

**LOUISIANA COASTAL PROTECTION AND RESTORATION FINAL  
TECHNICAL REPORT**

**PROGRAMMATIC  
CUMULATIVE EFFECTS ANALYSIS**

**APPENDIX**

**JUNE 2009**



**U. S. Army Corps of Engineers  
New Orleans District  
Mississippi Valley Division**

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# Programmatic Cumulative Effects Analysis

## FINAL APPENDIX

JUNE 2009

### 1.0 INTRODUCTION

A determination was made by the Louisiana Coastal Protection and Restoration (LACPR) team, with concurrence and guidance from the Corps Vertical Team, that adequate technical development of any alternative plan to a degree that would support specific recommendations for action was not feasible. Therefore at this stage of development no attempt is being made to indicate formulation or selection of a “preferred” alternative. Since a “preferred alternative” is not being proposed by this technical report, an environmental analysis is not being conducted as required by the National Environmental Policy Act and the Council on Environmental Quality regulations. However, questions arose concerning the potential cumulative effects of implementing alternatives under consideration in the LACPR report along with the other significant activities currently under construction or planned in the future for hurricane protection and coastal restoration. Based on this, a broad based programmatic cumulative effects analysis (PCEA) was initiated to assess the potential long-term effects of implementing the LACPR comprehensive alternatives. Due to the short deadline established, the team decided to develop a GIS database to create a visual picture of the other potential projects proposed as related to potential implementation of the LACPR alternatives. The analysis was not conducted in compliance with the National Environmental Policy Act (NEPA) and does not conform to the Council on Environmental Quality guidelines. The PCEA was undertaken to draw a visual picture of the potential combined effects of proposed efforts that are part of LACPR effort along with other ongoing and planned projects by the USACE, State and other Federal agencies unrelated to LACPR. This analysis compares the potential cumulative effects of on-going and future actions on a few identified key issues against a backdrop of conditions existing in the year 2011, the base year established in the LACPR main report. Due to time constraints, consideration of past projects or comparison of future conditions to conditions at some point in the past is not included this evaluation.

A full NEPA Analysis and cumulative effects analysis would be conducted when additional authorities are authorized for study or implementation. Steps in the LACPR process include 1) Use the multi-criteria decision analysis plan rankings and other rankings to reduce the current set of LACPR alternatives to a short list of viable alternative plans to increase levels of risk reduction. 2) Identify specific measures common to all or most of the final group of viable alternatives 3) Develop implementation strategies for those features by modifying existing construction authorities or asking for new study authorities 4) NEPA/Cumulative effects would be addressed through supplemental or new environmental impact statements under the existing construction or study authorities. The USACE is not pursuing a new programmatic authorization for LACPR. Units of measure would be determined at the time a new authority is authorized and a NEPA document is prepared.

## **2.0 TECHNICAL APPROACH**

### **2.1 *Scope of Analysis and Limitations***

This PCEA evaluates the potential combined effects of LACPR alternatives and other ongoing and future projects on several key issues that have been identified by the USACE in consultation with the Habitat Evaluation Team (HET), stakeholders and other agencies.

In addition to the LACPR effort, many other USACE, federal and state programs/projects are under construction, in feasibility study or planning stages. Due to the uncertainty in the final design components of these future projects as well as a lack of information on completion dates the identification and quantification of potential impacts is incomplete. In such cases, estimates and best professional judgment were used to fill data gaps based on the best available information at the time of the analysis. In addition, ongoing and proposed studies such as those on an overall sediment budget for the planning area and systems analysis for the Gulf Coast will provide valuable information that will further refine the conclusions presented in this analysis.

### **2.2 *Overview of Approach***

#### **Step 1: Identification of Issues of Concern**

Through discussions with the HET, the LACPR team, National Research Council and other stakeholders, eight issues were identified for evaluation as part of the PCEA. These issues were targeted because they were considered valuable resources and/or a limited resource, economically important or there was concern for overall resource condition resulting from multiple projects occurring simultaneously in the study area and there was available GIS data to conduct a simple analysis absent a NEPA document. These include: wetlands, salinity, freshwater availability, structure borrow sources, restoration sediment availability, social affects, recreational resources, and cultural resources.

#### **Step 2: Identification of Ongoing and Future Projects not Associated with LACPR**

Coordination with State and Federal agencies and private entities was completed in April 2008 to identify other current and potential future projects. Projects included coastal risk reduction and restoration projects and other major projects and actions that could affect South Louisiana and the LACPR Planning Area. The search for projects identified approximately 100 planned projects. This number of projects was too un-wielding a number to conduct a review in the short period of time allotted for this assessment. Therefore, the list of projects/actions identified was refined by eliminating those projects that would not likely have any direct effect on the issues of concern under evaluation in this analysis. This screening allowed the PCEA to focus on ongoing and future actions outside of the LACPR efforts that have the greatest potential to affect southern Louisiana. Remaining projects were then categorized by the time period of implementation (ie. before the base year 2011 or after the base year of 2011 and by the dominant project component (e.g. diversion, flood risk reduction, etc.)

#### **Step 3: Evaluation of Future Conditions Without the LACPR Effort**

The potential footprints and areas of influence of projects not associated with LACPR were overlain on resource baseline data to determine potential impacts. In addition, research was conducted using available reports to assemble both quantitative and qualitative information on

the potential adverse and beneficial effects of the projects. For example, the Louisiana Coastal Area (LCA) Programmatic Environmental Impact Statement (PEIS) dated 2004 provides valuable information on the potential effects of flood control structures and restoration alternatives on resources within the planning area. This step and the compilation of the results provide the potential effects of ongoing and future projects not associated with LACPR.

#### **Step 4: Evaluation of Future Conditions With the LACPR Effort**

LACPR comprehensive alternatives that result in the greatest effect were selected for inclusion in the analysis of cumulative effects. GIS data of the LACPR comprehensive alternatives were overlain on locational data of other proposed projects to determine the potential cumulative region of influence and area of impact. In addition to information generated by the GIS analysis, beneficial and adverse effects of the LACPR alternatives were compiled from the Structural, Nonstructural, and Coastal Restoration Appendices. This step and its results identify broad potential cumulative effects of the ongoing and future projects not associated with LACPR together with the comprehensive LACPR alternatives.

### **2.3 Issues of Concern**

The following issues of concern addressed in this analysis are not exhaustive. Rather, they represent issues that have commonly been identified by the LACPR team, the Habitat Evaluation Team (HET), the National Research Council (NRC) of the National Academies in meetings and correspondence and other stakeholders.

**Wetlands** – Wetlands include the unique and diverse habitat types found in south Louisiana including saline, brackish, intermediate, and fresh marsh, as well as scrub-shrub, cypress swamp, and bottomland hardwoods. These habitats would experience both short- and long-term direct and indirect effects resulting from implementation of the various projects not included with LACPR and the LACPR alternatives.

**Salinity** – Changes in salinity could affect vegetative and fish and shellfish communities as well as productivity levels in the coastal ecosystems. Salinity changes have the potential to impact recreational and commercial fisheries. Evaluation of this issue includes examining how freshwater diversions, in particular, may affect salinity levels and the surrounding ecosystems and plant and animal communities.

**Freshwater Availability** – Freshwater diversions for habitat restoration are evaluated in light of the overall water availability from the Mississippi River and competing needs for navigation and water supply for New Orleans and vicinity.

**Structure Borrow Sources** – Structure borrow includes potential sources and availability of borrow for use on proposed structural projects (i.e. projects including construction of major physical improvements such as levees, dikes, berms, and shoreline risk reduction). The evaluation takes into account potential borrow locations and the quantity of borrow material needed when such information was available.

**Restoration Sediment Availability** – Sediment availability is evaluated in terms of dredged material and its associated impacts as well as direct sediment deposition through diversion of sediment-containing freshwater. In addition, offshore sediment resources are examined as a source of material for barrier island restoration, including beach and dune construction.

**Social Affects** – Social affects issues revolve around the communities that may be directly or indirectly impacted by the projects and alternatives under evaluation. All of the projects may have direct and indirect effects on the lives of the people within the planning area in terms of possible relocations, levels of flood risk reduction, possible environmental justice impacts (i.e. potentially disproportionate effects on minority and/or low income populations), and continued community viability into the future.

**Recreational Resources** – These resources include local, state, and federal parks, state wildlife management areas, national wildlife refuges, and all other sport and recreation complexes. Recreational resources were included because of the unique heritage and culture found only in Louisiana, Louisiana is the sportsman's paradise and significant revenue is generated from tourism as related to natural resources in the State. As with social issues, all of the projects could have direct and indirect effects on recreation and park facilities within the planning area in terms of levels of resource risk reduction and continued viability of recreational resources into the future.

**Cultural Resources** – These resources were included because of the unique heritage and culture found only in Louisiana. The people that derive from diverse cultural backgrounds and from numerous ethnic groups including Creole, Cajun, African American, French, Spanish, Native American, South American, Islenos, Filipino, Italian, Chinese, Vietnamese among others. The cultural resources include archaeological sites, historic structures, and historic districts of local and national importance. The damage to or loss of archeological sites, historic buildings, parks and neighborhoods could lead to the loss of individual and community connection to place. Taken together, these outcomes could lead to a net loss of cultural diversity and South Louisiana. These resources are vulnerable to destruction by direct and indirect project impacts resulting from the implementation of the various flood risk reduction and coastal restoration projects.

## **2.4 Timeframe of Analysis**

The timeframe for the PCEA is similar to that described in Section 3 of the Main Technical Report beginning with a baseline year of 2011 and extending to the year 2075. The baseline conditions as stated in Section 3 of the main technical report are the no-action conditions assuming none of the LACPR alternatives are implemented. **Table 4-1** and **Figure 4-2** in the Main Technical Report display major existing USACE hurricane and flood control projects and studies by individual project or study name. Section 205 projects and studies are not shown in the table or on the map.

These projects and studies have evolved over different periods of time and are at various stages of completion. The LACPR analysis considers all authorized projects as part of its baseline condition, except for those recently authorized under the Water Resource Development Act as described above. Studies are evaluated as components of the overall LACPR comprehensive system.

**Figures 2.4-1** and **2.4-2** depict non-LACPR projects that are anticipated to be completed by 2011 in addition to those projects shown on Figure 4-2 of the Main Technical Report. The future period of analysis extends to 2075 to correspond with the LACPR planning horizon. For some issues of concern, only a 50-year projection of future conditions was available and was utilized and noted as such. For example, wetland restoration benefits were available for 2060.

## **2.5 Future Without LACPR**

Evaluating plans with respect to the without-project condition required making predictions about conditions that would exist in the future. In general, the baseline conditions assume completion of Federally-authorized navigation, flood risk management, hurricane risk reduction, and ecosystem restoration projects in the planning area. The baseline conditions also include non-Federal levees at existing design levels.

For a full discussion on the future condition without LACPR refer to Section 4 of the main technical report. Defining the future without LACPR condition provides a framework and baseline in which to analyze and determine the potential incremental impacts of the future with LACPR condition. It is expected that projects authorized and implemented outside of the LACPR evaluation would have independent effects on the issues of concern evaluated as part of this analysis.

**Table 2.5-1** provides a summary of the types of projects from **Tables 2.5-3** and **2.5-7** that are proposed within each planning unit. **Table 2.5-2** presents the likely key effects from those project types on the issues of concern examined in this analysis. The projects presented in **Tables 2.5-3** through **2.5-7** often have more than one project feature and these are accounted for in **Table 2.5-1**. However, for ease of graphical presentation the projects were categorized based on their main (most significant) project feature.

Project Type Descriptions:

- Diversion – includes pulsed/seasonal freshwater diversions which contribute sediment for land/marsh building
- Structures – consist primarily of physical structures that reduce surge and wave run-up, such as continuous or ring levees on land connected to floodgates acting as waterway barriers, where necessary.
- Dredging – include projects that dredge for operation and maintenance of navigation channels
- Marsh Creation- includes mechanical marsh creation projects
- Habitat Restoration – includes barrier island/shoreline restoration and ridge habitat restoration
- Hydrologic Restoration – includes projects that restore hydrologic function to wetlands

**Table 2.5-1. Number of Projects, by Type and Planning Unit, Not Associated with the LACPR Effort**

Project Type	PU1	PU2	PU3a	PU3b	PU4
Diversion	9	11	4	2	0

Structures	10	12	8	3	3
Dredging	5	14	10	11	4
Marsh Creation	8	14	9	7	6
Habitat Restoration	8	12	7	4	1
Hydrologic Restoration	7	5	4	1	4

Note that projects containing more than one component type have been counted once for each individual component. For example, a project in PU1 that contains marsh creation and hydrologic restoration components would be checked twice, once for marsh creation in PU1, and once again for hydrologic restoration in PU1.

**Table 2.5-2** summarizes key adverse and beneficial effects of the projects types on the issues of concern. The table measures both direct and indirect impacts on the issues of concern. Several of the project types may have beneficial or negative effects on a particular issue or resource. For example, dredging may have a negative impact if it is conducted within a wetland and a positive effect if dredging is conducted to obtain beneficial material for marsh creation. Additionally, structures can have both positive and negative effects on population and cultural resources. The siting of new structures may displace households or impact historic structures but they also provide hurricane risk reduction to surrounding communities and historic structures and sites. Similarly for wetlands, structures would result in direct adverse impacts if they are sited in wetlands; however, structures can be used to restore wetland hydrology. Diversions may be viewed as having a positive or negative effect on recreational resources by changing the salinity regimes within an area. Fish populations may change in response to salinity changes and with it species that are targeted by recreational fisherman. Diversions are assumed to result in potential adverse effects for water availability for navigation and consumptive uses.

**Table 2.5-2. Likely Key Effects by Project Type<sup>1</sup>**

Project Type	Wetlands	Salinity Regime	Water Availability	Need for Structure Borrow	Restoration Sediment	Social Affects	Recreational Issues	Cultural Resources
Diversion	+	+/-	-	o	o	o	+/-	o
Structures	+/-	o	o	-	o	+/-	-	+/-
Dredging	+/-	o	o	+	+	o	-	-
Marsh Creation	+	o	o	o	+	o	+	o
Habitat Restoration	+	o	o	o	+	o	+	o
Hydrologic Restoration	+	+	-	o	o	o	o	o

<sup>1</sup>Key: + = beneficial effect  
 - = negative/adverse effect  
 o = neutral/no effect

The future without-project condition for this analysis differs from the LACPR future without-project (future degraded) condition. The LACPR analysis focuses on LACPR alternative plans and does not account for other USACE coastal risk reduction projects and certain projects under construction or proposed by other local, state and federal agencies.

The future without-LACPR condition for this analysis includes 80 projects that are anticipated to be implemented independent of the LACPR effort. However, some of these projects such as the Freshwater Bayou Bank Stabilization and Grand Lake Shoreline Stabilization have also been included as part of LACPR Alternatives. A listing of these other projects by planning unit is presented in **Tables 2.5-3** through **2.5-7** in Annex A. **Figures 2.5-1** and **2.5-2** depict the projects that would be implemented after 2011 independent of LACPR within each planning unit. The figures depict the main component of each project.

## **2.6 Future With LACPR**

### **2.6.1 Overview of LACPR**

LACPR includes many or most of the features of other federal and state projects being evaluated for the Louisiana coast. The LACPR effort is closely tied with the State of Louisiana's master plan for coastal restoration and hurricane protection entitled *Integrated Ecosystem Restoration and Hurricane Protection: Louisiana's Comprehensive Master Plan for a Sustainable Coast*, which the Louisiana Legislature approved on May 30, 2007. In addition, the LACPR effort has and will continue to be integrated with the Mississippi Coastal Improvements Program (MsCIP). These individual measures, projects, and project components would ultimately define the overall detailed LACPR effort for the coastal Louisiana.

The information presented in the technical report is not suitable for making project authorizations, appropriations, or non-governmental decision. It does not present a preferred plan at this time. In order to provide the most meaningful cumulative effects analysis, it was necessary to identify the LACPR alternative plans that potentially would have the greatest effect as related to the identified issues of concern by planning unit are evaluated. Consequently, the plan evaluated for a particular issue that has the most adverse effect on that issue may be different than the plans evaluated for each of the remaining issues of concern.

### **2.6.2 LACPR Alternatives Included in the PCEA**

The development of alternative plans is presented in Section 5 of the main report. Alternative plans consist of structural, non-structural and coastal components. Over 100 alternatives have been evaluated for the LACPR (**Table 2.6-1**, below), which fall into one of five categories.

1. **No-action alternatives** in which no action is taken.
2. **Coastal restoration alternatives** in which the only action taken is coastal restoration.
3. **Nonstructural alternatives** in which stand-alone nonstructural measures are added to coastal restoration.
4. **Structural alternatives** in which structural measures are added to coastal restoration.
5. **Comprehensive alternatives** are combinations of coastal restoration, structural measures, and complementary nonstructural measures which generally provide a uniform level of risk reduction for hurricane surge throughout all areas in the planning unit. The complementary nonstructural measures were formulated in the residual floodplains not protected by structural measures.

The individual alternatives in each of the five categories are described in Section 5 of the main report. Table 2.6-1 summarizes the number of projects, by type and planning unit with the LACPR effort.

**Table 2.6-1. Number of Projects, by Type and Planning Unit, Associated with the LACPR Effort**

<b>Project Type</b>	<b>PU1</b>	<b>PU2</b>	<b>PU3a</b>	<b>PU3b</b>	<b>PU4</b>
Lock	0	0	1	0	0
Diversion	16	11	6	3	1
Structural Projects (Alternatives)	2	3	2	3	2
Marsh Creation	3	1	3	5	2
Shoreline Stabilization	1	0	0	2	2
Barrier Shoreline Protection	1	1	0	1	0
Freshwater Influence	9	0	0	0	0

In Planning Unit 1, the two primary strategies are the Lake Pontchartrain surge reduction strategy (barrier) and the High Level strategy (no barrier) (see Table 5-7 of main report). Within the Lake Pontchartrain Surge Reduction and High Level strategies, there are a number of options for levees in different areas (e.g. Northshore, Slidell, Laplace, upper Plaquemines Parish, etc.).

In Planning Unit 2, the three primary strategies are the West Bank interior strategy (no new levees), the Ridge strategy (build on natural ridges), and the GIWW strategy (build along the GIWW) (see Table 5-8 of main report). Within the Ridge and GIWW strategies, there are a number of options for levees in different areas (e.g. Boutte, Des Allemands, etc.). All Planning Unit 2 alternatives at the 400-year and 1000-year design levels include raising the existing Larose to Golden Meadow ring levee to the corresponding design level.

In Planning Unit 3a, one of the two primary strategies is to extend and/or improve the existing Morganza to the Gulf and Morgan City and Vicinity projects (see Table 5-9 of main report). The other primary strategy is to supplement the authorized Morganza to the Gulf project with a second line of defense along the GIWW. Within the Morganza/Morgan City strategy, the two options are to extend a continuous levee to the west of Morgan City or to tie the Morganza levee to high ground and build a ring levee around Morgan City.

In Planning Unit 3b, the three primary strategies are a continuous levee along the GIWW, a continuous levee inland of the GIWW (“Franklin to Abbeville”) and a series of ring levees (see Table 5-10 of main report).



In Planning Unit 4, the two primary strategies are continuous levees along the GIWW or a series of ring levees (see Table 5-11 of main report). Within the GIWW strategy, the three options are as follows:

- A continuous levee that is designed to connect to a similar levee in Planning Unit 3b.
- A continuous levee that can be a stand alone alternative (doesn't depend on what is built in PU3b).
- A 12-foot continuous levee that relies on additional ring levees to reach the desired level of risk reduction.

Other than the no-action alternative, all of the alternatives require active maintenance of the coast at the existing level of risk reduction, i.e. sustain (or maintain) the existing landscape.

Below is a summary table of the LACPR alternatives evaluated.

**Table 2.6-2. Summary of LACPR Alternatives Evaluated.**

Category	Planning Unit 1	Planning Unit 2	Planning Unit 3a	Planning Unit 3b	Planning Unit 4
No Action	PU1-0	PU2-0	PU3a-0	PU3b-0	PU4-0
Coastal Only	PU1-R1, R2, and R3	PU2- R1, R2, and R3	PU3a-R1	PU3b-R1	PU4-R1
Coastal* and Nonstructural	PU1-NS-100, 400, and 1000	PU2-NS-100, 400, and 1000	PU3a-NS-100, 400, and 1000	PU3b-NS-100, 400, and 1000	PU4-NS-100, 400, and 1000
Coastal* and Structural	PU1-LP-a-100-1	PU2-WBI-100-1	PU3a-M-100-1	PU3b-G-100-1	PU4-G-100-1
	PU1-LP-a-100-2	PU2-WBI-400-1	PU3a-M-100-2	PU3b-F-100-1	PU4-G-100-2
	PU1-LP-a-100-3	PU2-R-100-2	PU3a-G-400-2	PU3b-F-400-1	PU4-G-400-3
	PU1-LP-b-400-1	PU2-R-400-2	PU3a-G-1000-2	PU3b-F-1000-1	PU4-G-1000-3
	PU1-LP-b-400-3	PU2-R-100-3		PU3b-RL-100-1	PU4-RL-100-1
	PU1-LP-b-1000-1	PU2-R-400-3		PU3b-RL-400-1	PU4-RL-400-1
	PU1-LP-b-1000-2	PU2-R-100-4			PU4-RL-1000-1
	PU1-HL-a-100-3	PU2-R-400-4			
	PU1-HL-a-100-2	PU2-R-1000-4			
	PU1-HL-b-400-3	PU2-G-100-1			
	PU1-HL-b-400-2	PU2-G-100-4			
		PU2-G-400-4			
		PU2-G-1000-4			
	Comprehensive Plans (Coastal,* Structural, and Nonstructural)	PU1-C-LP-a-100-1	PU2-C-WBI-100-1	PU3a-C-M-100-1	PU3b-C-G-100-1
PU1-C-LP-a-100-2		PU2-C-WBI-400-1	PU3a-C-M-100-2	PU3b-C-F-100-1	PU4-C-G-100-2
PU1-C-LP-a-100-3		PU2-C-R-100-2	PU3a-C-G-400-2	PU3b-C-F-400-1	PU4-C-G-400-3
PU1-C-LP-b-400-1		PU2-C-R-400-2	PU3a-C-G-1000-2	PU3b-C-F-1000-1	PU4-C-G-1000-3
PU1-C-LP-b-400-3		PU2-C-R-100-3		PU3b-C-RL-100-1	PU4-C-RL-100-1
PU1-C-LP-b-1000-1		PU2-C-R-400-3		PU3b-C-RL-400-1	PU4-C-RL-400-1
PU1-C-LP-b-1000-2		PU2-C-R-100-4			PU4-C-RL-1000-1
PU1-C-HL-a-100-3		PU2-C-R-400-4			
PU1-C-HL-a-100-2		PU2-C-R-1000-4			
PU1-C-HL-b-400-3		PU2-C-G-100-1			

	PU1-C-HL-b-400-2	PU2-C-G-100-4		
		PU2-C-G-400-4		
		PU2-C-G-1000-4		

\*In Planning Units 1 and 2, coastal restoration alternative R2 is used as the representative landscape for combining with the structural, nonstructural, and comprehensive alternatives. In Planning Units 3a, 3b, and 4, R1 is used as the representative landscape.

