwater are available to offset marsh subsidence and saltwater intrusion. "*

- Bayou Bienvenue Pump Station Diversion and Terracing (Deauthorized)

State Project Number: PO-25

Project Priority List (PPL): 08

Federal Sponsor: National Marine Fisheries Service (NMFS)

Project Types: Hydrologic Restoration, Marsh Creation

Construction Completion Date: Deauthorized

Description:

*"This project was intended to combine the use of existing pump stations with the construction of a diversion channel, water control structures, and earthen terraces planted with smooth cordgrass (*Spartina alterniflora*). This will force the flow of freshwater and nutrients through a deteriorated marsh area to abate site-specific marsh loss. The project was officially deauthorized by the Breaux Act Task Force in April 2002."*

*"27,000 acre project located southeast of Yscloskey along the upper reaches of bayou Bienvenue in St. Bernard and Orleans Parishes. Construction calls for managing stormwater discharge from 3 pumping stations. By diverting freshwater into natural marshes and through a system of planted marsh terraces to be created by the project, wetland growth will be promoted, salinity spikes will be reduced and general environmental conditions will be improved. Cooperative Agreement awarded June 1, 2000. Preliminary design analyses indicate that terrace construction significantly more costly than originally estimated due to poor geotechnical condition. The project is estimated to cost between \$17 and \$20 million to build."*

- 4. CRMS (Coastwide Reference Monitoring System funded by CWPPRA)

*"CRMS is a multiple reference approach that uses aspects of hydrogeomorphic functional assessments and probabilistic sampling. This approach includes a suite of sites that encompass the range of ecological conditions for each stratum, with projects placed on a continuum of conditions found for that*

*stratum. Trajectories in reference sites are then compared with project trajectories through time. The approach could serve as a model for evaluating wetland ecosystems."*

- 5. Department of Agriculture and Forestry

*"LDAF, a department serving under the commissioner of agriculture, an elected official, is responsible for the development and growth of markets for Louisiana agricultural products. It provides agricultural and environmental services, pesticide waste control, agro-consumer services, animal health services, and forestry programs. LDAF is also given the responsibility for promotion, protection, and advancement of agriculture, except research and educational functions expressly allocated to other departments."*

- 6. Department of Environmental Quality

*"DEQ, department directly under the governor and civil service, is charged with the administration and enforcement of environmental laws to ensure a healthful and safe environment. This includes air quality, water quality, the regulation of solid and hazardous waste, and the regulation of radiation."*

- 7. Department of Natural Resources

*"DNR, a department directly under the governor and civil service, helps with the conservation, regulation, and development of state natural resources (except timber, fish, and wildlife, which are designated to the Department of Wildlife and Fisheries). DNR also provides coastal restoration and management."*

- 8. Department of Transportation and Development

*"DOTD, a department directly under the governor and civil service, is generally responsible for transportation within the state: airports, highways, bridges, railroads, waterways, intermodal transportation, public transportation, and mass transit. Public works and flood and drainage control also fall under DOTD's control."*

- 9. Department of Wildlife and Fisheries

*"LDWF, a department directly under the governor and civil service, sponsors programs related to wildlife and fish, including research and replenishment. LDWF maintains natural wildlife areas within the state. Its agents patrol the scenic rivers and game preserves of Louisiana, providing regulation of hunting and fishing. "*

- 10. Louisiana Recovery Authority (LRA)

*"The mission of the Louisiana Recovery Authority is to ensure that Louisiana rebuilds safer, stronger and smarter than before. There are five areas of focus: securing funding and other resources needed for the recovery, establishing principles and*

policies for redevelopment, leading long-term community and regional planning efforts, ensuring transparency and accountability in the investment of recovery funds, and communicating progress, status and needs of the recovery to officials, community advocates and the public. Throughout its initiatives, the LRA is committed to a recovery and rebuilding process that is fair and equitable to everyone.”

## Federal Players

1. Bayou Sauvage National Wildlife Refuge (U.S. Fish and Wildlife Service, established 1990, authorizes under the Emergency Wetland Act in 1986 by President Ronald Reagan)

“Approximately 13,000 acres of freshwater marsh, approximately 9,000 acres of brackish marsh, with about 400 acres of bottomland. Approximately 400,000 visitors generate \$15 million annually. Administered under the Southeast Louisiana Complex.”