Due to time constraints and the sheer number of alternatives (over 100 plans), the team decided to focus this analysis on evaluating the alternative that would have the greatest effect as it relates to a particular issue of concern. Based on this, the team focused on the comprehensive alternatives which contain all three components (structural, nonstructural and coastal restoration). Through this evaluation process, it became apparent that the “greatest-effect” alternative varied depending on the issue of concern. For example, diversions may have a beneficial effect on wetlands but have an adverse effect on water availability for navigation. Specifically, for the PCEA, these comprehensive plans include:

- 1) Coastal Restoration Alternative R2 for PU1 and PU2; and Coastal Restoration Alternative R1 for PU3a, PU3b, and PU4. These alternatives provide the greatest beneficial effect on coastal habitats;
- 2) the most conservative Nonstructural Alternative (i.e., the one that results in the highest number of buyouts); and
- 3) the structural alternative which results in the greatest adverse effect on each issue of concern.

To complicate things further, each Planning Unit (PU) has multiple structural strategies as described in Section 5 of the main Technical Report. For example, PU1 has two primary structural strategies: (1) High Level (HL) alternatives and (2) Lake Pontchartrain Surge Reduction (LP) alternatives. Therefore this PCEA focused on the alternative that results in the greatest effect for both the HL and LP strategies as related to the particular issue of concern.

The primary structural strategies by PU include:

PU1 High Level Plan  
Lake Pontchartrain Surge Reduction

PU2 Ridge Alignment  
GIWW Alignment  
West Bank Alignment

PU3a Morganza to Gulf  
GIWW Alignment

PU3b Franklin to Abbeville  
GIWW Alignment  
Ring Levee

### 3.0 ISSUES OF CONCERN

A brief description of the existing baseline (2011) conditions, future without LACPR, and the cumulative effects with LACPR for each of the Issues of Concern are presented below. In addition, to put the potential cumulative effects into a more realistic future context, available information on projected future trends for each issue is provided and discussed.

#### 3.1 Wetlands

##### 3.1.1 Existing Conditions

Wetlands within the planning area are comprised of forested swamp, scrub-shrub, freshwater marsh, intermediate marsh, brackish marsh, saline marsh, and open water. As described in the LCA PEIS (2004), Louisiana coastal wetlands have experienced an accelerated loss since at least the early 1990s. Wetland loss can be attributed to several major factors: sea level rise, storms, changes in salinity, and lack of sediment accretion/deposition.

Wetland and land loss rates in coastal Louisiana have varied over time. The LCA PEIS documents that as recently as the 1970s, the loss rate for Louisiana's coastal wetlands was as high as 25,200 acres per year. Barras et al. (2008) reported that from 1985 to 2004 the overall land loss for the Louisiana coast was  $30.71 \pm 5.70 \text{ km}^2$  per year. They reported that from 2004 – 2006, water area increased (indicating land loss) coastwide by  $512.8 \text{ km}^2$ , which was a land loss that is equalivalent to 70 percent of the cumulative loss from 1978 to 2004 ( $743.3 \text{ km}^2$ ). Hurricanes Katrina and Rita increased water area in coastal Louisiana by  $567.2 \text{ km}^2$  between 2004 and 2005 (Barras et al 2008). They reported that this increase in water area was followed between 2005 and 2006, by a decrease in water area (indicating land gain) by  $54.4 \text{ km}^2$  coastwide showing some recovery of land. The cumulative effects of human and natural activities in the coastal area have severely degraded the deltaic processes and shifted the coastal area from a condition of net land building to one of net land loss. It is with this backdrop that the cumulative effects from LACPR are examined.

Subsequent to completion and issuance of the LCA PEIS, Hurricanes Katrina and Rita resulted in the destruction of more than 217 square miles of coastal wetlands, which exceeded the projected statewide wetland losses over the next 20 years.

**Figure 3.1-1** presents the 2011 wetlands base map. **Figure 3.1-2** provides the results of the Coastal Louisiana Ecosystem Assessment and Restoration (CLEAR) model (Twilley and Barras, 2003; see *Coastal Restoration Plan Component Appendix*) results for 2050. The CLEAR model results provided on **Figure 3.1-2** represent the percent of the land mass that would be expected to be comprised of wetlands. For example, the areas with the color for 0 – 25 percent represent areas expected to be comprised of 0 to 25 percent wetland in 2050. The results of the CLEAR model do not extend past 2050.

##### 3.1.2 Future Without LACPR

In the future without LACPR, coastal wetlands would continue to decline due to sea level rise, land subsidence, periodic storms, and impacts from projects involving dredge and fill. In

addition, under any projected sea level rise scenario, existing barrier islands, such as the Chandelier Islands, are likely to disappear before the year 2030.

Due to the existing channelization of the Mississippi River, riverine influences (e.g., freshwater, sediment, and nutrients) would continue to sustain only minor land-building processes at the lower Mississippi River Delta. Most coastal cypress-tupelo swamps would be non-sustainable under current conditions. In addition, for a majority of the Louisiana coastal area, marine processes would continue to increasingly dominate the hydrology of wetland communities as coastal wetlands are replaced by open water areas due to sea level rise and the periodic storms that erode marshes.

With a decline in wetland acreage, as well as changes in vegetative composition due to changes in salinity and water depth, fishery resources are expected to decline in the future without LACPR condition as open water replaces wetland habitat and the extent of marsh-water interface begins to decrease. Diversion projects that are in place, such as the Caernarvon and Davis Pond Freshwater Diversion projects, or those that are proposed to be constructed under the future without LACPR condition, would have the potential to freshen areas and provide suspended sediment and nutrients load to a basin. Less freshwater tolerant species, such as brown shrimp and spotted sea trout may be displaced from areas near diversions. The extent of this impact is dependent on the diversion location, size, and operation (e.g., pulsed or continuous). Euryhaline species (species capable of living in a wide range of salinity) such as Gulf menhaden, blue crab, white shrimp and red drum populations would likely benefit from diversions, as would freshwater fishery species.

The marsh creation and freshwater diversion projects proposed in the future without LACPR would create and sustain approximately 40,000 acres of wetlands. **Figures 3.1-3** and **3.1-4** show the relative locations of these projects within the overall LACPR planning area landscape. However, it is uncertain whether these systems could be sustained in the future without a comprehensive approach to restoration such as is provided under LACPR.

In addition, under the future without LACPR, there would be continued loss and degradation of essential fish habitat (EFH) that is provided by the wetland systems, as well as the ability of the planning area to support Federally-managed species in the future without-project conditions. Wetlands function as important nursery and forage habitat for a number of Federally managed species on the coast.

The LACPR team projected the amount of wetland loss by Planning Unit in the Future Without LACPR. **Table 3.1-1** presents a summary of the amount of wetland loss projected to occur in the future 50-year horizon (2060) by Planning Unit. **Figures 3.1-3** and **3.1-4** depict the projects Without LACPR within each planning unit. In addition, the amount of marsh created and protected in the future without LACPR was estimated by compiling information from the individual projects listed in **Tables 2.5-3** through **2.5-7**. The benefits estimated from these projects are far short of the wetland loss expected to occur in the future without LACPR and that sustaining coastal wetlands in the future would not be possible without a comprehensive effort such as LACPR.

**Table 3.1-1. Summary of Wetland Effects in Future Without LACPR**

<b>Planning Unit</b>	<b>Approx. Marsh Creation/Wetlands Protected (ac)*</b>	<b>Projected Wetland Loss in 2060 (ac)**</b>
1	17,000	139,000
2	16,000	81,000
3a	2,200	122,000
3b	1,220	21,000
4	2,650	30,000
<b>Total</b>	<b>39,070</b>	<b>396,000</b>

Source: \* From projects listed in Tables 2.5-3 through 2.5-7.

\*\* From *Coastal Restoration Plan Component Appendix*

### **3.1.3 Future With LACPR**

Under LACPR, the expansion of existing levees, construction of new levees/flood control structures, implementation of nonstructural measures, and execution of coastal restoration efforts would result in direct and indirect adverse effects as well as beneficial effects to wetlands in the planning area. Given the present stage of LACPR, all information suggests that overall, the benefits of a future with LACPR to wetlands are greater than a future without LACPR. Below is a discussion of potential adverse and beneficial impacts of the individual components of LACPR.

#### ***Structural Alternatives***

Construction of new hurricane risk reduction levees and/or the raising of additional levees would result in direct and indirect impacts to wetlands. Direct impacts include the placement of fill for levee construction within wetlands. Indirect impacts would result from the enclosure of wetlands within levee systems such that their hydrologic and habitat connections are severed, which would result in fragmentation of the wetlands within the overall landscape. Both direct and indirect impacts to wetland habitat would in turn result in adverse impacts to fish and wildlife resources.

The cumulative direct adverse wetland impacts would exceed 34,000 acres for the non-LACPR projects and the LACPR structural alternatives. This total does not include unknown potential future development projects as a result of infrastructure, oil and gas development, and other projects. Assumptions for the footprints and location of non-LACPR structures are described below in **Section 3.4.2** (Structure Borrow).

#### ***Restoration Alternatives***

The LACPR coastal restoration alternatives, R2 (for PUs 1 and 2) and R1 (for PUs 3a, 3b, and 4) include river diversions and prioritized marsh creation projects within each of the Planning Units (**Figures 3.1-5 and 3.1-6**). An objective of the LACPR is to promote a sustainable ecosystem. With the reduction of risk to wetland systems, the LACPR restoration alternatives would have an overall benefit to fisheries compared to the future without-project conditions.

Freshwater diversions lower salinity and increase the suspended sediment loading as well as nutrients into a wetland system. Diversion projects are designed to imitate historic spring floods providing a controlled flow of fresh water and nutrients into a targeted area. Restoration

alternative R2 (for PUs 1 and 2) includes pulsed diversions and is a combination of river diversions operated with periodic large pulses and prioritized marsh creation measures.

The proposed locations of diversions and existing landscape that would receive the discharge of freshwater are important factors governing the success of the projects. Large diversions into open waters are much less effective at achieving sustainability of coastal wetlands than similar-sized diversions into more protected interior water bodies (USFWS November 2007 CAR). The inefficiency is due to reduced sediment retention in the open water systems. Restoration of a substantially deteriorated ecosystem using riverine diversions would be much less effective than restoration of a more intact system.

Restoration alternative R1 for PU 3a includes variously sized Mississippi River diversions with prioritized marsh creation measures to achieve sustainability. For PU3b and PU4, R1 includes severely limited freshwater diversion options. The R1 alternative relies heavily on dedicated dredging to create a significant amount of wetlands in addition to shoreline risk reduction to minimize wave/wake induced erosion.

In addition to the creation and preservation of wetlands under R2 and R1, a variety of benefits would be realized including storm and flood risk reduction, provision of wildlife habitat and biological productivity, reduction of risk to water supply and water quality, and support of regional economic activities.

As described in the *Coastal Restoration Plan Component Appendix* a significant trade-off component with Restoration Alternative R2 is the resource allocation of freshwater between PU1, 2, and 3a. This issue is further described in Section 3.3 Freshwater Availability.

**Table 3.1-2** presents a summary of projected adverse and beneficial effects by Planning Unit in the Future With LACPR. Under the coastal restoration alternatives R2 (PU1 and 2) and R1 (PU3a, 3b, and 4), approximately 385,000 ac of wetlands would be created and protected by 2060 (50-year projection provided in *Coastal Restoration Plan Component Appendix*). Wetlands created and protected refers to the increase in the number of wetland acres through marsh creation, diversions, and other restoration measures. A cumulative total of approximately 425,000 acres of wetlands would be created and protected by 2060 with the implementation of the non-LACPR projects and LACPR alternatives. Potential indirect impacts have not been estimated. In addition, there is insufficient data at this time to quantify potential impacts for ongoing and future projects not associated with LACPR.

**Table 3.1-2. Summary of Wetlands Effects in Future With LACPR**

	<b>Direct Adverse Wetland Impacts (ac) *</b>	<b>Projected Wetlands Created/Protected (ac) **</b>	<b>Net Wetland Benefit (ac)</b>
<b>Planning Unit 1 (R2)</b>		175,000	
HL-b-400-2	6,004		168,996
LP-b-1000-2	9,100		165,900
<b>Planning Unit 2 (R2)</b>		103,000	
WBI-400-1	3,688		99,312
R-1000-4	6,787		96,213
G-1000-4	9,458		93,542
<b>Planning Unit 3a (R1)</b>		107,000 – 110,000	
G-1000-2	6,642		100,358 – 103,358
M-100-2	4,201		102,799 – 105,799
<b>Planning Unit 3b (R1)</b>		50,000	
G-100-1	2,296		47,704
RL-400-1	1,702		48,298
F-1000-1	5,188		44,812
<b>Planning Unit 4 (R1)</b>		289,000	
RL-1000-1	99		288,901
G-1000-3	2,485		286,515

Note: \* Plan with highest adverse effects by structural strategy within a PU.

\*\* Total presented only by PU using Coastal Restoration Alternative R2 for PU 1 and 2 and Restoration Alternative R1 for PU3a, 3b, and 4.

## **3.2 Salinity**

### **3.2.1 Existing Conditions**

The salinity patterns throughout the major basins of the planning area are influenced by freshwater inflow, tides, wind, and coastal shelf processes. The seasonal freshwater discharge source and the timing of delivery vary between estuaries within the planning area as well as within the estuaries themselves. The high-inflow/low-salinity periods are typically from late winter to late spring. The low inflow/high-salinity periods are typically from late spring to late fall. With the exception of the Atchafalaya estuary (in PU3b), most of Louisiana's estuarine systems are shallow, wind-driven systems with small tidal action that prevents salinity stratification. In the Atchafalaya estuary, prevailing seasonal winds and entrainment of diluted gulf waters are secondary modifiers of the salinity structure in the basin. **Figure 3.2-1** depicts general isohaline contours within the LACPR planning area.

Levees and other flood control projects have cut off areas of the Deltaic Plain from freshwater riverine influences. As a result, areas that historically have experienced low salinity regimes have become more saline with the greater influence from the Gulf of Mexico. The presence of navigation channels and oil and gas canals has also contributed to an increase in marine influences on coastal wetlands, which has facilitated their subsequent degradation and loss. In addition, relative sea level rise has affected historic salinity regimes throughout the planning area. The LCA Study/PEIS provide modeling results for salinity regimes under various conditions for each Planning Unit.



Salinity is an important factor that determines the distribution of many fish and shellfish along the coast. The majority of the planning area is considered estuarine habitat and the organisms that are present in these waters are adapted to live within a range of salinity that varies based on tides and freshwater riverine inputs. Marine species are present in the offshore waters through the Gulf coast and generally do not depend on the coastal estuaries to complete any of their life cycle. However, many of the nearshore marine species prey on estuarine-dependent species. As a result, estuarine as well as marine species are impacted by changes in salinity.

For example, the American oyster is indigenous to coastal Louisiana and is an important ecological and commercial resource. Oyster reefs provide habitat for a number of other bottom-dwelling organisms that are important prey for finfish. Oysters are sessile organisms and do not migrate like other estuarine species. Salinity plays a key role in oyster sustainability. Typically, oysters proliferate in salinities ranging from 5 to 15 parts per thousand. Lower salinity waters fail to support biological function and more saline waters promote disease and predation.

### **3.2.2 Future Without LACPR**

In the future without LACPR, salinity regimes would continue to be shaped by riverine and marine influences such as varying freshwater discharge patterns, sea level rise, and periodic storm events. Freshwater from the Mississippi River would continue to be discharged away from coastal wetland systems. In addition, existing and newly constructed oil and gas canals and the maintenance of navigation channels would continue to facilitate saltwater intrusion into interior coastal wetlands. Coastal waters within the planning area would continue the existing trend of increasing salinity. As a result of increasing salinity, freshwater vegetation would continue to die and without protective vegetation, erosion would occur resulting into conversion of wetlands into open water. Salinity gradients across the coast would migrate north and become more narrow and variable without additional inputs of freshwater from riverine sources to hold back Gulf waters.

Given the quantities of water proposed for diversion, the projects anticipated to be implemented independent of the LACPR effort are not anticipated to have large-scale effects on the salinity regimes of the overall planning area landscape. As described further in **Section 3.3**, without large-scale diversions, wetlands would continue to convert to open waters and the influence of higher salinity Gulf water would further dominate the estuaries.

Fish and shellfish species tolerant of higher salinity waters would increasingly dominate the coastal planning area. However, with a reduction in their estuarine-dependent food resources, it is difficult to estimate the overall change in productivity that these populations may experience. Populations of species tolerant of lower salinities are expected to decline. For example, oysters and the extent of viable oyster reef habitat are predicted to decline in the future without-project conditions as the quality of their habitat decreases and they are more exposed to the higher salinity waters of the open Gulf.

### **3.2.3 Future With LACPR**

With the diversions anticipated independent of LACPR together with those included as part of LACPR (**Figure 3.2-2**), it is expected that historic salinity regimes would begin to be restored. With a restoration of salinity regimes, a long-term increase in fishery productivity may be expected together with a shift in species composition from those generally more tolerant of higher salinities to those more tolerant of lower salinities. It is unclear, however, whether the

comprehensive system of diversions as proposed under LACPR would displace more marine habitats and associated fisheries gulfward or might eliminate those habitats entirely.

Restoration of historic salinity regimes could potentially adversely affect some of the existing estuarine-dependent fish and shellfish that are less-tolerant of freshwater or low-salinity conditions. In turn, shifts in fish and shellfish populations may have impacts on recreational and commercial fisheries. Freshwater diversions may not be implemented every year, especially during low years. As reported in the U. S. Fish and Wildlife Service (USFWS) CAR Report (November 2007, Appendix F pg F-3), although fisheries are impacted during a high-flow year during which a diversion is implemented, the following low flow years have often exhibited exceptionally high fisheries production due in part to the nutrient inputs and resulting productivity levels throughout the system.

The USFWS postulates that freshwater diversions would likely increase the acreage of low-salinity nursery habitats preferred by the white shrimp. If river diversions are reduced substantially in the summer, this would facilitate the tidal exchange necessary for ingress of white shrimp post-larvae and juveniles. Freshwater habitats created in the vicinity of diversion structures would enhance blue crab abundance and production. Periodic heavy-diversions may result in substantial mortalities of oyster reefs located closer to the diversion sites but may stimulate oyster production at more distant locations. Forage fish species such as bay anchovy, Gulf menhaden, and striped mullet are euryhaline species and would not be expected to be adversely impacted and may even be enhanced by a system of large-scale diversion projects (USFWS October 2006).

The USFWS has noted that major seasonal diversions especially during peak Mississippi discharges in March and April could adversely effect the recruitment of post-larvae and juvenile brown shrimp (USFWS 2006). However, pulsed diversions such as are proposed under Coastal Restoration Alternative R2 would simulate the effects of crevasses and flood years and minimize adverse effects on the brown shrimp.

### **3.3 *Freshwater Availability***

Unlike **Section 3.2** above, this section addresses the relative quantity of freshwater in the Mississippi River that is available for the proposed freshwater diversion projects and the competing uses of the available water.

#### **3.3.1 Existing Conditions**

As reported in the LCA PEIS, the Mississippi River has an annual average flow rate of 495,000 cubic feet per second (cfs) and a freshwater discharge onto the continental shelf of 470,000,000 acre feet per year. Daily flow rates from 1980 – 2005 recorded at Tarbert's Landing ranged from 200,000 to occasional discharges in excess of 1,000,000 cfs; on two occasions discharges exceeded 1,400,000 cfs (USFWS, October 2006). The river discharge into the Gulf of Mexico is distinctly seasonal, with highest flows occurring between March and May and lowest flows occurring during August and October.

In addition to natural passes of the delta such as Baptiste Collette, Cubits Gap, and Pass a Loutre, Mississippi River flow exits the main channel through a variety of control structures such as:

- Bonnet Carre Emergency Bypass, Caernarvon Diversion, Bohemia Spillway, and Bayou Lamoque, that subsequently convey water into PU1;
- Davis Pond Diversion, the Naomi Siphon, and West Pointe a La Hache Siphon that convey water into PU2; and,
- West Atchafalaya Floodway, Old River Control Complex and Morganza Emergency Bypass that convey water into PU3a and/or PU3b.

In addition to existing freshwater diversions, there are several competing uses of water from the Mississippi River. As reported in the LCA PEIS, during 2000, about 3,000 million gallons per day (Mgal/d) of freshwater were withdrawn for various uses in the LCA Study area. Of this water, about 97 percent was from surface sources and about 3 percent was from groundwater sources. Most of this use was in southeastern Louisiana in parishes that border or straddle the Mississippi River.

Surface water is used for various purposes, including industry, power generation, public water supplies, and agriculture. Withdrawals for power generation and industry are primarily from the Mississippi River and used for once-through cooling; much of this water is returned to the source. Industrial withdrawals are primarily for petroleum refining and chemical manufacturing. In addition, adequate water levels in the river are important for navigation.

The USACE New Orleans District has estimated that a minimum Mississippi River flow of 300,000 cfs is required to avoid saltwater contamination of the current water supply that serves New Orleans. The river is also the predominant source of water for communities below New Orleans. During development of the State Master Plan, 525,000 cfs was estimated to be the maximum allowable total diversion discharge that would not result in adverse impact to water supply to New Orleans.

### **3.3.2 Future Without LACPR**

There are several freshwater diversion projects already in place within the planning area including the Caernarvon Freshwater Diversion and Davis Pond projects (**Figure 3.3-1**). The Caernarvon diversion in PU1 has been in operation since 1991 and has a design capacity of 8,000 cfs but has historically discharged less. The Davis Pond diversion in PU2 began provisional operation in 2000 and has a design capacity of 10,650 cfs.

Additional non-LACPR diversion projects are planned in the future. These include: Maurepas Swamp, Bohemia Mississippi River Reintroduction, and Benney's Bay Freshwater Diversions in PU1; Spanish Pass Diversion in PU2; and Grand Bayou/GIWW Freshwater Diversion and South Lake De Cade Freshwater Diversion in PU3a (Tables 2.5.3 through 2.5.7).

The existing and projected future diversions without LACPR would not exceed the maximum allowable discharge amounts that have been estimated for the river. Existing diversions in PUs 1 and 2 range from approximately 20,000 – 48,000 cfs in the low flow and high flow years, respectively. The planned non-LACPR freshwater diversions in PU1 have a total design discharge of greater than 100,000 cfs. Planned diversions in the remaining PUs (2, 3a, and 3b) are less than 25,000 cfs. No diversions are planned for PU4.

### 3.3.3 Future With LACPR

Depending on the operational plan for the diversion structures, LACPR would periodically decrease flow in the Mississippi River and potentially could decrease flow year-round. Users of water downstream of diversions could be negatively impacted by the proposed diversions. For example, the decrease in flow in the river would increase the tidal prism entering the river system through Southwest Pass and have the potential to impact the water supply for New Orleans.

For Alternative R2, the proposed total discharge of Mississippi River diversions would be in excess of the 525,000 cfs maximum allowable discharge determined by the USACE. To avoid reaching that discharge constraint and to reduce the spatial extent of diversion-related fisheries impacts, R2 diversions could be operated such that the high discharge year for diversions east of the river are not conducted concurrent with the high-discharge year for diversions west of the river. **Figure 3.2-2** (in **Section 3.2**) shows the approximate locations of all diversions that are expected to be in place in the future with LACPR.

In addition, Alternative R2 proposes pulsed diversions. As a form of adaptive management, diversions could be coordinated to correspond to high flow conditions in the river and might result in more rapid accumulation of wetland restoration benefits. However, the timing of fisheries impacts would be unpredictable. Alternatively, regularly scheduled and predictable high diversion discharge years would allow fishermen and stakeholders the opportunity to plan their efforts and activities accordingly.

Under R2 the anticipated diversion discharges for PU1 range from approximately 31,000 – 56,000 cfs in a low flow year and 311,000 – 569,000 cfs in a high flow year. Under R2 the anticipated diversion discharges for PU2 range from approximately 35,000 – 63,000 cfs in a low flow year and 185,000 – 330,000 cfs in a high flow year. Under R2, combined PU1 and PU2 Mississippi River diversions range from approximately 65,000 – 119,000 cfs in a low flow year to 496,000 – 899,000 cfs in a high flow year.

In PU3a, Alternative R1 includes Mississippi River diversions (operated from December through May), plus smaller diversions from the GIWW, Bayou Penchant or other freshwater sources. The total maximum freshwater diversion discharge for PU3a and 3b under LACPR is approximately 89,000 cfs. There are no diversions proposed under R1 for PU4.

A significant trade-off component with Restoration Alternative R2 is the resource allocation of freshwater between PU1, 2, and 3a. The issue of freshwater allocation for diversions can impose operational difficulties or opportunities and induced shoaling maintenance within the navigation channel of the Mississippi River. The “pulsed” alternative provides the most flexibility in regards to optimal operation through adaptive management opportunities.

Trade-offs with the cumulative effects of the non-LACPR and LACPR diversions include (USFWS 2006):

- 1) Deep-Draft Navigation - Major diversions of river water would reduce velocities in the river navigation channel resulting in increased sedimentation and shoaling. Consequently, increased channel maintenance dredging and beneficial use of that material would be required.

- 2) Flood Control - The ability of the river to convey flood flows is dependent on maintaining an adequate channel cross-section. Diversion-induced shoaling and reductions in cross-section may also reduce the capacity of the channel to safely convey flood flows. Maintenance dredging and beneficial use of dredge material would be required.
- 3) Water Supply - The river provides drinking water for New Orleans. During very low-flow conditions, the saltwater wedge could potentially move northward up the deep-draft navigation channel and reach the water supply intakes. Major diversions during moderate to low river stages would exacerbate that problem.

## **3.4 Structural Borrow Sources**

### **3.4.1 Existing Conditions**

It is estimated that in excess of 100 million cubic yards of clay borrow would be required for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System (GNOHSDRRS) that is currently being implemented by the USACE to provide 100-year storm damage risk reduction for New Orleans and vicinity by 2011. This program is by far the largest source of demand for borrow material at the present time. The projects comprising this program include approximately 530 miles of levee work in PU1 and 350 miles of levee work in PU2. Levee work includes construction of new levees as well as augmentation and repair of existing levees. The USACE is investigating potential borrow sites both within and outside the State of Louisiana. **Figure 3.4-1** identifies the potential borrow sites that were under investigation by the USACE as of April 2008. The borrow sources shown in the graphic as “Approved” or “Under Investigation” represent approximately 40 percent of the total borrow needed for the GNOHSDRRS program.

Site conditions and existing development impose limitations on the availability of suitable borrow areas in southern Louisiana generally and specifically for the GNOHSDRRS. Due to the prevalence of wetlands and other low-lying areas containing unsuitable muck or silt deposits in the Deltaic Plain forming the eastern portion of the study area - particularly within PUs 1 and 2 - prospects for borrow sites are limited. **Figure 3.4-1** identifies the locations of alluvium and backswamps in PU1, PU2 and PU3a where borrow may be available. Usable clay can be found in scattered locations in Planning Units 1 and 2, such as areas north and west of Lake Pontchartrain. Suitable borrow material, if any, can be found within a foot of the surface to deep below the ground surface and overlain by an organic or silty overburden that must be removed, adding to the excavation cost. In addition, extensive wetlands and development throughout PUs 1 and 2 eliminate large tracts of land as potential borrow sites. As a result, longer haul distances and higher transportation costs may be unavoidable outcomes of the need to expedite project delivery. For example, sixty-mile haul distances (one-way) are assumed for planning purposes for levee construction in Plaquemines Parish due to the distribution of suitable borrow sites.

Within the Chenier Plain further to the west in PU4, deposits from the Pleistocene period offer suitable borrow material that generally occurs at or near the ground surface inland, grading downward to approximately 20 feet below the surface near the coastline. The relatively widespread availability of suitable borrow material in this portion of the study area reduces the need for long-distance transport of borrow for projects in this area. However, the cost to haul this material to major project construction sites in PUs 1 and 2 is prohibitive under most circumstances. **Figures 3.4-3** and **3.4-4** also illustrate the cumulative size of borrow pits that

would be needed to accommodate 100 million cubic yards of material should all material come from borrow pits. This estimated cumulative borrow pit “footprint” assumes a maximum borrow pit depth of 20 feet below grade; 5 feet of unusable material atop usable fill; and a borrow pit width of 1.5 miles. Borrow pit depths can reach 40 feet or more below grade depending on how and from where the material is acquired.

### **3.4.2 Future Without LACPR**

The majority of projects anticipated to be implemented after 2011 that are independent of LACPR do not have levee, dike, or berm construction as major components of the project. A few would need borrow for minor components, but borrow requirements for all of these projects combined would likely be relatively low compared to the borrow requirements for projects in LACPR. The CAP-Fisher School Basin project (PU 2) would need approximately 130,000 cubic yards of borrow to raise existing levee heights. Minor levee construction would be included in the Point Au Fer Gulf Shoreline project (PU3b), the Delta Building Diversion at Myrtle Grove project (PU2), and the Weeks Bay Marsh Creation and Shoreline Protection project (also in PU3b). The West Lake Boudreaux Shoreline Protection and Marsh Creation project in PU3a would include 4,000 feet of earthen dike construction, which should have minor borrow requirements compared to typical levee construction of the same length. The Spanish Pass Diversion project (PU2) would involve approximately 1,300 feet of levee construction for water diversion, while the Brown Lake Hydrologic Restoration project would include construction of 30,000 feet of boundary levees which would require material of different quality than the hurricane protection levees.

The geographic spread of the projects requiring borrow and the anticipated amounts of borrow needed (based on descriptions of the planned uses for this material rather than specific design calculations, which are not available as yet for most of these projects) appear to raise few, if any, concerns about borrow availability. In addition, impacts would be dispersed across the entire planning area, so the cumulative effects of borrow excavation and transport is not expected to be severe under the future without-project condition. The greatest concern about borrow availability may occur in PU1 and PU2. **Figure 3.4-2** illustrates the locations of non-LACPR projects in these planning units and generalized locations of surficial deposits. Sites consisting of alluvium may represent good candidates for potential borrow sites. Backswamps may also provide some amount of clay borrow, but these surficial deposits may also be situated in wetlands or have suitable but scattered and/or limited clay-containing deposits intermixed with unsuitable muck or fine-grained silts. Based on the available project information, the borrow requirements of the non-LACPR projects in this area should result in limited adverse impacts.

### **3.4.3 Future With LACPR**

Potential borrow sites are usually identified, investigated, and approved on a project-by-project basis during design or pre-construction. Since most of the projects and programs under evaluation as part of this analysis have not reached the design phase, there is no information available on potential sources of borrow or estimated quantities needed. As an indicator of possible structure borrow requirements, **Table 3.4-3** summarizes GIS queries of the estimated miles of levee work associated with those LACPR alternatives in each planning unit with the largest structural components.

**Table 3.4-3. Estimated Miles of Levee Work for Major LACPR Structural Alternatives by Planning Unit**

Planning Unit	Structural Strategy	Alternative with Largest Structural Component	Miles of Levee Work <sup>1</sup>
1	High Level Plan	PU1-C-HL-b-400-2	205
1	Lake Pontchartrain Surge Reduction	PU1-C-LP-b-1000-2	236
2	Ridge Alignment	PU2-C-R-1000-4	172
2	GIWW Alignment	PU2-C-G-1000-4	405 <sup>2</sup>
2	West Bank Alignment	PU2-C-WBI-400-1	82
3a	Morganza Alignment	PU3a-C-M-100-2	133
3a	GIWW Alignment	PU3a-C-G-1000-2	184
3b	Franklin to Abbeville Alignment	PU3b-C-F-1000-1	111
3b	GIWW Alignment	PU3b-C-G-100-1	111
3b	Ring Levee	PU3b-C-RL-400-1	94
4	GIWW Alignment	PU4-C-G-1000-3	128
4	Ring Levee	PU4-C-RL-1000-1	36
<b>Worse-Case Total Miles of Levee Work<sup>3</sup></b>			<b>1,064</b>

Notes: <sup>1</sup>Includes new levee construction and modification and repair of existing levees.

<sup>2</sup>Includes levee work for the complete Donaldsonville to the Gulf of Mexico project including those sections not part of LACPR.

<sup>3</sup>Calculation based on **one** worse-case structural alternative from each Planning Unit (i.e., PU1-C-LP-b-1000-2, PU2-C-G-1000-4, PU3a-C-G-1000-2, PU3b-C-F-1000-1, PU4-C-G-1000-3).

As described previously in **Section 3.4.1**, the GNOHSDRRS program would require in excess of 100 million cubic yards of borrow for 530 miles of levee improvements in PU1 and 350 miles of levee work in PU 2. The data do not distinguish new levee construction from repair or modification of existing levees. However, based on total length of levee work as a gross indicator of possible borrow needs, the LACPR alternatives with the greatest borrow requirements (approximately 1,060 miles) is greater than the total length of levee construction under the GNOHSDRRS program. As a result, it is anticipated that levee construction under LACPR would necessitate excavation of substantial quantities of borrow in excess of 100 million cubic yards.

It is likely that implementation of the LACPR alternatives would face some of the same borrow availability and transport issues occurring at present with the GNOHSDRRS in PUs 1 and 2, where approximately 60 percent of the total miles of levee work would potentially occur. **Figure 3.4-3** depicts the locations of projects in these planning units in relation to potential surficial deposits that could provide borrow. Locations containing alluvium may offer the greatest opportunity for borrow sites containing suitable clay materials, while clay deposits may be available in backswamp areas although more widely dispersed and in more limited quantities.

With the widespread presence of wetlands as well as development in PU1 and PU2, it may be extremely difficult to supply borrow needed under this future condition from sources in close proximity to project sites. For PUs 3a, 3b, and 4, potential borrow sites are likely to be increasingly more available and in closer proximity to work areas the further west projects are located. PU4 would have the lowest total amount of levee work of any planning unit, but it is also the area with the greatest availability of usable borrow. **Figures 3.4-3 and 3.4-4** depict the cumulative size of borrow pits that would be needed to obtain estimated borrow needed for the LACPR effort through 2075. Estimated, cumulative borrow pit "footprints" assume that the same proportional need for borrow material per mile of levee through year 2011 would remain constant through 2075. As estimated for **Figure 3.4-1**, the cumulative borrow pit footprints assume a maximum borrow pit depth of 20 feet below grade; 5 feet of unusable material atop usable fill; and a borrow pit width of 1.5 miles.

Borrow requirements with implementation of the projects comprising the LACPR, in combination with construction of the projects not associated with the LACPR, would far exceed those from the latter group of projects considered separately (the future without-project condition). Many of the LACPR components include alternatives with major borrow requirements for new levee construction and for modification and repair of existing levees. The cumulative effects of LACPR components and projects not associated with the LACPR are not expected to be substantially different than the expected effects of the LACPR considered independently.

### **3.5 Restoration Sediment Availability**

#### **3.5.1 Existing Conditions**

Sediment inputs are essential to compensate for land subsidence and to maintain a sustainable platform in the coastal wetlands of the planning area (USFWS 2006). Sediment availability encompasses the potential sediment in the form of suspended sediment as well as sediment transported down the river as bedload and offshore sediment resources. Sediment for the mechanical construction/restoration of marshes is anticipated to be obtained from the beneficial use of dredged material from river navigation channels. Currently, no sediment budget has been developed for the region but a study is currently being conducted by Thorne, et al entitled *Current and Historical Sediment Loads in the Lower Mississippi*. A regional sediment budget study has been proposed that would be applicable to all regional projects such as the ongoing levee work, CWPPRA, LCDA and LACPR. This study is anticipated to take a couple years to complete. The NRC Report (May 2008) and Day et al. (2007) estimate that the volume of sediment necessary to counter the effects of relative sea level (RSL) rise is 24,000 km<sup>2</sup> times a 10 cm rise in RSL. Preliminary results of the Thorne et al. study conclude that there is more than ample sediment available in the Mississippi to sustain existing wetland acreages.

#### ***Beneficial Use of Dredged Material***

The availability of sediment from the river can be ascertained by examining the operations and maintenance dredging that is conducted by the New Orleans District, USACE (**Figure 3.5-1**). Part of this material (approximately 25%) is already being utilized for beneficial uses. The District has the largest annual channel operations and maintenance (O&M) program in the USACE, with an annual average of 70 million cubic yards (mcy) of material dredged. Approximately 14.5 mcy of this material is used beneficially in the surrounding environment with funding from either the O&M program itself or the Continuing Authorities Program (CAP)



defined by the WRDA 1992 Section 204 for beneficial use of dredged material. The amount of material generated by O&M operations, the volume of material recovered for beneficial use in existing operations, and the potential total volume of material that can be reused varies considerably from year to year, based on the type of dredging operations being performed and their environmental setting.

The ten-year \$100 million LCA Beneficial Use of Dredged Material (BUDMAT) Program was authorized by WRDA 2007 pending approval of a feasibility level decision document by the Secretary of the Army. The decision document would be comprised of the BUDMAT Study and the accompanying PEIS, both of which are ongoing. Construction of beneficial use projects under the Program is anticipated in FY2010 pending appropriation of construction funds. As the Study is programmatic in nature, no specific beneficial use projects are identified in the Study, which primarily focuses on Program guidance and management framework, including the processes by which future beneficial use projects would be selected.

Potential areas for beneficial use of dredged material could be considered most feasible within a 10 mile boundary around the authorized navigation channels in the New Orleans District. Of course, future infrastructure, such as permanent long distance pipelines for disposal of dredged material, could change the potential footprint considerably.

### ***Suspended River Sediment***

An important component of the hydrologic and deltaic process in the Deltaic Plain is the suspended sediment flowing down the Mississippi River. Mississippi River suspended sediment concentrations have been continually decreasing over the last 50 years (USWFS November 2007 FWCA Report). A combination of factors, such as dams, channel improvement features, and improved land use management practices upstream of the Louisiana coastal area, has decreased the available suspended sediment load within the system. While the retention of soil and reduction of bank erosion in the middle and upper portions of the Mississippi River Drainage Basin are considered as positive developments to people and industries upstream of Louisiana, the reduction of available sediment flowing down the Mississippi directly impacts the land-building and sustenance processes in the Deltaic Plain. In addition to a reduction in sediment loads, nutrients are also diverted away from the coastal wetland systems.

A majority of the sediment and freshwater that supports the active deltas in the Lower Atchafalaya River Basin pass through the Upper Atchafalaya River Basin. The upper basin acts as a large conveyance system and reservoir for freshwater and sediment material that eventually fuels delta building at the Wax Lake Outlet and the mouth of the Lower Atchafalaya River. While delivery of sediment material is necessary to sustain and, if possible, augment land-building processes in the planning area, the continued accumulation of sediment affects the hydrology of the upper basin, and adversely impacts its cypress and tupelo swamps communities.

### ***Offshore Borrow Material***

Offshore sand borrow material has been mapped and characterized by the LDNR in cooperation with the USGS and the Minerals Management Service. The offshore sand shoals and larger nearshore sand bodies offer the highest potential and volume of material for the restoration of the barrier shorelines, headlands, islands, as well as to a certain degree marsh creation. The material

is less suitable for construction of levees and floodwalls, which require impermeable material such as clay.

Potential offshore sand resources include major sand shoals such as Trinity, Outer, St. Bernard, and Ship Shoals; near-shore sand bodies; and distributary mouth-bar deposits, tidal inlets, and tidal deltas. Resource estimates for the volumes of sand comprising the Ship Shoal structure are 1.2 billion cubic meters (m<sup>3</sup>) (15.6 billion cy) ranging from very fine to medium sand, 112 million m<sup>3</sup> (151 million cy) in the shoal crest, 430 million m<sup>3</sup> (580 million cy) in the shoal front, and 640 million m<sup>3</sup> (864 million cy) within the shoal base. An additional 123 million m<sup>3</sup> (166 million cy) of sand is estimated to be contained as distributary channel (a stream that branches off and flows away from a main stream channel, a common feature of river deltas) fill deposits under the shoal (LCA 2004).

Depending on the proximity from shore, sediment types, water depth, and pit orientation and geometry, borrow pits in open water may impact hydrodynamics, water quality, and biological communities (benthos and fish). The resulting general guidance developed by the HET for the PEIS level clearance was: the borrow areas should not be dredged below 15 feet deep in two sites and 20 feet for another, and for each, the borrow should be at least 300 feet away from the shoreline.

### 3.5.2 Future Without LACPR

Proposed marsh creation and habitat restoration (e.g., barrier island, beach restoration) would require suitable sediment for construction and maintenance. **Table 3.5-1** presents the estimated amount of sediment that would be required to construct the marshes proposed for the projects independent of LACPR. Collectively over all planning units, approximately 315 million cu yds of sediment would be required to construct the over 39,000 acres of marsh proposed. This volume of sediment assumes that 124 ac of marsh can be created for every 1.0 M cu yds of sediment. In addition to sediment required for mechanical construction of marshes, suspended sediment carried into wetlands by freshwater diversions would be required to sustain existing wetlands. Other than the estimate by Day et al. (2007) described above, no additional information or estimate of the suspended sediment requirements is available.

Offshore sediment comprised of sand would provide the material necessary for barrier island restoration that would include dune, headland, and beach restoration. In the future without LACPR, proposed barrier island restoration projects include Ship Shoal Whiskey West Flank Restoration; Scofield Island Restoration, Barataria Basin Landbridge and Shoreline Restoration (Annex A, **Table 2.5-3**). Based on the estimated available sand resources offshore, there is an ample supply of sand for these restoration projects.