“To enhance the population of migratory, shore and wading birds, to encourage natural diversity of fish and wildlife species, to protect endangered and threatened plants and animals, to fulfill the international treaty obligations of the nation with respect to fish and wildlife, to protect archaeological resources, to provide.”

2. EPA Wetland Regulatory Authority (Section 404 of the Clean Water Act, CWA, establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Federal resource agencies include U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service and National Marine Fisheries Service.) [www.epa.gov/owow/wetlands/regs/](http://www.epa.gov/owow/wetlands/regs/)

“The basic premise of the program is that no discharge of dredged or fill material may be permitted if: (1) a practical alternative exists that is less damaging to the aquatic environment, or (2) the nation’s waters would be significantly degraded.”

3. CIAP [The Coastal Impact Assistance Program (CIAP) was authorized by Section 384 of the Energy Policy Act of 2005, to assist coastal producing states and their political subdivisions (parishes, counties, and boroughs) in mitigating the impacts from Outer Continental Shelf (OCS) oil and gas production. Louisiana is one of the seven coastal states selected to receive funds under this appropriation to implement this program. June 2007]

“CIAP legislation appropriated \$250 million per year for Fiscal Years 2007 through 2010 to be distributed among eligible producing States and their coastal political subdivisions, or CPSs(in Louisiana’s case, the Governor designated Louisiana Department of Natural Resources to interact with U.S. Department of the Interior. The plan components involving proposed expenditures of the State’s share of CIAP funds include the fol-

lowing major categories:

- Enhanced Management of Mississippi River and Water Sediment
- Protection and Restoration of Critical Land Bridges
- Barrier Shoreline Restoration and Protection
- Interior Shoreline Protection
- Marsh Creation with Dredged Material
- Coastal Forest Conservation Initiative
- Infrastructure Projects to Mitigate Onshore OCS Impacts

4. National Sierra Club

“The Delta Chapter is the Sierra Club in the State of Louisiana. We advance the cause of protecting Louisiana’s environment in a variety of ways, including lobbying the state legislature in Baton Rouge, sponsoring a Mercury Public Education Campaign, raising public awareness about climate change, and working to keep the Atchafalaya Basin, America’s greatest river swamp, wet and wild. In addition, we encourage our members to get outside and enjoy our beautiful planet.”

5. National Park Service (NPS)

“Beyond national parks, the National Park Service helps communities across America preserve and enhance important local heritage and close-to-home recreational opportunities. Grants and assistance are offered to register, record and save historic places; create community parks and local recreation facilities; conserve rivers and streams, and develop trails and greenways.”



## II. Strategies

### 1. Moist-soil Management Report Summary (Corps of Engineers, October 1999)

*"The use of moist-soil impoundments is especially effective for managing waterfowl habitat in areas of declining wetland acreage. This technique promotes production of naturally occurring wetland vegetation by emulating natural wetland functions. This report describes the design and construction of moist-soil impoundments, including desirable site characteristics, levee construction and placement, water delivery systems, and control structures. The stewardship value of moist-soil impoundments is discussed, and recommendations are given for managing impoundments as single structures or as complexes of smaller units. Strategies are presented for controlling undesirable vegetation and for managing impoundments to accommodate a diversity of wildlife species. The application of moist-soil impoundments to an ecosystem management approach on Corps projects is emphasized."*

### 2. Waterfowl Management Handbook, 13.4.6 Strategies for Water Level Manipulations in Moist-soil Systems (United States Department of the Interior, Fish and Wildlife Service 13.4.6, 1991)

*"Water level manipulations are one of the most effective tools in wetland management, provided fluctuations are well timed and controlled. The size and location of water level control structures are important, but timing, speed, and duration of drawdowns and flooding also have important effects on plant composition, plant production, and avian use."*

### 3. Coast2050 Strategies:

- Beneficial use of dredged material from maintenance operations
- Dedicated dredging for wetland creation
- Herbivory control (nutria, muskrats)
- Stabilization of major navigation channels
- Maintenance of bay and lake shoreline integrity
- Management of pump outfall for wetland benefits
- Vegetative planting
- Maintain or restore ridge functions
- Terracing (accompanied by vegetative planting, is an effective means of marsh habitat creation in areas with soils of suitable mineral content. Functions and values of terraces include nursery habitat, fetch reduction, and sediment trapping in addition to promoting conditions conducive to growth of submerged aquatic vegetation)