**Table 3.5-1. Anticipated Marsh Creation and Sediment Requirements for Projects Implemented Independent of LACPR by PU**

Planning Unit	Marsh Creation (ac)	Approximate Sediment Requirements (cu yds)*
1	17,000	137,000,000
2	16,000	129,000,000
3a	2,200	18,000,000
3b	1,220	10,000,000
4	2,650	21,000,000

<b>Total</b>	<b>39,070</b>	<b>315,000,000</b>
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Note: \* Assume 124 ac marsh creation per 1.0 M cu yds.

### 3.5.3 Future With LACPR

There are approximately 229,500 ac of proposed marsh creation under LACPR from 2011 – 2075 (**Table 3.5-2**). Assuming 1.0 M cu yds of sediment would allow for creation of 124 acres of marsh, the proposed marsh creation and barrier island restoration proposed under LACPR would require approximately over 1.8 billion cubic yards of suitable sediment to construct (**Table 3.5-2**). With the projects anticipated to be implemented independent of LACPR plus those under the LACPR effort, approximately 2.2 billion cu yds of sediment would be required to provide the cumulative marsh creation projects proposed. Renewable Mississippi River and/or Atchafalaya River sediments would be the preferred sediment sources for mechanical marsh creation.

In addition to the technical challenges of handling and utilizing the material, there would be a tremendous cost associated with the mechanical construction of the proposed marshes.

**Table 3.5-2. Anticipated Marsh Creation and Sediment Requirements by PU under R2 alternative for PU1 and 2 and R1 alternative for PU3a, 3b, and 4 from 2011 – 2075**

Planning Unit	Marsh Creation (ac)	Approximate Sediment Requirements (cu yds) *
1	42,500	342,000,000
2	36,000	290,000,000
3a	55,800	450,000,000
3b	33,200	268,000,000
4	62,000	500,000,000
<b>Total</b>	<b>229,500</b>	<b>1,850,000,000</b>

In addition to the proposed marsh creation, barrier island restoration is planned under LACPR. Approximately 15,000 acres and 10,000 acres of barrier island restoration are proposed in PU2 and PU3a, respectively. The total estimated volume of sediment required for barrier restoration is approximately 36,000,000 cu yds over a 50 year planning horizon. The primary source material for this restoration effort is anticipated to be the offshore sand shoals. Based on the estimated amount of available offshore sand resources, there appears to be an adequate supply of sand for this portion of the coastal restoration alternatives under LACPR; however, dredging the material from offshore would be very costly.

## 3.6 Social Affects

### 3.6.1 Existing Conditions

The Hurricane events of 2005 led to large scale displacement of persons from the entire LACPR planning area. Large scale damage to housing, disruption of basic services and infrastructure, loss of employment along with closure of damaged schools and educational institutions are just some of the reasons that led to the displacement of the resident population. The displacement of persons after the hurricane events compounded by lack of credible information regarding the

likelihood of evacuees' returning to the area has resulted in great uncertainty about current population estimates and the overall demographic characteristics of the area (Rand Gulf States Policy Institute, 2006). Population estimates and projections developed before the hurricane events by national, state and private agencies are currently being revised. Following the hurricanes, ethnic groups, not previously present in high percentages arrived in the New Orleans area to fill reconstruction employment needs. As a result of this in-migration, the resident population in the future is expected to be more diverse than before the hurricanes. Current estimates and future projections developed by Environmental Systems Research Institute, Inc. (ESRI) have been used throughout this report.

The environmental justice analysis for the LACPR effort follows the guidance and methodologies recommended in the Federal Council on Environmental Quality's (CEQ's) Environmental Justice Guidance under the National Environmental Policy Act (December 1997). Executive Order 12898 titled Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, issued in 1994, directs federal and state agencies to incorporate environmental justice as part of their mission by identifying and addressing the effects of all programs, policies and activities on minority and low-income populations. The fundamental principles of environmental justice are as follows:

- Ensure the full and fair participation by all potentially affected communities in the decision-making process;
- Prevent the denial of, reduction in or significant delay in the receipt of benefits by minority and low-income populations; and
- Avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

The planning area for the LACPR effort includes 26 parishes located in the southern portion of the state. Based on a review of available population estimates, the total population within the study area for year 2000 and 2005 (second quarter) is reported to be 2,414,535 and 2,430,093 persons respectively (see **Table 3.6-1**), a reported increase of 15,558 persons during the five-year period.

**Table 3.6-1. Population by Planning Unit**

<b>Planning Unit (PU)</b>	<b>Population (2000)</b>	<b>Population (2<sup>nd</sup> Qtr. 2005)</b>	<b>Population (4<sup>th</sup> Qtr. 2005)</b>	<b>Percent Change (2000-2005)</b>
PU1	1,239,216	1,245,115	885,105	-28.6%
PU2	354,227	354,099	276,654	-22.0%
PU3a	230,574	234,059	240,302	4.2%
PU3b	343,698	350,298	357,777	4.1%
PU4	246,820	246,522	245,107	-0.7%
<b>Total</b>	<b>2,414,535</b>	<b>2,430,093</b>	<b>2,004,945</b>	<b>17.0%</b>

Source: 2000 and 2005 Population from LACPR Plan Formulation Atlas, April 16, 2007, USACE

However, after the hurricane events, population within the area reported in the fourth quarter of 2005 dropped to 2,004,945 persons, a decrease of 425,148 persons compared to the pre-storm estimates. Based on the above estimates, population growth has been fairly modest in the LACPR planning area before the storms and future projections predict a gradual increase to pre-Katrina and Rita levels as people return to the affected areas.

Based on population estimates reported after the hurricanes in the fourth quarter of 2005, PU 1 reported the largest population of nearly 885,105 persons among all planning units. PU3b and PU2 reported the second and third highest population numbers of 357,777 persons and 276,654 persons, respectively.

In 2012, the five planning units are expected to experience a further increase in population as some of the persons displaced by the hurricanes are expected to return to the area following improvement of conditions. The total population forecast for 2012 is approximately 2,391,815 persons. PU1, considered the most densely populated area in coastal Louisiana, is reported to be the fastest growing planning unit.

The LACPR planning area contains some of the largest urban areas within the state. PU1 includes the urbanized areas of the New Orleans Metropolitan Area (NOMA). PU2 includes portions of NOMA, Venice, Grand Isle and portions of towns located along the Bayou Lafourche such as Port Fourchon, Larose, Thibodaux, and Donaldsonville. Communities within PU3a include a portion of the Baton Rouge metropolitan area along with areas such as Bayou Cane, Houma, Morgan City, Raceland and Thibodaux. Most of the population within PU3b is located along Bayou Teche and includes cities and towns of Berwick, Patterson, Franklin, Jeanerette, New Iberia, Abbeville, Garden City, Sorrel, Louisa, Avery Island, Delcambre, Erath, Henry, Intercoastal City, and the southern portion of Lafayette. Located within PU4 are the cities and towns of Sulphur, Lake Charles, Welsh, Iowa, Vinton, Kaplan, Morse, and Lake Arthur. The planning area for this effort is home to persons of several ethnic groups including African American, Hispanics, Filipino, Chinese and Vietnamese including many others.

As the LACPR planning area is spread across multiple parishes, the percentage of minority residents and persons living below the poverty level within the State was used as the basis for determining those areas with high minority and low-income concentrations. Block groups that had either minority percentages above the State average or poverty levels above the State average were designated as areas with potentially high concentrations of minority or low-income persons.

The share of minority persons as a percentage of the total population has been fairly consistent across five planning units. In 2000, minority persons comprised 36 percent of the total population across all five planning units, compared to the statewide threshold of minority persons computed to be 37.5 percent. Population estimates obtained from ESRI 2012 were further computed to determine the percentage of minority persons. In 2012, minority persons accounted for nearly 38 percent of the total population within the five planning units.

As indicated in **Figures 3.6-1** and **3.6-2** within PU 1 and 2, the highest concentration of minority persons in 2012 were reported in portions of St. Bernard Parish, eastern and north western portions of the City of New Orleans and areas around Donaldsonville. Minority persons within St. Bernard Parish include Islenos and African Americans. Areas around Donaldsonville also include Islenos and African Americans. Portions of the PUs along either side of the Mississippi River were also inhabited by higher concentrations of minority persons. Within PUs 3a, 3b and

4, portions of Morgan City, Houma, Lake Charles and areas east of the Grand Lake exhibit greater concentrations of minority persons.

Using 2000 Census Data, block groups that exhibited a higher percentage of low-income persons compared to the statewide threshold of 19.5 percent were classified as low-income areas. Within PU1 and 2, low-income persons are concentrated in areas along St. Bernard Parish; eastern portions of New Orleans, Donaldsonville and Baton Rouge (see **Figure 3.6-3**). Within PUs 3a, 3b and 4, areas that have a higher concentration of low-income persons include areas surrounding the major population centers of Houma, Morgan City, Lafayette and Lake Charles (see **Figure 3.6-4**)

In terms of employment, government and government establishments employed nearly 17 percent of the total workforce within the state and were the largest single largest employer in 2000. Within the southern portion of the state, some of the large employers historically have been the sectors of transportation, oil and gas, fishing, tourism, and the finance, insurance, and real estate sectors.

### **3.6.2 Future Without LACPR**

Without the LACPR effort, growth in population and housing units is expected to occur within the planning area into the future. These are based on modeling results conducted for two future development scenarios: “high employment” and “business as usual.” The two future development scenarios were modeled using a custom application of the U.S. Macro Model. During the course of LACPR planning studies, projections were subsequently developed for a third development scenario known as the “modified high employment” scenario, considered to be a conservative estimate of one of the initial growth scenarios. In addition to the population projections, three land use allocation scenarios (compact, dispersed and hybrid) were developed to show the distribution of population over the planning area for the “high employment” and “business as usual” future development projections for year 2050 and 2075. The Economics Appendix provides further details on the scenarios and the rationale behind their development. **Table 3.6-2** below presents the comparison of the future estimates in population, households and employees for years 2025, 2050 and 2075 by PU based on the high employment projection using the dispersed land use allocation scenario and the business as usual growth under the compact land use allocation scenario.

The 2050 and 2075 population estimates based on the high employment and business as usual scenarios for dispersed and compact land use allocation scenarios for the five planning units were mapped to identify areas that are expected to be inhabited in the future. As presented in **Figure 3.6-5** in 2050 within PU1 the compact land use allocation scenario will witness residential development and population growth in areas near the major cities of New Orleans, Donaldsonville, Madisonville, Mandeville and Baton Rouge. In PU2, development is expected to focus around the urban areas of Hahnville, Des Allemands, and portions of Gonzalez in St. James Parish. Figures 3.6-7 presents similar trends in population distribution in 2075. In PUs 3a, 3b and 4 in 2050 and 2075, under the compact land use allocation scenario, population is expected to be concentrated around Houma, Lafayette and Lake Charles (see **Figures 3.6-6** and **3.6-8**). Under the compact land use allocation scenario, a greater proportion of multi-family housing units compared to single-family units are expected to be built into the future. As the name suggests, the dispersed land use allocation scenario projects development away from the major cities with a greater proportion of single-family housing units compared to multi-family

housing units. As presented in **Figures 3.6-9 to 3.6-12**, in 2050 and 2075, under this scenario future growth in population is expected to be directed towards the outer suburbs of the major urban centers within the five planning units.

Typical impacts to the population in an area from the expansion of existing levees and construction of new levees include direct and indirect impacts. Direct impacts can result from displacements of residences and businesses and reductions in local property tax revenue as a result of right-of-way acquisition of property. The indirect impacts include temporary disturbances due to noise, worsening of air quality due to operation of construction related machinery and construction related impacts leading to temporary closure of streets and detours. In the future without LACPR, there are a limited number of projects proposed in the planning area that include a structural component which could lead to permanent and temporary direct and indirect impacts to the human environment. Prior to the construction of any LACPR elements, low-income and minority persons will be identified and involved in the overall planning process in accordance with Executive Order 12898. During the final design phase of the project, efforts to avoid adverse impacts to the communities shall be undertaken. If impacts to certain communities cannot be avoided, USACE in collaboration with other public agencies will provide compensatory mitigation to offset the adverse impacts of the program.

**Table 3.6-2. General Planning Area Population, 2025, 2050 and 2075**

<b>High Growth Dispersed Land Use Scenario</b>	<b>Population</b>	<b>Households</b>	<b>Employees</b>	<b>Business As Usual Growth Compact Land Use Scenario</b>	<b>Population</b>	<b>Households</b>	<b>Employees</b>
<b>Year 2025</b>				<b>Year 2025</b>			
Planning Unit 1	1,208,404	460,356	668,395	Planning Unit 1	1,147,756	434,726	586,124
Planning Unit 2	439,553	151,313	181,562	Planning Unit 2	382,919	130,336	161,951
Planning Unit 3a	261,742	94,059	127,303	Planning Unit 3a	251,111	89,081	117,885
Planning Unit 3b	384,253	140,463	220,203	Planning Unit 3b	390,563	142,852	233,916
Planning Unit 4	288,117	105,207	128,307	Planning Unit 4	292,568	106,788	128,325
<i>Total</i>	<i>2,582,069</i>	<i>951,398</i>	<i>1,325,770</i>	<i>Total</i>	<i>2,464,917</i>	<i>903,783</i>	<i>1,228,201</i>
<b>Year 2050</b>				<b>Year 2050</b>			
Planning Unit 1	1,717,408	673,884	996,303	Planning Unit 1	1,222,673	472,930	648,098
Planning Unit 2	507,758	185,071	211,815	Planning Unit 2	390,063	134,225	167,540
Planning Unit 3a	326,272	119,156	157,353	Planning Unit 3a	260,941	95,030	124,230
Planning Unit 3b	412,053	153,853	230,338	Planning Unit 3b	417,528	154,207	265,771
Planning Unit 4	322,587	122,434	160,356	Planning Unit 4	302,949	111,721	131,693
<i>Total</i>	<i>3,286,078</i>	<i>1,254,398</i>	<i>1,756,165</i>	<i>Total</i>	<i>2,594,154</i>	<i>968,113</i>	<i>1,337,332</i>
<b>Year 2075</b>				<b>Year 2075</b>			
Planning Unit 1	1,973,388	790,549	1,271,055	Planning Unit 1	1,315,782	554,003	754,507
Planning Unit 2	557,580	204,895	249,163	Planning Unit 2	398,446	147,278	179,729
Planning Unit 3a	363,101	136,745	193,074	Planning Unit 3a	272,810	102,982	136,558
Planning Unit 3b	448,003	170,181	273,788	Planning Unit 3b	449,978	171,240	313,537
Planning Unit 4	335,134	130,259	172,639	Planning Unit 4	315,080	120,865	142,096
<i>Total</i>	<i>3,677,206</i>	<i>1,432,629</i>	<i>2,159,719</i>	<i>Total</i>	<i>2,752,096</i>	<i>1,096,368</i>	<i>1,526,427</i>

Source: Calthorpe Associates, 2008

Note: Planning Area includes 26 Parishes



### 3.6.3 Future With LACPR

The LACPR effort includes several structural, nonstructural, and coastal restoration measures. Based on the results of the multi-tier screening exercise and the screening attribute values of the MCDA analysis, comprehensive plans that could cause the greatest adverse effect on social resources were identified and are presented in **Table 3.6-3**. For the purpose of this analysis, alternatives that could cause the greatest adverse effect were selected based on the number of persons that are likely to be impacted based on a 400-year event in the year 2075.

**Table 3.6-3. Worst Case Alternatives for Social Resources**

<b>Planning Unit</b>	<b>Alternative</b>
PU 1	PU1-LP-a-100-1 PU1-HL-a-100-3
PU 2	PU2-WB1-100-1 PU2-R-100-3 PU2-G-100-4
PU 3a	PU3a-M-100-2 PU3a-G-400-2
PU 3b	PU3b-G-100-1 PU3b-F-100-1 PU3b-RL-100-1
PU 4	PU4-G-100-2 PU4-RL-400-1

Based on hydrology and hydrodynamic modeling, several areas within the five planning units were identified as potential buyout areas where development would be prevented to occur within the floodplain in the future. GIS shapefiles of the potential buyout areas were overlain on future population estimates for the year 2050 and 2075 to better understand the communities that are most likely to be impacted by the alternatives proposed for further evaluation (see Figures 3.6-5 to 3.6-12). The voluntary buyout program would target certain areas and make them off-limits to future development thereby preventing future damage to communities that are susceptible to flooding and damages. Although future population projections are available within the planning area up to year 2075, future conditions for environmental justice evaluations are often subject to considerable uncertainty. The recommended practice calls for evaluating potential impacts based on existing conditions and established data sets such as the U.S. Census.

The construction of the proposed alternatives, the voluntary buyout program would target certain areas and make them off-limits to future development thereby preventing future damage to communities that are susceptible to flooding and damages. Therefore, in 2050, under the dispersed and compact land use allocation scenarios within PUs 1 and 2 for the PU1-LP-a-100-1 and the PU1-HL-a-100-3 plan, development is expected to be sparse in the buyout areas located along the eastern portions of St. Bernard Parish and Jefferson Parish (see **Figures 3.6-5** and **3.6-6**). Similarly within PUs 3a, 3b and 4, development is expected to sparse around the proposed buyout areas for the proposed plans located in proximity to Houma, Lafayette and Lake Charles. Similar trends are observed within the five planning units under the dispersed land use scenarios.

Under both the dispersed and compact land use allocation scenario, a majority of the buyout areas are proposed along the coastline that are also not expected to be heavily populated in the future (see **Figures 3.6-7** and **3.6-8**).

The construction of an expanded and improved levee system would increase the level of protection to the population within the five planning units. As indicated in the Non-Structural Plan Component Appendix the proposed structural alternatives are anticipated to impact several dwellings, farms and business establishments. As final design of the structures are prepared, an identification of the affected properties would be performed, and the affected property owners would receive just compensation as required by the policies of The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (P.L. 91-646). Further details on the proposed mitigation strategies are outlined in the Nonstructural Plan Component Appendix. In addition to the mitigation measures outlined, several nonstructural measures are proposed to reduce damage to vulnerable populations within the planning area. These measures include elevating the structure, constructing barriers such as floodwalls, or berms to stop floodwaters from damaging the structure and, structural modifications through floodproofing and relocating contents. Under the LACPR effort, it is expected that some rural areas would become more suburban or urban in character, while the character of other areas would remain relatively unchanged. Efforts to avoid or minimize property displacements in any one neighborhood would be taken so as to ensure that existing social networks are maintained. The benefits from an improved hurricane protection system would accrue to the all populations regardless of ethnicity, race and income levels.

## **3.7 Recreational Resources**

### **3.7.1 Existing Conditions**

South Louisiana contains hundreds of thousands of acres that are designated for recreation. **Figure 3.7-1** depicts the recreation areas that are listed in the Recreational Resources Annex (Annex B). Potential cumulative impacts from non-LACPR projects and LACPR alternatives were examined for these areas both in terms of physical impacts from, for example, levee construction or impacts to uses of the areas.

In December 2007, a preliminary study of current recreational opportunities was conducted that looked at boating, hunting, fishing, hiking, bird watching, or swimming provided by the recreation areas. Focus group interviews were conducted with 22 participants. The study was initially limited to areas managed by Federal and State agencies and was later expanded to include some other large or environmentally significant areas managed by nonprofit or local government entities. In addition, there are State-owned land and water bottoms, privately owned and parish owned and managed land and boat ramps, scenic rivers, reefs, rookeries, and protected sensitive areas that contribute to recreational opportunities in the area.

A qualitative research approach was used to examine the potential impacts of alternatives on recreation areas. Site visits and focus group interviews with managers and users of various recreation resources were conducted to identify the potential effects of alternatives on the recreational opportunities provided and on usage of the recreation areas.

**Figure 3.7-1** shows the recreational areas considered in this analysis, and the following paragraphs summarize the recreational opportunities they provide in each planning unit.

### ***Planning Unit 1***

Recreation areas in PU1 that were examined include four National Wildlife Refuges, three Jean Lafitte National Historical Park and Preserve Units, seven Wildlife Management Areas and State Wildlife Refuges, four State Parks, one State Historic Site, as well as other significant recreation areas. These areas alone represent more than 355,000 acres that are visited annually over 4 million times for recreational purposes. Recreation areas in PU1 include more than 1,000 miles of trails for hiking and biking, 28 boat ramps, 500 feet of fishing pier, seven campgrounds that are rented more than 122,000 times per year, four classrooms, eight visitor centers or museums, six picnic shelters, and five historic sites. The recreation areas provide opportunities for such activities as hunting, hiking, biking, boating, bird watching, fishing, crabbing, crawfishing, shrimping, education, camping, picnicking, and playing.

### ***Planning Unit 2***

Recreation areas in PU2 that were examined include one Jean Lafitte National Historical Park and Preserve Unit, two Wildlife Management Areas, two State Parks, and two other large recreational areas. These areas represent more than 76,000 acres that are visited annually more than 1 million times. Recreation areas include more than 14 miles of trails for hiking and biking, four boat ramps, 400 feet of fishing pier, one classroom, one visitor center, seven picnic shelters, and two campgrounds that are rented more than 123,000 times annually. The recreation areas provide opportunities for such activities as hunting, hiking, biking, boating, bird watching, fishing, crabbing, crawfishing, shrimping, education, picnicking, and playing.

### ***Planning Unit 3a***

Recreation areas in PU3a that were examined include two National Wildlife Refuges, one Jean Lafitte National Historical Park and Preserve Unit, five Wildlife Management Areas or State Wildlife Refuges, one State Historic Site, and one other recreational area. These areas represent more than 223,000 acres that are visited annually more than 141,000 times. Recreation areas include one hiking trail, three boat ramps, 150 feet of fishing pier, one visitor center, two historic sites, four campgrounds that are rented more than 300 times each year, one classroom, one visitor center, and two historic sites. The recreation areas provide opportunities for such activities as hunting, hiking, boating, bird watching, fishing, crabbing, crawfishing, education, camping, and picnicking.

### ***Planning Unit 3b***

Recreation areas in PU3b that were examined include two National Wildlife Refuges, one Jean Lafitte National Historic Park and Preserve Unit, two State Wildlife Refuges, two State Parks, one State Historic Site, and seven other recreational areas. These areas represent more than 127,000 acres that are visited annually more than 250,000 times. Recreation areas include almost 27 miles of hiking trails, two boat ramps, three visitor centers or museums, 22 picnic shelters, two classrooms, one historic site, and two campgrounds that are rented more than 55,000 times annually. The recreation areas provide opportunities for such activities as hunting, hiking,

boating, bird watching, fishing, crabbing, crawfishing, shrimping, education, picnicking, camping and playing.

#### ***Planning Unit 4***

Recreation areas in PU4 include three National Wildlife Refuges, one Wildlife Management Area, one State Wildlife Refuge, and one State Park. These areas represent more than 269,000 acres that are visited more than 460,000 times annually. Recreation areas include more than 9.5 miles of trails for hiking and biking, three boat ramps, three visitor centers, one picnic shelter, one classroom, and one campground that is rented more than 36,700 times annually. The recreation areas provide opportunities for such activities as hunting, hiking, biking, boating, bird watching, fishing, crabbing, crawfishing, education, picnicking, education, camping, and playing.

### **3.7.2 Future Without LACPR**

Recreational areas may be affected both positively and negatively by the various projects that would be implemented without LACPR. Generally, projects that improve access to recreation areas or increase the diversity of species in an area would be beneficial to recreation. Projects that impede access to open waters or limit birding, hunting or fishing areas would be detrimental to recreation. **Figures 3.7-2** and **3.7-3** show the locations of projects that are scheduled for implementation in the next several years as well as the location of recreation areas.

Freshwater diversion projects would benefit freshwater fishing by increasing the area in which freshwater fish live, but would be detrimental to saltwater fishing because to reach saltwater, people would have to travel further towards the Gulf. Diversion projects must be diligently monitored to detect any accumulation of heavy metals and nutrient loads, which can negatively affect fish quality. Diversion projects must also be monitored because non-native plant species can flourish when salinity levels are reduced, and removing non-native plants can be very expensive for recreation areas. In addition, diversions may introduce non-native fish such as grass carp into wetlands. Diversion projects would particularly affect the Maurepas Swamp Wildlife Management Area, Delta National Wildlife Refuge, Mandalay National Wildlife Refuge, and Atchafalaya Delta Wildlife Management Area.

The borrow pits that would be created to supply material for structural projects may benefit recreational fishing by providing additional public access to fishing, additional ponds for freshwater fishing or for fish hatcheries, and additional habitat for waterfowl. If the borrow pits are large and in areas where there never was a recreational area, the borrow pits may provide entirely new recreation opportunities.

Beneficial use of dredged materials would benefit recreation by increasing the nesting areas for birds. However, dredging projects can hurt fishing resources by decreasing water clarity, disturbing long-buried contaminants, and contributing to salt water intrusion, and must be timed so that they would not interfere with migration patterns of fish. Particularly, dredging projects would affect the Delta National Wildlife Refuge, Pass A Loutre Wildlife Management Area, Sabine National Wildlife Refuge, and Cameron Prairie National Wildlife Refuge.

Marsh creation projects benefit recreation by providing additional land for birding and hunting, but may be detrimental for recreational boating as open waters are removed. Marsh creation projects would benefit the Biloxi Wildlife Management Area.

Barrier shoreline restoration projects would reduce risk for recreational areas and would generally benefit recreation by providing increased areas for bird nesting. Shoreline risk reduction projects cause silt and sediment to accumulate along shorelines, which facilitates access to the water providing a benefit for recreational fishing. In PU4, reforestation of the Cheniers would be a key component of shoreline restoration projects, and would provide additional nesting areas for birds. Restored barrier islands may also make it possible to expand recreation opportunities by allowing camping, for example, in Rockefeller Wildlife Refuge.

Hydrologic restoration projects would restore natural flows of water and would particularly affect the Wisner Wildlife Management Area, Sabine National Wildlife Refuge, Rockefeller Wildlife Refuge, State Wildlife Refuge, and Pointe Aux Chenes Wildlife Management Area. Projects that alter water flow can be detrimental for recreational boating if, for example, they create new currents that boaters do not understand; but can be beneficial for fishing, birding, and other recreational opportunities by nourishing native plant and animal life.

### **3.7.3 Future With LACPR**

With LACPR, additional coastal restoration, structural and nonstructural projects would be implemented and these may be beneficial or detrimental to recreation areas and to the provision of recreational opportunities. **Figures 3.7-4** and **3.7-5** show the locations of both non-LACPR and LACPR projects as well as the location of designated recreation areas.

Coastal restoration measures would change the diversity of species in specific areas, which may be detrimental or beneficial to recreation areas. For example, there are usually manatees in the brackish waters on the north shore of Lake Pontchartrain near Fontainebleau State Park in the summer. With freshwater diversion through the Bonnet Carre spillway due to high water in the spring of 2008, the water on the north shore has become less brackish. As a result, the manatees remain further east, nearer to the Gulf, denying park visitors the opportunity to view manatees.

Freshwater diversion measures can be beneficial by creating new opportunities for recreation. For example, near St. Bernard State Park, due to the Caernarvon freshwater diversion project, there are more bass in the area and residents are considering the possibility of creating a bass tournament. The tournament would bring in tourist dollars but may also lead to excess traffic on local roads. Freshwater diversion projects would particularly affect fishing in the Salvador-Timken and Maurepas Swamp Wildlife Management Areas,

One negative effect of structural coastal restoration measures on recreation is the potential for the creation of rip tides near swimming areas. For example, rocks placed parallel to the shoreline to protect Grand Isle State Park have caused unanticipated rip currents. Shoreline stabilization measures may particularly benefit recreational opportunities in Sabine, Cameron Prairie, and Lacassine National Wildlife Refuges by creating additional areas for bank fishing.

An expanded and improved levee system would have both beneficial and detrimental effects to recreation areas and to recreational opportunities. The potential levee projects that were

identified through the MCDA analysis as having the greatest effect on recreation areas are shown on **Table 3.7-1**.

**Table 3.7-1. Structural Alternatives Having Greatest Adverse Effect on Recreational Resources**

<b>Planning Unit 1</b>	<b>Planning Unit 2</b>	<b>Planning Unit 3a</b>	<b>Planning Unit 3b</b>	<b>Planning Unit 4</b>
HL-b-400-2	WBI-400-1	G-1000-2	RL-400-1	RL-1000-1
LP-b-1000-2	R-1000-4	M-100-2	F-1000-1	G-1000-3
	G-1000-4		G-100-1	

Increased levees would necessitate the destruction of some cabins, which are along waterways in State Parks. At Bayou Segnette State Park, larger levees, depending upon the design, may also necessitate the destruction of a swimming pool, because it is located near the base of the current levee. Due to their proximity, larger levees would potentially affect the Bayou Sauvage, Big Branch Marsh, Bayou Teche and Lacassine National Wildlife Refuges, St. Tammany Wildlife Refuge, the Bonnet Carre Spillway, Fairview-Riverside and Fontainebleau State Parks, and the Maurepas Swamp, Pearl River, Salvador-Timken, and Point Aux Chenes Wildlife Management Areas.

Increased levees along Highway 82, which is along a natural levee or chenier in PU4, would necessitate the destruction of homes along the roadway. This would negatively affect recreation in the area because these are the homes of many guides and people who work to support recreation in the area.

Increased levees would require longer access roads in recreational areas. To pull a mobile home or a boat trailer over a higher levee to get to campgrounds or boat ramps, it would be necessary to build longer access roads so that the grade would be manageable. This would be costly for recreational areas.

Increased levees would also provide additional risk reduction to the structures and utility systems at recreational areas, which would decrease the amount of time that the areas cannot be used following severe storms. Following Hurricane Katrina, many recreational areas were used for several months for temporary housing.

Additional levees would also provide new recreational opportunities such as the development of bike trails along the levees that may connect with existing trails.

Nonstructural measures would be beneficial to recreation areas as elevated structures would create less debris that must be removed following a flood. The Louisiana State Parks are considering building floating cabins rather than elevated cabins to protect them from flood and storm surge damage.

Elevation requirements may affect recreation areas negatively. For example, elevated fishing piers would change the fishing experience as people would be higher and further removed from the water. In addition, elevation requirements would add to the cost of developing bath houses and handicapped access ramps, which would either have to be very long to provide for a reasonable grade or be replaced by marine grade elevators.

Elevation requirements may lead to there being fewer hunting clubs in southern Louisiana because elevated structures would be more costly to erect.

Acquisition projects may have a similar detrimental effect on recreation by causing low-income people who support recreation areas to leave the area, which would, in turn, cause businesses that support both the local population and others who come to enjoy recreational areas to leave the area. Acquisition projects are most likely to affect Pearl River and Point Aux Chenes Wildlife Management Areas, the State and Rockefeller Wildlife Refuges, and the Lacassine, Cameron Prairies, and Sabine National Wildlife Refuges.

In summary, focus group interviews identified both beneficial and detrimental effects of potential projects to recreation areas and to the recreational opportunities provided. In addition to the potential effects, participants discussed the need for long-term monitoring of projects, the importance of privately-owned, parish and municipal, and other state-owned lands to recreation, and the contributions of other state and non-profit agencies to recreational opportunities.

### **3.8 Cultural Resources**

#### **3.8.1 Existing Conditions**

South Louisiana contains abundant historic and prehistoric archeological sites, historic structures, historic districts, and other heritage sites that represent Louisiana's cultural heritage. The LACPR area contains over 3,500 recorded archeological sites and more than 8,000 recorded historic structures. Five-hundred and forty-nine sites are listed on the National Register of Historic Places, 66 of which are National Register historic districts, and 37 have the special status of National Historic Landmark. The Cultural Resources appendix provides an overview of historic preservation laws that require consideration of cultural resources as part of federal actions, describes cultural resources within the LACPR area, and presents the methodology for determining cultural resources metrics included in the Multi-Criteria Decision Analysis (MCDA). The worst performing alternatives for protecting cultural resources are selected for the worst case scenarios consideration of the future with LACPR.

For the MCDA, cultural resources are classified into three broad categories: (1) archaeological sites; (2) National Register and National Historic Landmark properties; and (3) Historic Districts. The relationship of cultural resources to environmental laws, statutory protection, and public importance formed the basis for defining these categories. The consideration of cultural resources for the cumulative effects overview involves subdividing archaeological sites into two sub categories (1) terrestrial archaeological sites and (2) off-shore archaeological sites. Terrestrial archaeological sites include sites on land and include the material remains of campsites, houses, villages, cemeteries, industries, and other occupational or activity locations. Off-shore sites include the material remains of shipwrecks and other submerged vessels. This distinction is important in the cumulative effects overview because project construction activities and operations have the potential to differentially affect terrestrial and submerged archaeological sites.

Inventories of cultural resources exist as the result of investigations prior to state and federal undertakings and avocational efforts to record and preserve sites. These inventories are not comprehensive and only reflect the small percentage of the study area that has been surveyed.

Overviews, such as Chase et al., 1988, Davis and Castille, 2005, Roblee et al., 2000, and Smith et al., 1983 synthesize cultural history and present overarching models of prehistoric and historic land use. **Figure 3.8-1** presents the distribution of recorded cultural sites in South Louisiana. These data help to summarize existing patterns and to assess how likely it is that unrecorded sites exist in a given location. Some geomorphic features, such as natural levees, beach ridges, cheniers, barrier islands, and elevated salt domes have a high probability for containing cultural resources because they were a focus of both prehistoric and historic occupation. In addition, the outer continental shelf and shoals form additional geomorphic features where unrecorded sites are likely to occur because of their association with shipwrecks (Watts et al., 2004).

### *Archaeological Sites*

Archeological sites include the material remains of people and cultures from the historic and prehistoric past. Native American groups of coastal Louisiana relied on hunting, fishing, and gathering plants; and sites include hunting and food processing camps, hamlets, villages, and mounds. Geomorphology and land formation greatly influences the age of prehistoric archaeological sites within the South Louisiana (Saucier, 1994). The oldest sites within the LACPR area may date to 14,000 years ago and they would occur inland on the Pleistocene terraces, and on the cheniers of the western portions of the LACPR area. In contrast, sites are not expected to be older than 3,000 years old in the eastern Mississippi River delta lobes associated with PUs 1, 2, and 3a (Maygarden et al., 2006). Native Americans increased the intensity of use of the coastal zone beginning around 200 B.C. by establishing camps and hamlets along channels extending into the marsh. By A.D. 400 villages concentrated around ceremonial mounds developed throughout the LACPR planning area (Roblee, 2000). Similarly the pattern of historic period site distribution follows natural levees and waterways. While many of today's urban settlements and Parish seats contain historic sites, historic sites are also located in rural areas. Plantations along the Mississippi River and other tributaries were common across the area, and associated features such as slave quarters and sugar mills tend to be located away from the waterways and in backswamps.

### *Shipwrecks*

Shipwrecks and other submerged archaeological sites have the potential to yield important data about the past. Shipwrecks are found throughout South Louisiana's waterways and off-shore. Many shipwrecks are recorded along the Outer Continental Shelf, and within the Ship Shoal, St. Bernard Shoal, Trinity Shoal, and the St. Bernard Shoals. The Minerals Management Service (MMS) (Watts et al 2004) has identified areas of high probability of shipwrecks on the Outer Continental Shelf. The shoal sands and sediments are prime targets for borrow for barrier island restoration and marsh re-creation. Ship Shoal, located within PU3a and PU3b, is associated with numerous shipwrecks.

### *Historic Districts, Historic Properties, and National Historic Landmarks*

Historic Districts, National Register Sites (also referred to as historic properties) and National Historic Landmarks are concentrated in urban areas and other locations of historic settlement. In fact, more than 70% of these properties fall within PU1. Additional locations with a relatively



high density of historic districts and historic properties include Lake Charles, Abbeville, New Iberia, and Morgan City.

### **3.8.2 Future Without LACPR**

Without LACPR the burial and subsidence of historic land surfaces would continue in their current pattern. Land loss forms the most significant process causing the loss of archaeological sites. While marsh creation projects proposed in the future without LACPR would help to minimize the loss of sites, many sites would still be lost or destroyed. In addition, existing levees would provide some risk reduction for archaeological sites, historic districts, historic places, and National Historic Landmarks located within the existing levee system. However, the comparison of projected flood depth to the location of historic structures (see Cultural Appendix) reveals substantial potential for historic districts, historic properties, and National Historic Landmarks to sustain damage from future flood events.

**Figures 3.8-2 and 3.8-3** present the location of Archeological Sites, Historic Properties and Historic Districts in relation to the Non-LACPR projects. Both marsh creation and hydrologic restoration projects would provide benefits by reducing loss of sites by stabilizing land surfaces. Similarly, shoreline stabilization projects such as the project planned at Grand Isle (see Figure 3.8-3) would provide protection to coastal cultural resources.

### **3.8.3 Future With LACPR**

The expansion of existing levees, construction of new levees, implementation of nonstructural measures, and execution of coastal restoration efforts would have a combination of adverse and beneficial impacts to cultural resources. Given the present stage of LACPR, all information suggests that overall the benefits of a future with LACPR to cultural resources are greater than a future without LACPR.

The expansion of existing levees and construction of new levees have the potential to directly impact cultural resources within the footprints. Similarly, the need for borrow material for both structural features and coastal restoration activities have the potential to adversely affect cultural resources. However, prior to the construction of any LACPR elements, the U.S. Army Corps of Engineers is obligated under the National Historic Preservation Act of 1966, as amended, to consider project impacts on cultural resources. This process typically occurs during the project design phase. In addition, projects can be designed around cultural resources in order to avoid impacts. If a project cannot avoid effects to a historic property, then the effects must be mitigated. In consultation with the State Historic Preservation Officer, Tribes, interested parties, and the public, mitigation plans are developed for specific resources, which might include excavation of archaeological sites, completing architectural drawings and photographs of historic structures, or developing lesson plans to teach historic preservation. If impacts to an historic property cannot be avoided, there would be opportunity to assess impacts to cultural resources in greater detail prior to construction. Given the ability to avoid adverse impacts to cultural sites, it is expected that direct impacts to cultural resources as the result of construction would be minimal or mitigated.

LACPR coastal restoration alternatives would provide a net benefit to cultural resources. The reduction in land loss might help preserve both recorded and unrecorded sites located in the

coastal marsh and other areas otherwise susceptible to land loss. Since all comprehensive plans include coastal restoration measures, the coastal restoration element has no influence on the worst case scenario.

An expanded and improved levee system associated with LACPR would provide increased protection to archaeological sites, historic districts, historic properties, and national historic landmarks for properties located within the levee systems. The reduction in flooding would lessen the destruction of archaeological sites through scouring. In addition, the reduction in flooding would decrease damages to historic structures and other elements that contribute to an historic district. **Figures 3.8-4 and 3.8-5** show the LACPR projects in relation to the sites of Archeological and Historic importance.

The alternatives that allow the greatest flooding within the levee system provide the least amount of risk reduction to cultural resources. These plans were identified through the calculation of the number of protected sites for the MCDA analysis. These worst performing alignments for each plan are provided in **Table 3.8-1**.

**Table 3.8-1. Structural Alternatives Having Greatest Adverse Effect on Cultural Resources**

Planning Unit 1	Planning Unit 2	Planning Unit 3a	Planning Unit 3b	Planning Unit 4
LP-a-100-1 HL-a-100-3	WBI-100-1 R-400-2	G-400-2 M-100-2	RL-100-1 F-100-1	RL-100-1(RL-400-1; RL-1000-1) G-400-2

As far as cultural resources are concerned, the differences in the performance in the level of risk reduction they provide cultural resources is frequently minor. The worst case scenarios for the western planning units tend to be ring levee plans because less land is protected behind the levees. The situations in the western planning units do present tradeoff situations because the overall benefit of protecting archaeological sites may not offset the cost of the alternative, especially if there is an alternative plan that provides equal or better benefits to other resources.

***Planning Unit 1***

Alternative LP-a-100-1 presents the worst case scenario for Planning Unit 1. This is mainly due to lack of risk reduction along the north shore of Lake Pontchartrain and around Laplace. Slidell, Covington, Mandeville and Laplace contain numerous historic properties and archaeological sites. In addition, many of the historic structures present in these historic towns would likely meet the criteria of an historic district and be eligible for listing on the National Register of Historic Places, if they were evaluated. Alternative HL-a-100-3 presents the second worst case scenario due to the limited risk reduction provided to the cultural resources along the north shore of Lake Pontchartrain and to the archaeological rich areas of the Rigolets and Lake St. Catherine. In addition, both of these alternatives only provide a 100 year level of risk reduction, and levee overtopping may damage historic properties and historic districts within the levee system.

***Planning Unit 2***

Alternatives WBI-100-1 and R-400-2, the two worst case scenarios for Planning Unit 2, lack the GIWW alignment. The GIWW alignment reduces risk to the numerous archaeological sites

around Lake Salvador and to the Jean Lafitte National Historic District. In addition, neither worst case scenario alternative reduces risk to the numerous archaeological sites along Bayou Lafourche or near Des Allemands. The WBI-100-1 is also the worst performing alternative because it allows the greatest amount of levee overtopping that could lead to damage of historic properties and districts along the West Bank.

### ***Planning Unit 3a***

G-400-2 and M-100-2, the two worst case scenarios for Planning Unit 3a, do not contain the levee connecting the Morganza alignment to the Morgan City ring levee. Therefore, these worst case scenario alternatives do not reduce risk to sites and historic properties between Houma and Morgan City. Although impacts of levee footprints on unrecorded cultural resources is not factored into the metrics, the impacts of the GIWW alignment is expected to impact unrecorded cultural resources because it lies in a high probability area for the presence of cultural resources and very little of this alignment has been considered in previous cultural resource surveys.

### ***Planning Unit 3b***

The two worst case scenarios for Planning Unit 3b are the RL-100-1 and F-100-1 alternatives. Neither of these alternatives provides risk reduction benefits to the islands and wetlands north of the Gulf Intracoastal Waterway and New Iberia. These wetlands are rich with archaeological sites, some of which are on the National Register of Historic Places. RL-100-1 provides the least amount of risk-reduction, mainly due to the flooding that would occur southeast of New Iberia, which contains several plantations listed on the National Register of Historic Places.

### ***Planning Unit 4***

Alternative RL-100-1 presents the worst case scenario for cultural resources in Planning Unit 4. The 400 year and 1000 year ridge alignment alternatives perform slightly better because they provided a greater amount of risk reduction to the single historic property located within Planning Unit 4. In order to explore some variation in the worst case scenarios, G-100-2 is selected as the second worst case scenario even though RL-400-1 and RL-1000-1 would not perform as well. The ring levee alternatives provide little risk reduction to the archaeological sites located to the north of Grand Lake and White Lake and along the Sabine River. In contrast the GIWW plan would provide some risk reduction to sites located to the north of Grand Lake. In both instances sites located in the coastal zone south of Grand Lake and White Lake would remain vulnerable to storm surges.

In summary, all alternatives would provide some benefit toward providing storm and flood damage reduction to cultural resources in South Louisiana when compared to the no-action alternative. The worst case scenarios, especially of the western planning units present situations where the benefits to archaeological sites must be examined in terms of costs and benefits to other important resources. For example if the GIWW alignment of Planning Unit 4 does not provide significant benefits to other resources, nor can be economically justified, choosing that alignment because it provides the greatest risk to archaeological sites would unlikely provide justification for the selection of that alternative. As LACPR moves forward and if programs or

construction is authorized then processes outlined by Sections 106 and 110 of the National Historic Preservation Act would direct consideration of cultural resources.