#### Coast2050 Background

- *"The evidence is irrefutable: south Louisiana is washing away and endangering state and national resources in the process. The U.S. Geological Survey estimates that Louisiana has*

*lost approximately 1,900 square miles of its coast since 1932. If present trends continue, the state will lose another 500 square miles by 2050.*

*Many factors have contributed to these extreme loss rates, but the Mississippi River levees have had the greatest impact. Before the levees were built, the river's floods washed over the wetlands each year, replenishing the marsh with water and sediment. Today, however, the river's flow is channeled into the Gulf of Mexico, effectively starving the wetlands of the material they need to survive. Navigation channels and oil and gas canals have also introduced salt water into the marshes and disrupted the natural flow of water throughout the ecosystem. In a region that already tends to compact and subside particularly in the face of rising sea level, these human-induced stressors have created a crisis. If the wetlands continue to disappear, globally significant habitat and nationally important infrastructure will be damaged, coastal communities will be abandoned, and millions of lives will be disrupted." (State of Louisiana Wetlands Conservation and Restoration Plan, Fiscal Year 2004-2005, the State Wetlands Conservation and Restoration Authority, February 2004)*

- *"Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Water saturation (hydrology) largely determines how the soil develops and the types of plant and animal communities living in and on the soil. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils." (United States Environmental Protection Agency Office of Wetlands, Oceans and Watersheds)*

### III. How to Improve Water Quality

#### 1. Mississippi River Freshwater Diversion

#### 2. Bio-remediation

##### a. Stormwater detention before entering wetland

*“Urbanization dramatically alters the natural hydrologic cycle. As urban structures such as roads and buildings are built, the amount of impervious area within a watershed increases. Increases in impervious area increase the volume and rate of runoff, while decreasing groundwater recharge. Urbanization also increases the type and amount of pollutants in surface runoff.*

*Older approaches to stormwater management have focused on efficiently collecting and conveying stormwater offsite. This approach can increase downstream property damage and impacts on receiving water. Newer approaches to stormwater management seek to retain natural features of drainage systems and provide onsite management to address water quality and water quantity goals. This approach views stormwater as a resource to be used to recharge groundwater and to supply fresh water to surface waters, including wetlands. Properly managing stormwater can avoid problems with erosion, flooding, and adverse impacts on natural drainage features, including wetlands.”*(Natural Wetlands and Urban Stormwater: Potential Impacts and Management, United States Environmental Protection Agency Office of Wetlands, Oceans and Watersheds, February 1993)

##### b. Within wetland

*“As stormwater runoff passes through a wetland, its quality often changes and the changes tend to be variable and difficult to predict. The ability of a wetland to remove pollutants from water has typically been the predominant reason cited to promote the use of wetlands for stormwater runoff treatment. Physical, chemical, and biological qualities of the soil substrate change in wetlands as they are subjected to stormwater runoff. Soils are storage facilities for many potentially toxic compounds including heavy metals. Physical property changes of wetland soils due to stormwater runoff include texture, particle size and distribution, and degree of saturation. Chemical property changes in the soil typically reflect sedimentation patterns. Biological activity within wetland soils is also subject to change due to changing conditions. Changes in water quality, chemistry and sediment loading, have the potential to affect the vegetative community structure and to reduce the availability of plant species preferred by fish, mammals, birds, and amphibians for food and shelter.*

*An impoundment is defined as a body of water confined by a dam, dike, floodgate, or other barrier. Often the impoundment of a wetland results in changes in the wetland. These changes may result in such extreme modifications that the functional characteristics of a wetland, such as hydrology, soils, or water quality, are affected. Shallow water impoundments have been*

*shown to be both potentially beneficial and potentially detrimental to the fluctuations of the impounded wetland systems.*(Natural Wetlands and Urban Stormwater: Potential Impacts and Management, United States Environmental Protection Agency Office of Wetlands, Oceans and Watersheds, February 1993)