## **4.0 REGIONAL LACPR CUMULATIVE EFFECTS**

The USACE has taken a systematic and regional approach in formulating solutions and in evaluating the impacts and benefits of those solutions. Louisiana, Mississippi, and Texas share key resource issues including shoreline erosion and barrier island loss, wetland loss, salinity intrusion, and storm surge and wave run-up. The USACE is preparing a “systems analysis” report that would address the effects of the various LACPR alternatives on Mississippi

The LACPR and Mississippi Coastal Improvements Program (MsCIP) teams are working together to solve issues at the local, regional, and national levels. Several measures may have beneficial impacts beyond specific planning units. For example, the diversion of freshwater from the Mississippi River to Lake Borgne via the Violet Canal could reduce saltwater intrusion in the Mississippi Sound south of Hancock County, Mississippi and provide sediment to the Biloxi Marshes of Louisiana. The systematic restoration of the coastal sediment budget and sand transport system along the Mississippi barrier islands could provide benefits to eastern Louisiana.

Both MsCIP and LACPR consider alternatives to divert freshwater from the Mississippi River or other sources as a mechanism for promoting a reversal of the historic increase in salinity in the Mississippi Sound/Biloxi Marsh area. The intent of such a diversion is to build wetlands, support fresher marshes and improve oyster reef health and productivity, thus enhancing economic and ecological value. However, diverted freshwater usually carries more sediment and nutrients than marine water. That may result in areas of excess nutrients, and thus cause algal blooms and eutrophication, greater light attenuation, and changed substrate characteristics. Therefore, the team must evaluate the system-wide impacts of freshwater diversions carefully. Spatially explicit evaluations of habitat change over large areas are required for such system-wide impacts evaluation. The positive and negative aspects of various diversion scenarios are being evaluated to assess their ability to meet the goals of both MsCIP and LACPR.

Based on preliminary evaluations that have been conducted by the LACPR Team, the LACPR Weir and High Level structural alternatives in PU1 are projected to have some adverse incremental effect on wetlands within Mississippi.

Because the majority of LACPR alternatives are concentrated in eastern and central portions of the LACPR planning area, the potential cumulative effects of LACPR on the Texas coast is less well studied than the Mississippi coast. There are large navigational channel improvements and shoreline protection projects proposed at the state boundary between Texas and Louisiana. These include two large projects: the Sabine-Neches Waterway Channel Improvement Project which proposes to deepen, widen, and extend the navigation channel and provide for marsh and oyster reef restoration; and, the Sabine Pass to Galveston Bay, Texas Shoreline Erosion project which encompasses 90 miles of shoreline.

## 5.0 CONCLUSIONS

Together with other projects that are authorized and anticipated to be implemented, the LACPR alternatives would have both beneficial and adverse impacts on the issues that were addressed in this analysis. In particular, the non-LACPR projects and LACPR alternatives will result in a huge demand for sediment both for levee construction as well as marsh creation and habitat restoration. There is a regional sediment budget study proposed that will be applicable to all regional projects such as CWPRRA, LCDA, as well as LACPR.

Wetlands would greatly benefit from the proposed diversion and restoration projects and alternatives both in terms of the planned mechanical marsh creation projects as well as the diversion projects that would supply sediment and nutrients to sustain existing wetlands. However, there will be a tremendous amount of sediment required for the projects. Based on some very preliminary calculations, sediment quantities in excess of 1,850,000 cubic yards will be required just for the mechanical marsh creation projects proposed under Coastal Restoration Alternative R2 (for PU1 and PU2) and R1 (for PU3a, 3b, and 4). This figure does not include sediment that would be required from river diversions in order to sustain and protect existing wetlands. Wetland impacts as a result of levee, or other structure, construction may be relatively large on the order of several thousand acreages. Nevertheless, these impacts would be offset by the hundreds of thousands of acres of wetlands created and protected.

Proposed structure projects would result in a similar demand on sediment for construction. The sediment quality requirements differ for levees and marsh creation projects. Levee construction will require sediment that is dominated by clay whereas marsh creation projects will require sediment dominated by organic material. Borrow pits for clay would not be allowed in wetland areas and a result would impact undeveloped upland habitat. Shoreline restoration projects will require sand that is compatible with the existing beach sediment. Offshore sand shoals contain a large amount of sand for beach and shoreline restoration but there are environmental as well as economic considerations. Sand shoals may provide habitat for fish and benthic organisms. Additionally, it is very costly to dredge and transport sand from offshore to restoration sites.

Existing salinity regimes would be expected to change as a result of the diversion projects and alternatives proposed. Salinities would be expected to decrease in nearshore areas due to the influx of freshwater. As a result, coastal fish and shellfish resources would be expected to change from marine species to a more estuarine or euryhaline species that are tolerant of lower and variable salinities. It is not known how coastal biological communities may be impacted from the comprehensive diversions that are proposed under LACPR in conjunction with existing and proposed diversions not considered part of LACPR.

Levee improvements and modifications will provide generally beneficial effects in the form of hurricane risk reduction to populations, recreational areas, and cultural resources. Minor adverse effects may result from the siting of structures but these impacts would be avoided and minimized as the projects go through the design phase.

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**ANNEX A**

**On-going Projects in Study Area**



**Table 2.5-3  
Projects Independent of LACPR Effort to Be Completed After 2011 - Planning Unit 1**

<b>Project</b>	<b>Sponsoring Agency</b>	<b>Main Project Components</b>
Alligator Bend Marsh Restoration and Shoreline Protection	USACE/NRCS	Marsh Creation; Habitat Restoration
Benneys Bay Diversion	USACE	Diversion
Bohemia Mississippi River Reintroduction	EPA	Diversion
Caernarvon Outfall Management/Lake Lery Shoreline Restoration	USFWS/NRCS	Habitat Restoration
Goose Point/Point Platte Marsh Creation	USFWS	Marsh Creation
River Reintroduction into Maurepas Swamp	EPA	Diversion
Biloxi Marsh Creation	DNR	Marsh Creation
Baptiste Collette Bayou Sediment Diversion	DNR	Diversion
LCA-MRGO Ecosystem Restoration	USACE/DNR	Habitat Restoration
Pass A Loutre Sediment Mining	NA	Dredging
Violet Freshwater Diversion	DNR/USACE	Diversion
Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana	USACE	Structures
Central Wetlands Assimilation Project (Phase 1)	DNR	Habitat Restoration
Marsh Creation via Beneficial Use (Phase 1)	DNR	Marsh Creation
GIWW-O&M	USACE	Dredging

NA = Not available

**Table 2.5-4  
Projects Independent of LACPR Effort to Be Completed After 2011 - Planning Unit 2**

<b>Project</b>	<b>Sponsoring Agency</b>	<b>Main Project Components</b>
CAP - Fisher School Basin	USACE	Structures
Fringe Marsh Repair	DNR	Marsh Creation
Long Distance MS River Sediment Pipeline	DNR	Marsh Creation
Bayou Dupont Marsh and Ridge Creation	NMFS	Marsh Creation
Dedicated Dredging on the Barataria Basin Landbridge	USFWS	Marsh Creation
Delta Building Diversion at Myrtle Grove	USACE	Diversion
East/West Grand Terre Islands Restoration	NMFS	Habitat Restoration
Lake Hermitage Marsh Creation	USFWS	Marsh Creation
Mississippi River Reintroduction Into Northwest Barataria Basin	EPA	Diversion
Mississippi River Sediment Delivery System - Bayou Dupont	EPA	Marsh Creation
Riverine Sand Mining/Scofield Island Restoration	NMFS	Habitat Restoration
South Shore of the Pen Shoreline Protection and Marsh Creation	NRCS	Structures
Spanish Pass Diversion	USACE	Diversion
Venice Ponds Marsh Creation and Crevasses	EPA/USACE	Marsh Creation
West Pointe a la Hache Outfall Management	NRCS/ EPA	Hydrologic Restoration
Barataria Bay Waterway Alternative Disposal Site	USACE	Dredging
Channel Maintenance Dredging	USACE	Dredging
Cutterhead/Dustpan Maintenance Dredging	USACE	Dredging
South Pass Sediment Diversion	DNR	Diversion
LCA - Barataria Basin Landbridge	DNR/USACE	Habitat Restoration
LCA - Barataria Basin Barrier Shoreline Restoration	DNR/USACE	Habitat Restoration
Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
Marsh Creation via Beneficial Use (Phase 1)	DNR	Marsh Creation
GIWW-O&M	USACE	Dredging

**Table 2.5-5  
Projects Independent of LACPR Effort to Be Completed After 2011 - Planning Unit 3a**

<b>Project</b>	<b>Sponsoring Agency</b>	<b>Main Project Components</b>
Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
North Lake Marchant Landbridge Restoration	USFWS	Diversion
Grand Bayou / GIWW Freshwater Diversion	USFWS	Diversion
Madison Bay Marsh Creation and Terracing	NMFS	Marsh Creation
Move Existing Atchafalaya Water to Central Terrebonne	USFWS	Hydrologic Restoration
North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management	USFWS	Diversion
Raccoon Island Shoreline Protection/Marsh Creation	NRCS	Structures
Ship Shoal: Whiskey West Flank Restoration	EPA	Habitat Restoration
South Lake De Cade Freshwater Introduction	NRCS	Diversion
West Belle Pass Barrier Headland Restoration	NMFS	Marsh Creation
West Lake Boudreaux Shoreline Protection and Marsh Creation	USFWS	Structures; Marsh Creation
Whiskey Island Back Barrier Marsh Creation	EPA	Structures
Dedicated Dredging Program - Grand Bayou Blue	DNR	Dredging
Houma Navigation Canal - O&M	USACE	Dredging
Houma Navigation Canal Deepening	USACE	Structures
Marsh Creation via Beneficial Use (Phase 1)	DNR	Marsh Creation
GIWW-O&M	USACE	Dredging
North Lake Merchant Landbridge Restoration	USFWS	Habitat Restoration

**Table 2.5-6  
Projects Independent of LACPR Effort to Be Completed  
After 2011 - Planning Unit 3b**

<b>Project</b>	<b>Sponsoring Agency</b>	<b>Main Project Components</b>
Avoca Island Diversion and Land Building	USACE	Diversion
Castille Pass Channel Sediment Delivery	NMFS	Diversion
East Marsh Island Marsh Creation	EPA	Marsh Creation
Weeks Bay Marsh Creation and Shore Protection / Commercial Canal Freshwater Redirection	USACE	Marsh Creation
Dedicated Dredging Program - Point au Fer Site	DNR	Dredging
Point au Fer Island Gulf Shoreline	DNR / USACE	Structures
ABFS - Land Acquisition	USACE	Hydrologic Restoration
Bayou Teche O&M	USACE	Dredging
CAP - 204 Shell Island Pass	USACE	Habitat Restoration
Atchafalaya River, Bayous Chene, Boeuf, and Black, LA Maintenance	USACE	Dredging
Marsh Creation via Beneficial Use (Phase 1)	DNR	Marsh Creation
GIWW-O&M	USACE	Dredging

**Table 2.5-7  
Projects Independent of LACPR Effort to Be Completed After 2011 - Planning Unit 4**

<b>Project</b>	<b>Sponsoring Agency</b>	<b>Main Project Components</b>
Brown Lake Hydrologic Restoration	NRCS	Hydrologic Restoration
Little Pecan Bayou Hydrologic Restoration	NRCS	Marsh Creation
South Grand Chenier Hydrologic Restoration Project	USFWS	Hydrologic Restoration
South Pecan Island Freshwater Introduction	NMFS	Hydrologic Restoration
Marsh Creation Near Freshwater Bayou	DNR	Marsh Creation
Sabine Refuge Marsh Creation (SA-01)	USACE	Marsh Creation
Calcasieu River & Pass, La - O&M	USACE	Dredging
Mermentau River-O&M	USACE	Dredging
Marsh Creation via Beneficial Use (Phase 1)	USACE	Marsh Creation
GIWW-O&M	USACE	Dredging

**ANNEX B**  
**Recreational Resources**

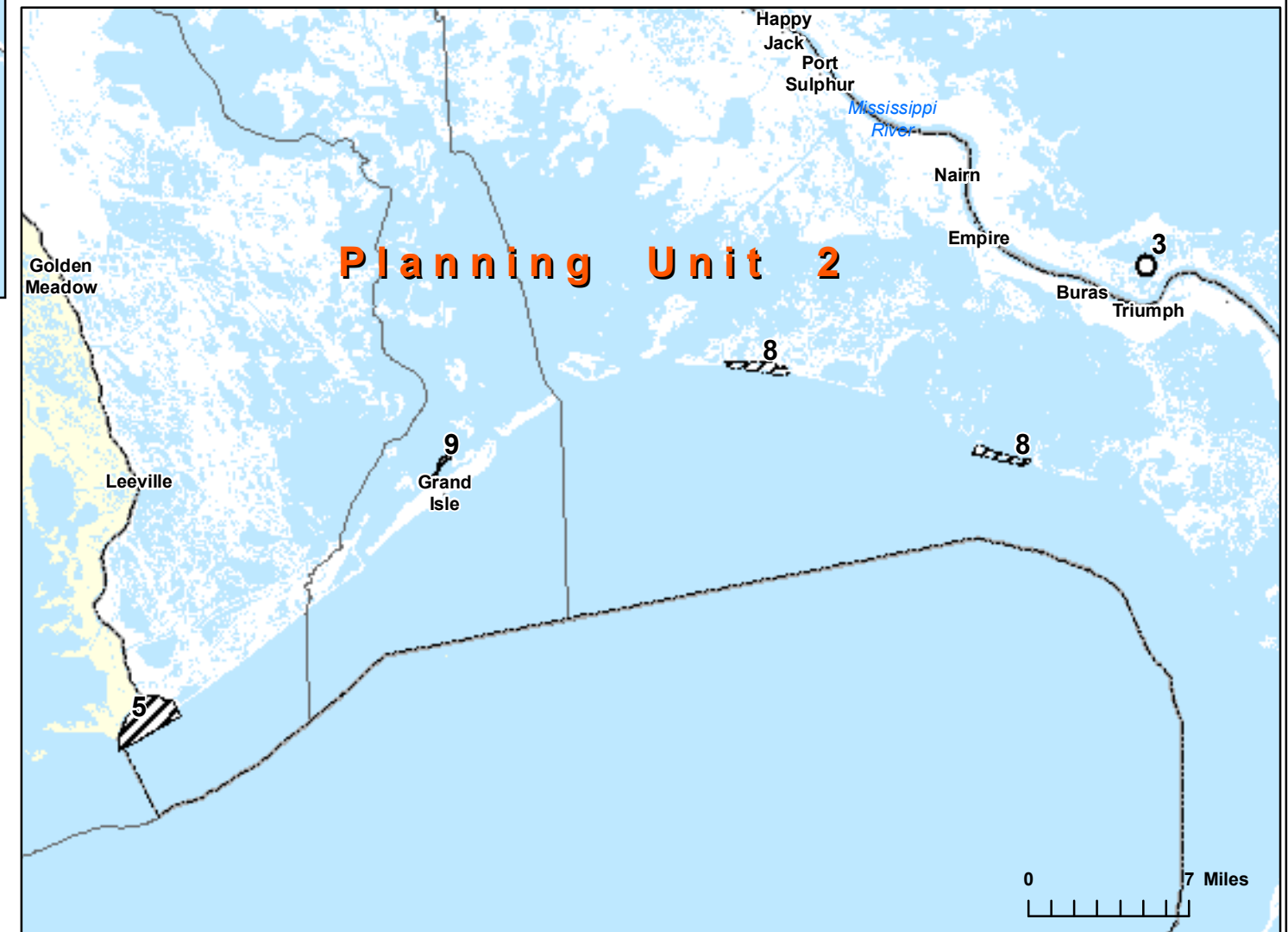
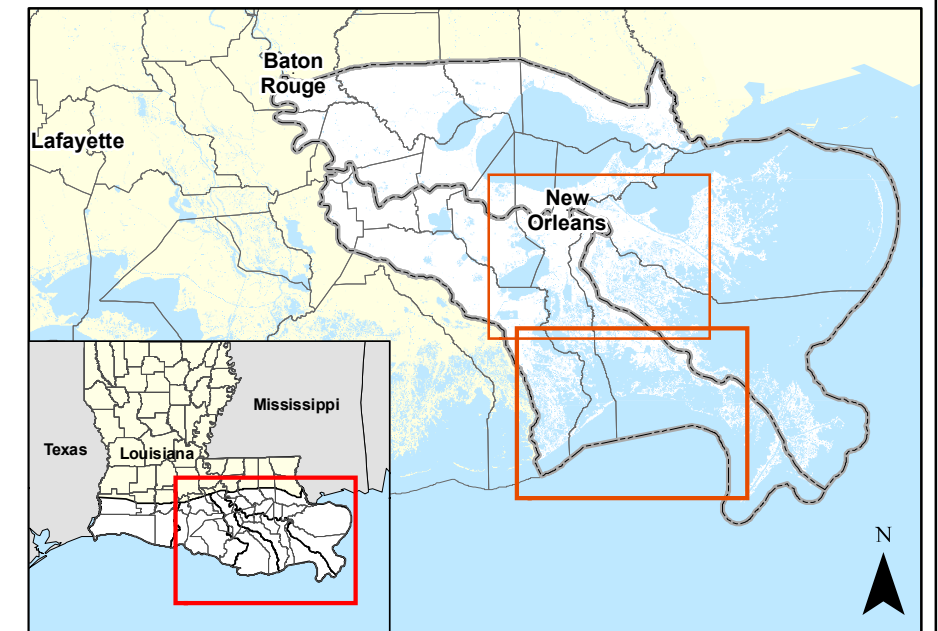
## Recreational Resources Annex

<b>Planning Unit</b>	<b>Name of Recreational Area</b>	<b>Parish Location</b>
1	Abita Creek Flatwoods Preserve	St. Tammany
1	Audubon Nature Center/Joe W. Brown Memorial Park	Orleans
1	Audubon Park	Orleans
1	Bayou Sauvage NWR	Orleans
1	Big Branch Marsh NWR	St. Tammany
1	Biloxi WMA	St. Bernard
1	Bonnet Carré Spillway	St. Charles
1	Breton NWR	St. Bernard
1	Chalmette Battlefield NHPP	St. Bernard
1	Delta NWR	Plaquemines
1	Fairview Riverside SP	St. Tammany
1	Fontainebleau SP	St. Tammany
1	Fort Pike SHS	St. Tammany
1	French Quarter NHPP	Orleans
1	Honey Island Swamp	St. Tammany
1	Joyce WMA	Tangipahoa
1	Manchac WMA	Livingston
1	Maurepas Swamp WMA	Livingston
1	New Orleans City Park	Orleans
1	Pass-a-Loutre WMA	Plaquemines
1	Pearl River WMA	St. Tammany
1	St. Bernard SP	St. Bernard
1	St. Tammany State Wildlife Refuge	St. Tammany
1	Tickfaw SP	Livingston
1	White Kitchen Preserve	St. Tammany
2	Barataria National Historic Park and Preserve (NHPP)	Jefferson Parish
2	Bayou Segnette SP	Jefferson Parish
2	Brechtel Park	Orleans
2	Grand Isle SP	Jefferson Parish
2	Lafitte Woods Preserve	Jefferson Parish
2	LaFreniere Park	Jefferson Parish
2	Salvador Timken WMA	St. Charles
2	Wisner WMA	Lafourche
3a	Atchafalaya Delta WMA	St. Mary
3a	Atchafalaya NWR	Iberville, St. Martin
3a	Attakapas WMA	St. Mary, St. Martin, Iberia
3a	Bayou des Ourses	Iberville
3a	Elm Hall WMA	Assumption

<b>Planning Unit</b>	<b>Name of Recreational Area</b>	<b>Parish Location</b>
3a	Mandalay NWR	Terrebonne
3a	Plaquemine Lock SHS	Iberville
3a	Pointe au Chien WMA	Terrebonne and Lafourche
3a	Terrebonne Barrier Islands SWR	Terrebonne
3a	Wetlands Acadian NHPP	Lafourche
3b	Acadian Cultural Center NHPP	Iberia
3b	Acadiana Park	Lafayette
3b	Bayou Teche NWR	St. Mary
3b	Cypremort Point SP	St. Mary
3b	Cypress Island Preserve	St. Martin
3b	I.R. Bud Chalmers Park	Lafayette
3b	Indian Bayou	St. Martin
3b	J. Otto Broussard Memorial Park	Lafayette
3b	Jungle Gardens	Iberia
3b	Lake Fausse Pointe SP	St. Martin
3b	Longfellow Evangeline SHS	St. Martin
3b	Marsh Island SWR	Iberia
3b	Moore Park	Lafayette
3b	Shell Keys NWR	Iberia
3b	State Wildlife Refuge	Vermilion
4	Cameron Prairie NWR	Cameron
4	Lacassine NWR	Vermilion
4	Rockefeller SWR	Cameron and Vermilion
4	Sabine Island WMA	Calcasieu
4	Sabine NWR	Cameron
4	Sam Houston Jones SP	Calcasieu

## Figures





**Non-LACPR Projects to be completed by 2011**

ID #	Projects To Be Completed By 2011, Planning Unit 1		
1	MRGO Deauthorization	USACE	Habitat Restoration
2	Orleans Landbridge Shoreline Protection	NA	Structures
3	Delta Building Diversion North of Fort St. Philip	USACE	Diversion
4	Comite River Diversion, LA	USACE	Diversion