#### 3. Water Treatment Plant

##### a. Mechanical Treatment Alternatives

*Constructed Treatment Wetlands (method employed by United States Environmental Protection Agency) “Constructed wetlands are treatment systems that use natural processes involving wetland vegetation, soils, and their associated microbial assemblages to improve water quality. The most important function is water filtration. Suspended solids become trapped by vegetation and settle out. Other pollutants are transformed to less soluble forms taken up by plants or become inactive. Wetland plants also foster the necessary conditions for microorganisms to live there. Through a series of complex processes, these microorganisms also transform and remove pollutants from the water.*

*While not all constructed wetlands replicate natural ones, it makes sense to construct wetlands that improve water quality and support wildlife habitat. Constructed wetlands can be a cost effective and technically feasible approach to treating wastewater. Wetlands are often less expensive to build than traditional wastewater treatment options, have low operating and maintenance expenses and can handle fluctuating water levels. Additionally, they are aesthetically pleasing and can reduce or eliminate odors associated with wastewater.*

*Wetlands Assimilation (Wetlands Assimilation Pre-Design Project Team, Sewerage and Water Board of New Orleans and St. Bernard Parish) Gary Schaffer, Sara Mack, Royal Engineers and Consultants*

*“Plans to implement wetland assimilation of the East Bank Sewage Treatment Plant and the wastewater treatment plants located in St. Bernard Parish. Treatment plants include East Bank STP, Dravo STP, Munster STP, and Riverbend STP.”*

##### b. Traditional Chemical Treatment

#### IV. Los Islenos Cultural Timeline

*"Beginning in the 1300s, kingdoms in the Iberian Peninsula (predating the establishment of the Kingdom of Spain) began searching for gold and other mineral wealth to enrich their realms. King Henry of Castille commissioned Jean de Bethancourt to explore and colonize the Canary Islands, which he began with the conquest of Lanzarote Island in 1399 and ended with the conquest of Tenerife in 1496. The Canaries became the first colonial territory of the Spanish Empire.*

*Christopher Columbus' last stop before discovering the New World was Las Palmas de Gran Canaria. Because of their geographic location, the Canaries became the unquestioned gateway to the Americas throughout the period which sailing craft dominated the seas. The islands, situated off the African coast were located at about one-third the distance along the sailing route to the West Indies and are the last land mass lying between Europe, Africa and the Americas. The Canarian chain consists of thirteen islands of which seven are inhabited. St. Bernard was settled by colonists from each of the inhabited islands which are named Fuerteventura, Lanzarote, Gran Canaria, Hierro, Tenerife, LaPalma and Gomera.*

*The Canary Islands became a proving ground for policies, which were utilized in the administration of the Spanish Empire. Slavery and the cultivation of sugar cane were introduced to the Americas through the Canaries. Canary Islanders or Isleños formed the vanguard of colonists in colonization programs throughout the Spanish Empire. Canarians settled in Cuba, Venezuela, Puerto Rico, Paraguay, Santo Domingo, the Philippine Islands and other areas throughout the Spanish Empire. Colonists predominately from Gran Canaria founded San Antonio, Texas in 1731.*

*France ceded Louisiana to Spain and Great Britain in 1766 following the French and Indian War. Spain acquired that part of Louisiana lying west of the Mississippi River and the Island of Orleans, an area east of the Mississippi including New Orleans. Early in the 1770's Spanish officials learned that the British were planning to invade and occupy the Province of Louisiana, using the province as a base from which to attack Mexico and deprive Spain of the vast deposits of Mexican silver and gold. The British attempted to realize their plans almost fifty years later during the Battle of New Orleans.*

*Consequently, Spanish administrators started developing Louisiana as a barrier between Mexico and the British colonies east of the Mississippi River. Reacting to successful British colonization efforts along the Gulf Coast in British West Florida, Spain settled thousands of immigrants from Malaga and the Canaries, as well as Acadian refugees, in Louisiana. The settlers came to Louisiana to increase production of food, populate the province and defend it against the projected British invasion.*

*The first Isleños arrived in Louisiana during 1778 and*

*continued to arrive in the province until 1783. They were settled in four locations, strategically placed around New Orleans to guard approaches to the city.*

*Galveztown, situated just below Baton Rouge, was the first settlement. The others were Valenzuela, located along Bayou Lafourche; Barataria, located along Bayou des Familles in Jefferson Parish; and La Concepcion, later San Bernardo, located in St. Bernard Parish along Bayou Terre-aux-Boeufs. A fifth settlement for Bayougoulas was planned, but never completed.*

*Isleños fought against the British during the American Revolution through their service in the Galvez Expedition. Militiamen from the four Isleño settlements, including San Bernardo, participated in the three major military campaigns (Baton Rouge, Mobile and Pensacola) of the expedition, which resulted in the expulsion of the British presence from what is now the United States Gulf Coast.*

*The male inhabitants of Terre-aux-Boeufs and the river area, including Plaquemines, were organized into the Volunteers of the Mississippi during the 1780's. This regiment of militia remained intact and was incorporated in the state militia after 1803 as the Third Regiment of Louisiana Militia. In September of 1814, news of a possible British invasion began to circulate along Bayou Terre-aux-Boeufs, and arouse concerns among the Canarian farmers. The Isleños were organized into three of the regiment's companies.*

*The Third Regiment was called to active service on December 16, 1814 to help defend against the British invasion. They had very few weapons, relying on their shotguns as their primary weapons. Many did not own shotguns, and some served unarmed. Their officers furnished a small number of weapons, but the government supplied none. The Isleños fought in the night battle of December 23, 1814 and sustained the worst property losses and hardships resulting from the British invasion of Louisiana.*

*Bernardo de Galvez was governor of Louisiana when the Isleños arrived. Galvez took a personal interest in the Canarian settlers, many of whom had been "recruited" for service in Louisiana during Mat, as de Galvez's governorship of the Canaries (Matias was Bernardo's father.) The Spanish government had houses constructed for the Canarian colonists and their families and awarded small grants of land to each Isle colonist. These land grants were awarded according to the size of each family. Hence, larger families received greater acreage. Subsidies of food, cloth and tools, as well as annual subsidies of money were given by Spain to most Isleños colonists. The government's subsidies began in 1778 and continued in St. Bernard until the settlement was declared self-sustaining in 1785.*

*Of the four Isleño settlements, San Bernardo was most successful. Established along the banks of Bayou Terre-aux-Boeufs, an abandoned channel of the Mississippi River, the Isleño farmers of San Bernardo provided the New Orleans market*



with the majority of garlic, onions, beans, potatoes and poultry consumed in the city in the late 18th and early 19th centuries.

The settlement of St. Bernard began in 1779 on land, which was donated to the King of Spain for the colonization of Canary Islanders by Pierre Phillipe de Marigny. St. Bernard was settled by two successive groups of Isleño families.

The first group arrived in 1779 and settled an area extending from Poydras Plantation to Contreras Plantation, establishing settlements now known as St. Bernard and Toca Villages. This settlement was originally called "el Primero Poblacin," or the First Settlement. Isleños from Gomera Island were among the first to settle in "el Segundo Poblacin," or the Second Settlement, during 1783.

Eventually, this settlement was named Benchijigua after a mountain and region in Gomera from which several colonists had originated. The settlement name was later corrupted to Bencheque by French-speaking sugar planters and is currently known as Reggio. Originally, the Bencheque-Reggio settlement extended roughly from Verret through Woodlake.

Isleño colonists from Tenerife brought the tradition of domesticating cattle to St. Bernard. Ranchers throughout Louisiana and eastern Texas brought herds of cattle to St. Bernard Village for training by Isleños, who became renowned for their ability to domesticate animals. The tradition of cattle training evolved in Tenerife because of a scarcity of horses and mules. Tenerfenos were forced to utilize oxen in the cultivation of crops throughout the island. In addition to cattle training and farming, Isleños in the 19th century worked on the sugar plantations, harvesting sugar cane and cypress.

Drayage performed by ox-drawn carts declined rapidly following the establishment of the Mexican Gulf Railroad in 1836, one of the earliest railroads in the South. By the 1840's, the railroad had begun to penetrate the Terre-aux-Boeufs section of eastern St. Bernard Parish in fulfillment of plans to establish a deep water port connecting the Mississippi Sound to New Orleans and serve the sugar plantations and vegetable farms located in that area. After several years of vigorous opposition by Isleño farmers and draymen, railroad construction was completed to Lake Borgne at what became Old Shell Beach by 1850. The bulk of sugar cane, produce and wild game harvested in St. Bernard Parish was shipped to New Orleans using the railroad after the War Between the States.