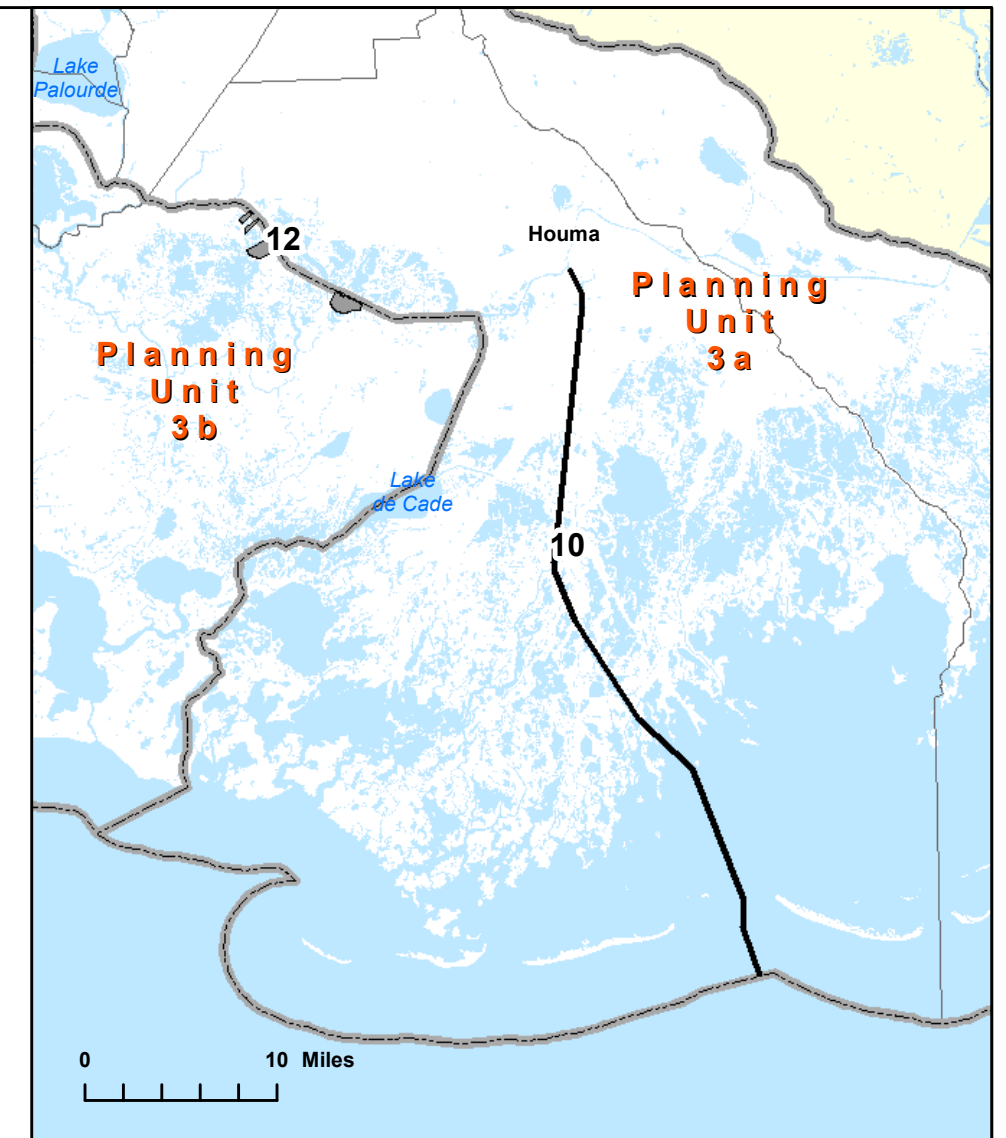
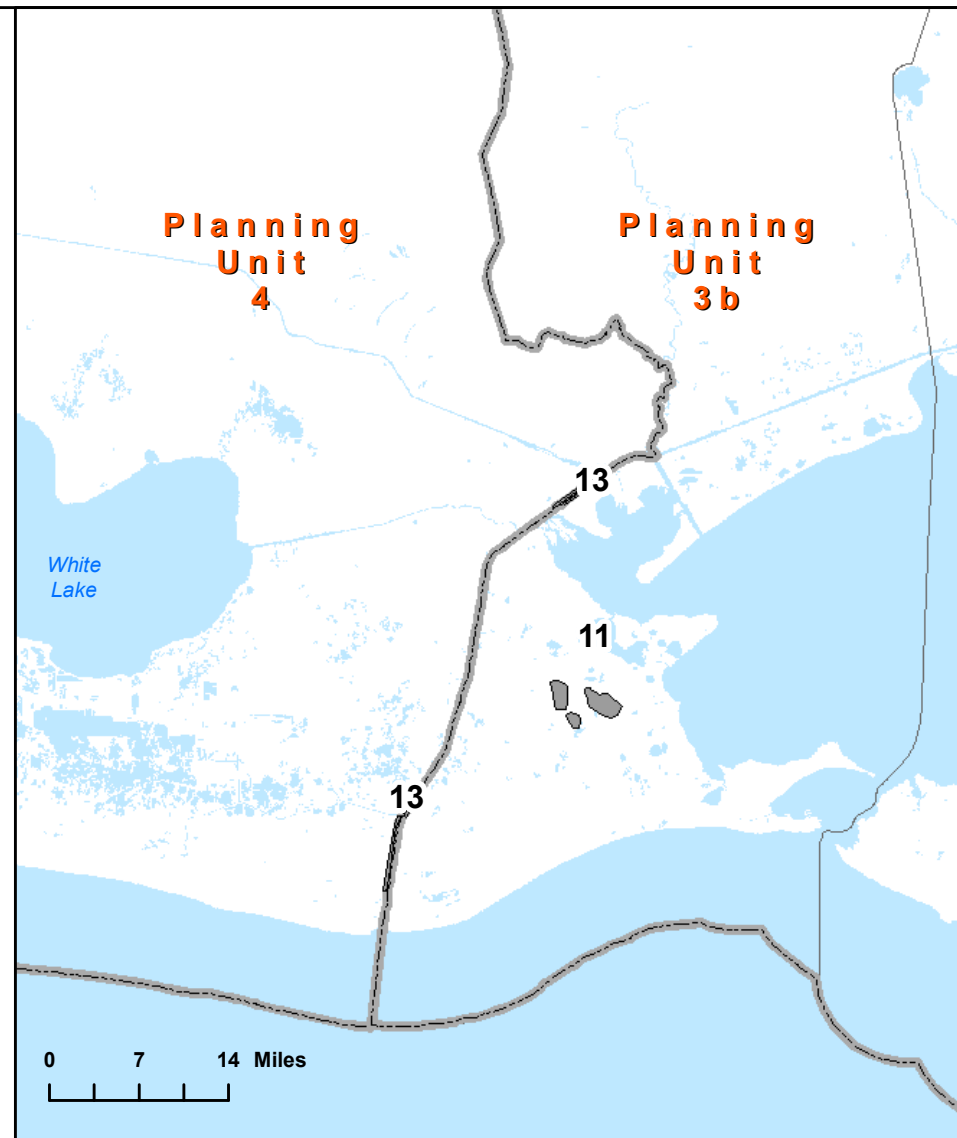
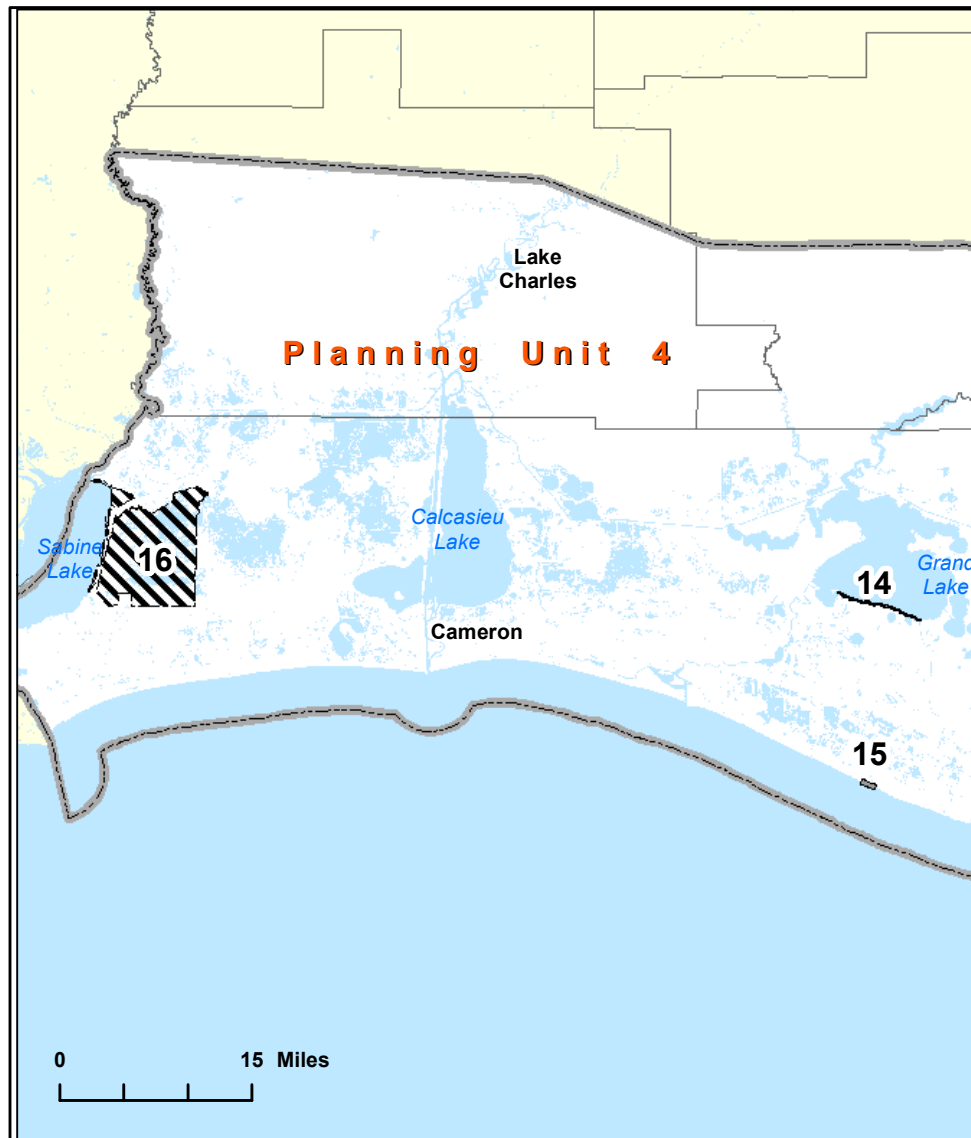
ID #	Projects To Be Completed By 2011, Planning Unit 2		
5	Caminada Headlands	NA	Habitat Restoration
6	Dedicated Dredging on Barataria Landbridge	NA	Marsh Creation
7	Lake Salvador Shoreline Protection Phase III	NA	Structures
8	Barataria Barrier Island Complex Project: Pelican Island and Pass La Mer to Chaland Pass Restoration	NMFS	Habitat Restoration
9	Fifi Island Restoration	NA	Structures

**Legend**

**Non-LACPR Projects**

- Diversions
- ▨ Hydrologic Restoration
- ▩ Habitat Restoration
- ▤ Marsh Creation
- Structures
- Parish Boundary
- ▭ Planning Unit Boundary

**Non-LACPR Projects to be completed by 2011 - PU1 and PU2  
Figure 2.4-1**

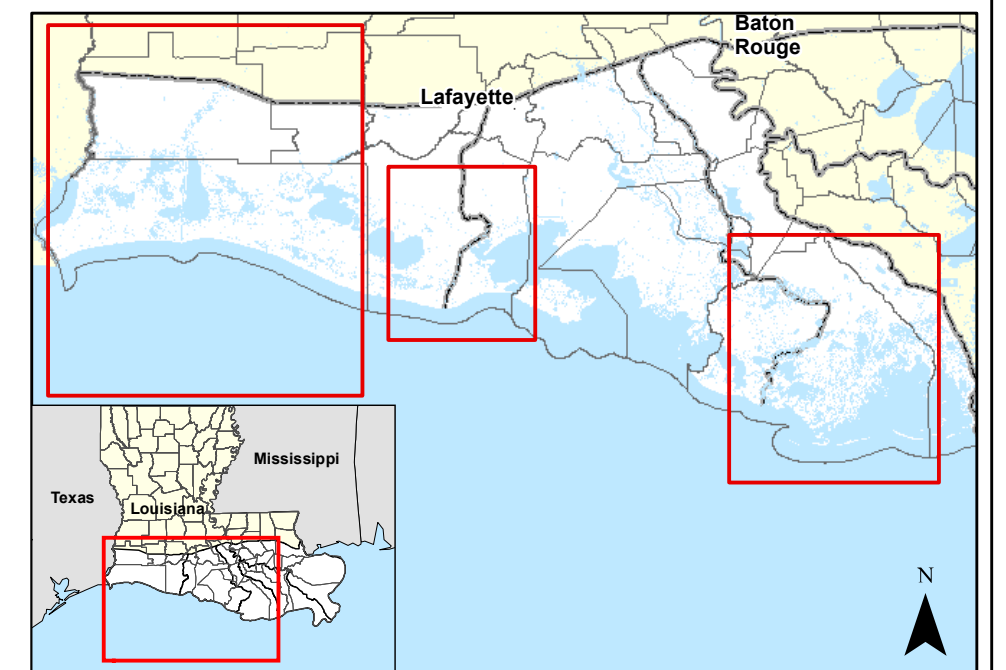
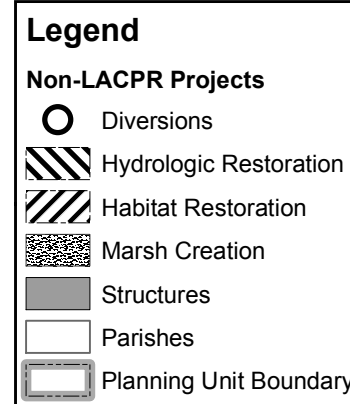


**Non-LACPR Projects to be completed by 2011**

ID #	Projects To Be Completed By 2011, Planning Unit 3A		
10	Houma Navigation Canal Deepening	USACE	Structures
11	Rainey Audubon Wildlife Sanctuary Earthen Terraces	NA	Structures

ID #	Projects To Be Completed By 2011, Planning Unit 3B		
12	GIWW Bank Restoration of Critical Areas of Terre	NA	Structures

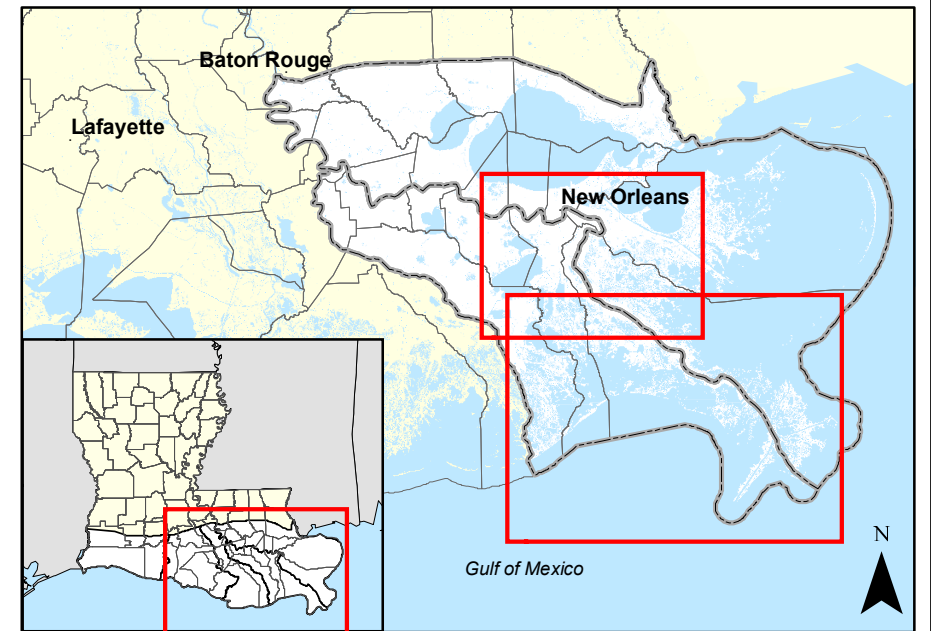
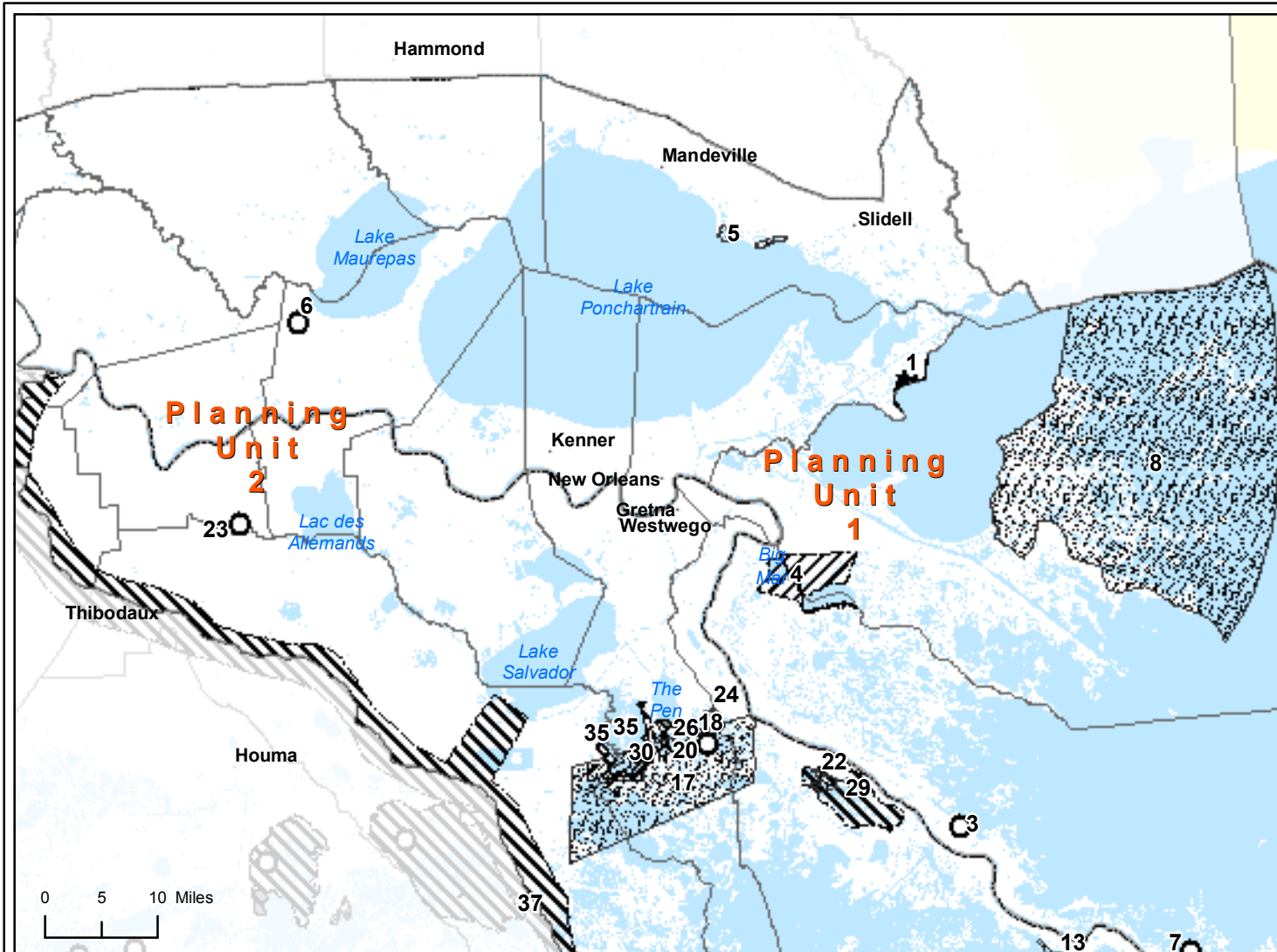
ID #	Projects To Be Completed By 2011, Planning Unit 4		
13	Freshwater Bayou Bank Stabilization	NA	Structures
14	Grand Lake Shoreline Protection	NA	Structures
15	Rockefeller Refuge Gulf Shoreline Stabilization	NA	Structures
16	East Sabine Lake Hydrologic Restoration	USFWS	Hydrologic Restoration