The homes of the Isleños along Bayou Road were virtually identical to the numerous houses of small farmers residing above and below New Orleans along the Mississippi River. They typically consisted of four rooms with porches in the front and rear. Two small storage rooms flanked either side of the rear porch. The homes were covered most frequently with steeply pitched gabled roofs. The kitchens were always detached from the residence. Other outbuildings included barns, corncribs,

chicken coops and stables for livestock.

Isleño social life was centered on the family and Roman Catholicism. Three and occasionally four generations of Isleño families lived together on farms along Bayou Terre-aux-Boeufs. Families ate all meals together and were dominated by the eldest male family member or patriarch. Isleños celebrated religious feast days with great ceremony, followed by much dancing and the consumption of large amounts of food.

St. Bernard Church, established in 1785, became the first church parish below New Orleans. The first permanent church building was begun in 1787 and built at the geographic center of the Isleño settlements along Bayou Terre-aux-Boeufs. Public proclamations were posted on the doors of the church from the colonial era until the War between the States. Public meetings were held on the grounds in front of the church and the local militia was periodically mustered there during the colonial period. Founded in 1787, the St. Bernard Cemetery began in the churchyard, but burials were soon moved directly opposite the church. This is one of the oldest existing burial grounds in Louisiana. The cemetery is the burial place of the original Isleño colonists in St. Bernard.

Manuel Solis and Antonio Mendez, two officials in the Spanish administration of Colonial Louisiana, perfected the process of granulating sugar at their plantation in Woodlake in 1787. By the early 1790s, sugar cane was rapidly replacing indigo as the major cash crop of Louisiana. The soil and climatic conditions below New Orleans proved particularly conducive to the cultivation of sugar cane. Sugar planters began purchasing Isleño land grants and gradually amassed large estates along Bayou Terre-aux-Boeufs. At least ten large sugar plantations were established by the 1840s in the former Isleño settlements.

After selling their land grants to the planters, the Isleños frequently worked on the plantations they helped to create. Those who tired of plantation work began to resettle in the easternmost reaches of St. Bernard around the 1820s resulting in the firm establishment of Delacroix Island fishing community before the Civil War. By the end of the nineteenth century, Yscloskey and Shell Beach near Lake Borgne were thriving communities inhabited primarily by Isleño commercial fishermen. Seafood harvested by these fishermen in the 1800s and 1900s supplied New Orleans restaurants with a seemingly inexhaustible supply of shrimp, fish and crabs.

Trapping of fur bearing animals, which had always been important to Louisiana since its inception as a French colony, became a particularly important livelihood for the Isleños following the Civil War. Before World War II, the marshes of St. Bernard Parish were nationally recognized for their abundance of mink, muskrat and other fur bearing animals, all of which produced pelts, which were highly prized in the manufacture of coats and clothing. Many Isleños enjoyed a new prosperity resulting from their pursuit of trapping and commercial

*fishing. The fur industry was a multi-million dollar industry in Louisiana prior to the 1940s.*

*Hunting was another important occupation of the Canary Islanders who migrated to Louisiana. Isleños hunted not only to partially sustain their households, but also to supply a commercial market in New Orleans with game. Ducks were the most highly sought after type of game commercially.*

*Improved roads begun in the 1920s gradually opened eastern St. Bernard Parish to the remainder of southeast Louisiana. The Isleños who had been previously isolated began traveling outside the fishing communities of eastern St. Bernard to sell seafood and fur pelts.*

*Following World War II, many Isleños returning home began to seek work opportunities in the large industrial facilities, which developed along the Mississippi River in the 1940s and 1950s. Their children were reared outside the traditional Isleño cultural environment and did not learn to speak Spanish. Today, thousands of Isleño descendants live throughout the metropolitan New Orleans area.*

*Nevertheless, the elderly Isleños still speak an archaic Spanish dialect, brought to Louisiana more than two centuries ago. They have preserved to a large extent, their distinct cultural identity. Today, the Isleño communities of St. Bernard Parish survive as the last living vestige of Spanish Colonial Louisiana.”*  
 (<http://www.losislenos.org/history.htm>)

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