Source: Project Data Provided By USACE, New Orleans District, 2008

**Non-LACPR Projects to be completed by 2011 - PU3a, PU3b, and PU4**  
**Figure 2.4-2**





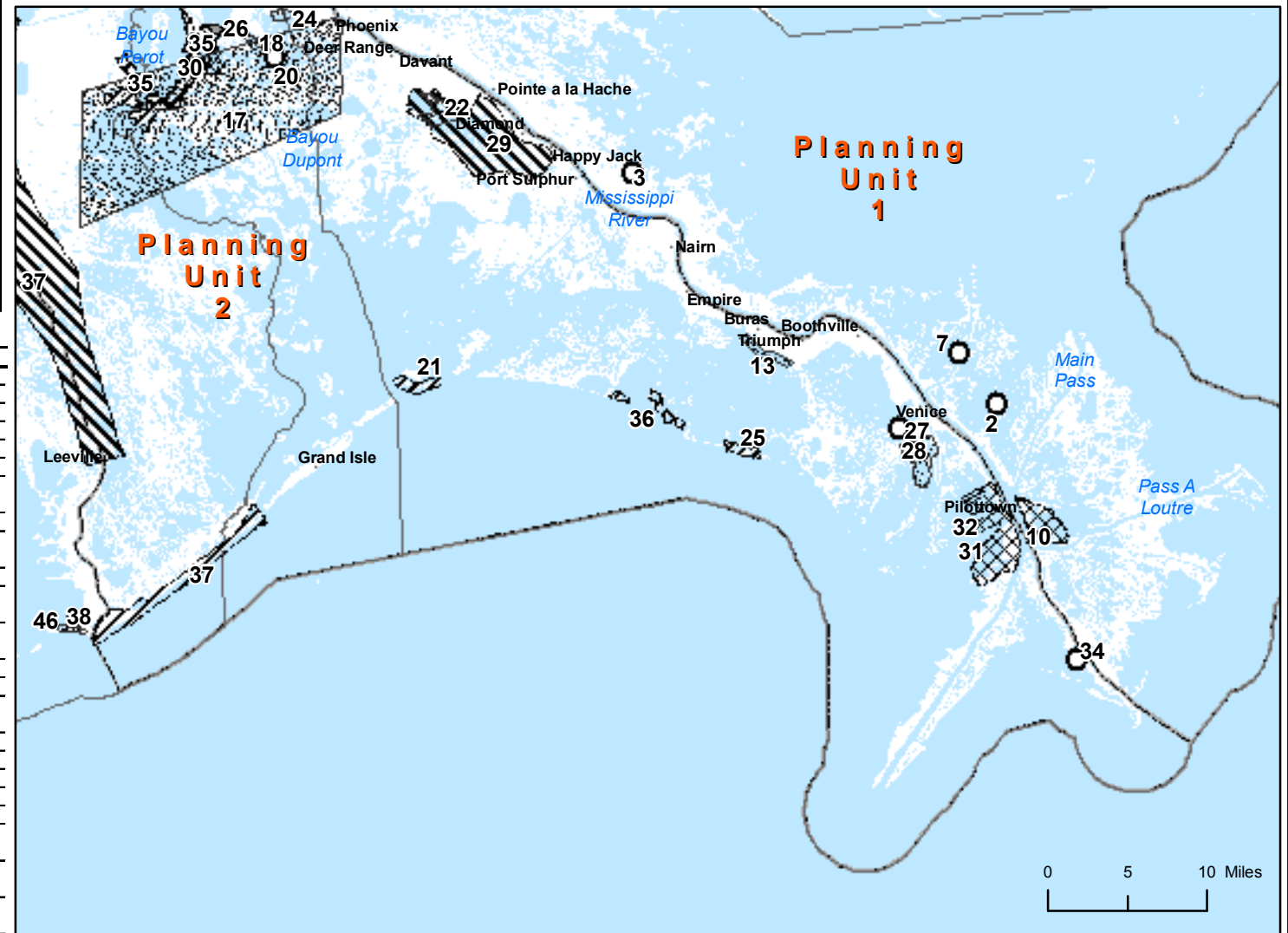
**Non-LACPR Projects To Be Completed After 2011**

ID #	Projects To Be Completed After 2011, Planning Unit 1	USACE/NRCS	Marsh Creation; Habitat Restoration
1	Alligator Bend Marsh Restoration and Shoreline Protection	USACE/NRCS	Habitat Restoration
2	Bennevis Bay Diversion	USACE	Diversion
3	Bohemia Mississippi River Reintroduction	EPA	Diversion
4	Caernarvon Outfall Management/Lake Lery Shoreline Restoration	USFWS/NRCS	Habitat Restoration
5	Goose Point/Point Platte Marsh Creation	USFWS	Marsh Creation
6	River Reintroduction into Maurepas Swamp	EPA	Diversion
7	Baptiste Collette Bayou Sediment Diversion	NA	Diversion
8	Biloxi Marsh Creation	NA	Marsh Creation
9	MRGO Environmental Restoration *		
10	Pass A Loutre Sediment Mining	NA	Dredging
11	Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana *	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation

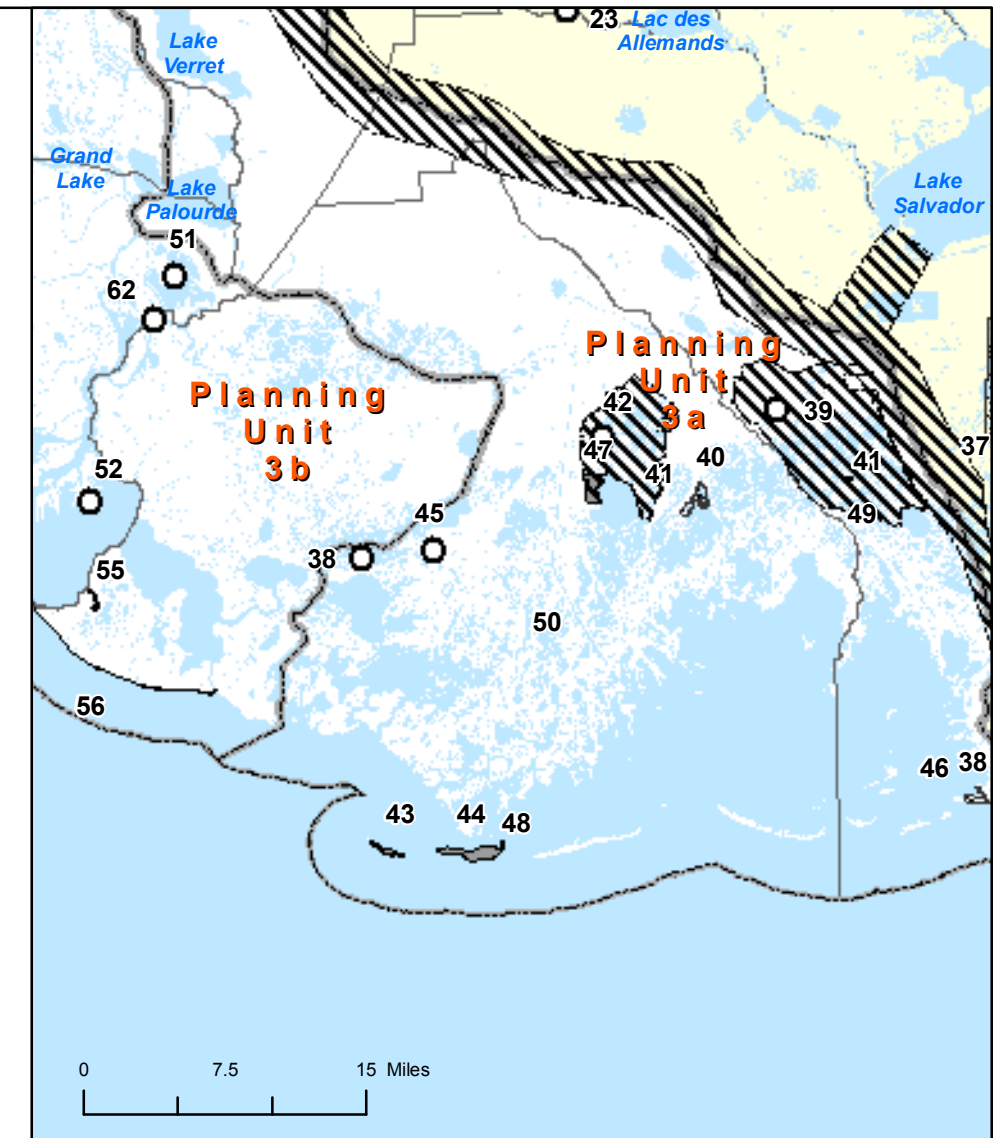
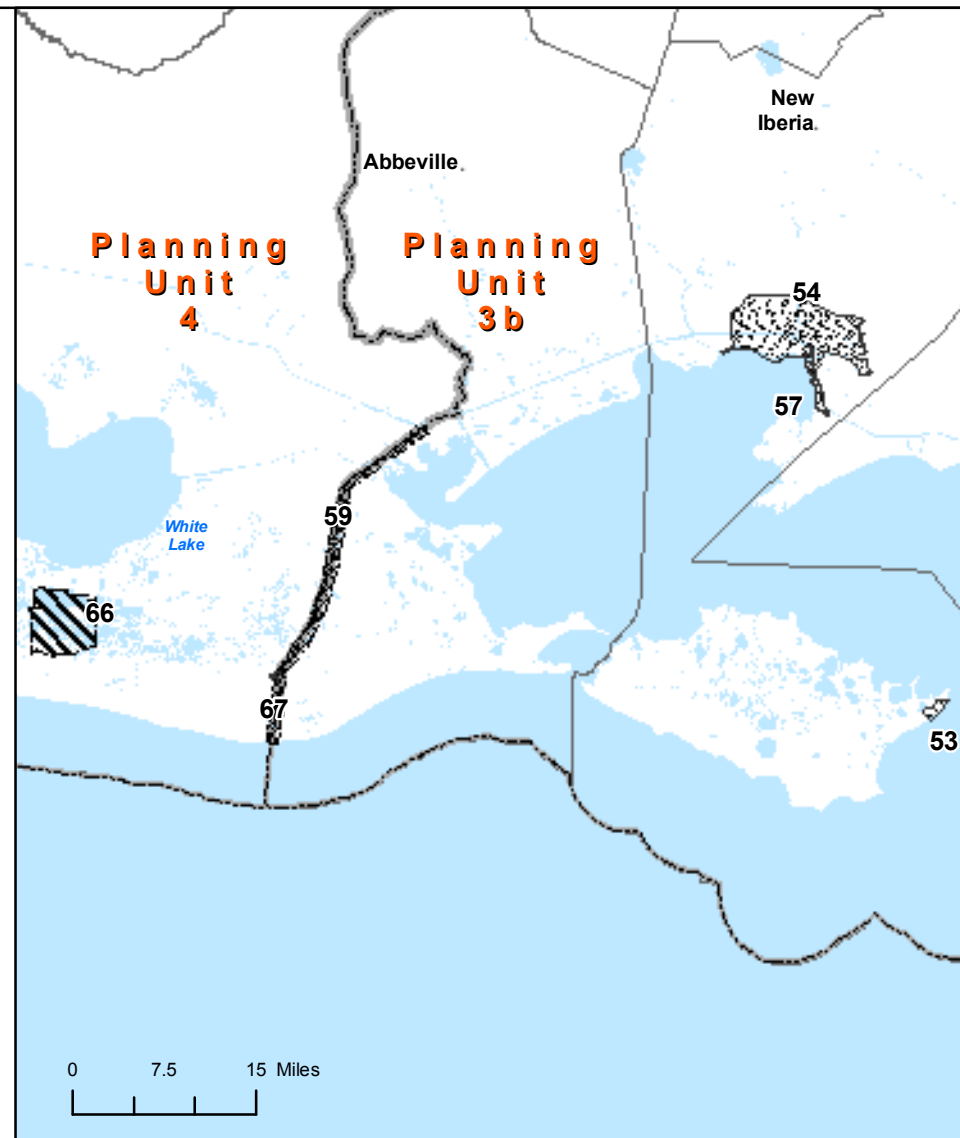
ID #	Projects To Be Completed After 2011, Planning Unit 2	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
17	Long Distance MS River Sediment Pipeline	NA	Marsh Creation
18	Bayou Dupont Marsh and Ridge Creation	NMFS	Marsh Creation
19	Dedicated Dredging on the Barataria Basin Landbridge	USFWS	Marsh Creation
20	Delta Building Diversion at Myrtle Grove	USACE	Diversion
21	East/WEST Grand Terre Islands Restoration	NMFS	Habitat Restoration
22	Lake Hermitage Marsh Creation	USFWS	Marsh Creation
23	Mississippi River Reintroduction Into Northwest Barataria Basin	EPA	Diversion
24	Mississippi River Sediment Delivery System - Bayou Dupont	EPA	Marsh Creation
25	Riverine Sand Mining/Scofield Island Restoration	NMFS	Habitat Restoration
26	South Shore of the Pen Shoreline Protection and Marsh Creation	NRCS	Structures
27	Spanish Pas Diversion	USACE	Diversion
28	Venice Ponds Marsh Creation and Crevasses	EPA/USACE	Marsh Creation
29	West Pointe a la Hache Outfall Management	NRCS/EPA	Restoration
30	Barataria Bay Waterway Alternative Disposal Site	NA	Dredging
31	Channel Maintenance Dredging	NA	Dredging
32	Cutterhead/Dustpan Maintenance Dredging	NA	Dredging
33	Small Bayou Lafourche Reintroduction *	DNR/USACE	Diversion
34	South Pass Sediment Diversion	NA	Diversion
35	LCA - Barataria Basin Landbridge	DNR/USACE	Habitat Restoration
36	LCA - Barataria Basin Barrier Shoreline Restoration	DNR/USACE	Habitat Restoration
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration

**Legend**

- Diversions
- ▨ Habitat Restoration
- ▨ Hydrologic Restoration
- ▨ Marsh Creation
- Structures
- ▭ Planning Unit Boundary
- ▭ Parish Boundary



**Non-LACPR Projects to be completed after 2011, PU1 and PU2  
Figure 2.5-1**

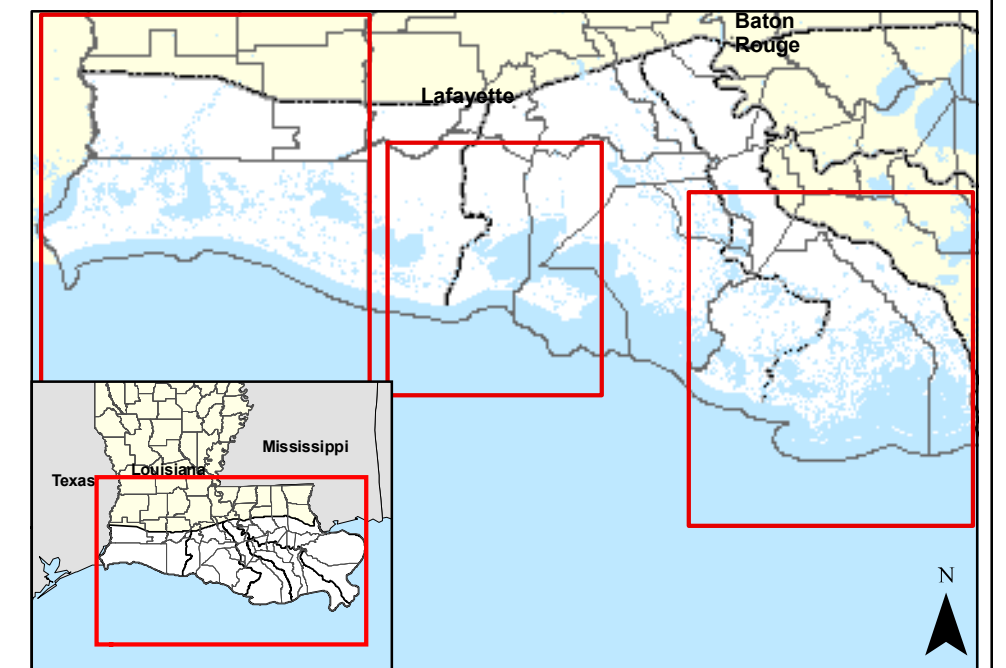
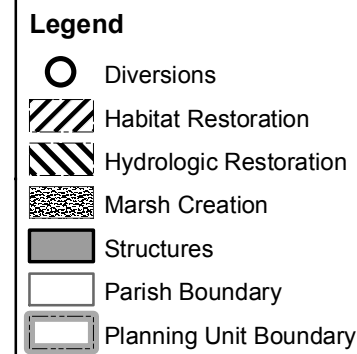


**Non-LACPR Projects To Be Completed After 2011**

Projects To Be Completed After 2011, Planning Unit 3A			
ID #	Project Name	Agency	Activity
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
38	North Lake Mechant Landbridge Restoration	USFWS	Diversions
39	Grand Bayou/GIWW Freshwater Diversion	USFWS	Diversions
40	Madison Bay Marsh Creation and Terracing	NMFS	Marsh Creation
41	Move Existing Atchafalaya Water to Central Terrebonne	USFWS	Hydrologic Restoration
42	North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management	USFWS	Diversions
43	Raccoon Island Shoreline Protection/Marsh Creation	NCRS	Structures
44	Ship Shoal Whiskey West Flank Restoration	EPA	Habitat Restoration
45	South Lake De Cade Freshwater Introduction	NCRS	Diversions
46	West Belle Pass Barrier Headland Restoration	NMFS	Marsh Creation
47	West Lake Boudreaux Shoreline Protection and Marsh Creation	USFWS	Structures; Marsh Creation
48	Whiskey Island Back Barrier Marsh Creation	EPA	Structures
49	Dedicated Dredging Program - Grand Bayou Blue	DNR	Dredging
50	Houma Navigation Canal - O&M	USACE	Dredging
	GIWW-O&M *	USACE	Dredging
Projects To Be Completed After 2011, Planning Unit 3B			
ID #	Project Name	Agency	Activity
51	Avoca Island Diversion and Land Building	USACE	Diversions
52	Castille Pass Channel Sediment Delivery	NMFS	Diversions
53	East Marsh Island Marsh Creation	EPA	Marsh Creation
54	Weeks Bay Marsh Creation and Shore Protection / Commercial Canal Freshwater Reintroduction/Dedicated	USACE	Marsh Creation
55	Dredging Program - Point au Fer Site	DNR	Dredging
56	Point au Fer Island Gulf Shoreline	DNR/USACE	Structures
57	Weeks Bay	NA	Marsh Creation
58	ABFS - Land Acquisition *	USACE	Hydrologic Restoration
59	Bayou Teche O7M	USACE	Dredging
60	CAP - 204 Shell Island Pass *	USACE	Habitat Restoration
61	Atchafalaya River, Bayous Chene, Boeuf, and Black, LA Maintenance *	USACE	Dredging
62	Convey Atchafalaya River to Northern Terrebonne Marshes	WRDA	Diversions

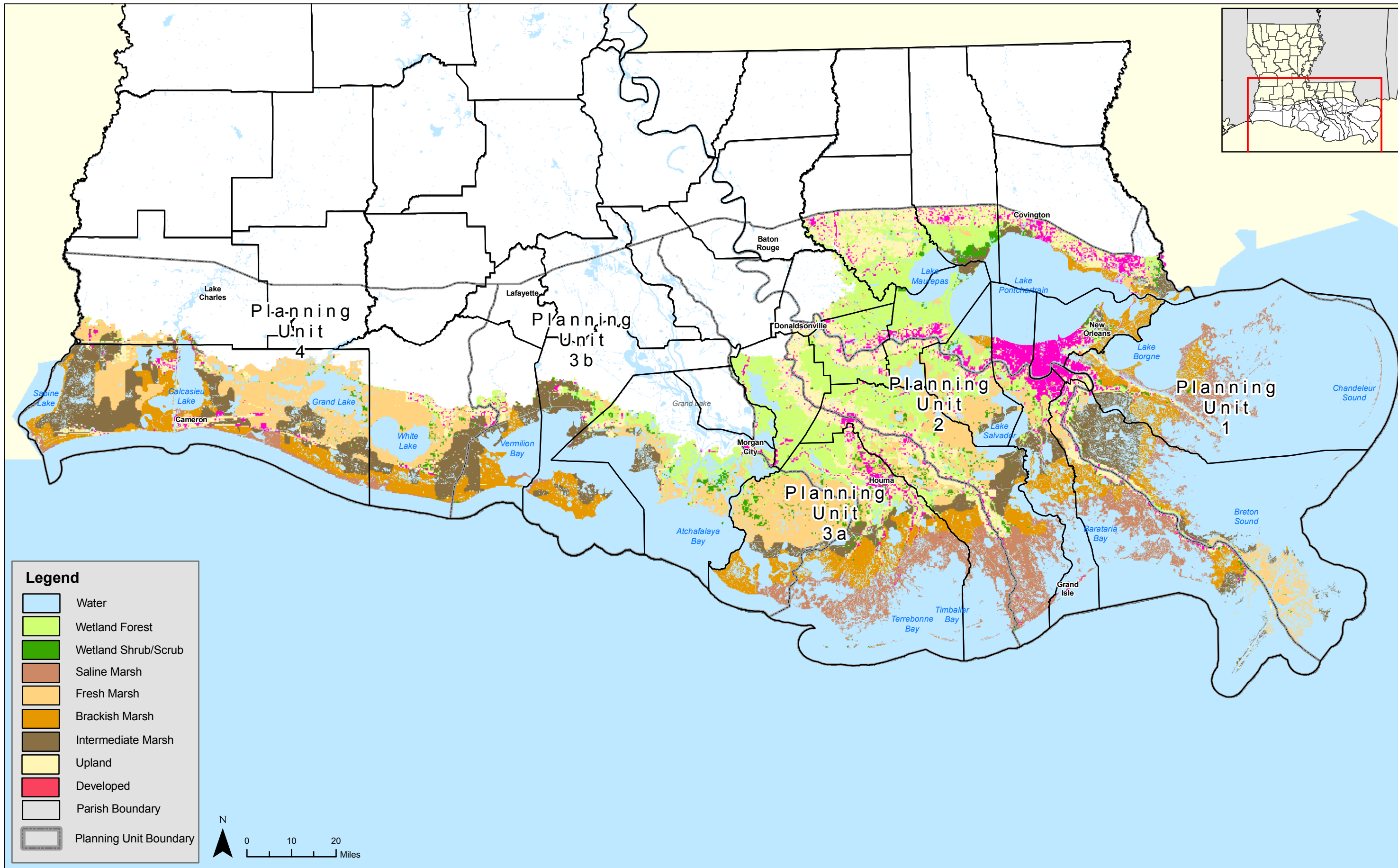
Projects To Be Completed After 2011, Planning Unit 4			
ID #	Project Name	Agency	Activity
63	Brown Lake Hydrologic Restoration	NRCS	Hydrologic Restoration
64	Little Pecan Bayou Hydrologic Restoration	NRCS	Marsh Creation
65	South Grand Chenier Hydrologic Restoration Project	USFWS	Hydrologic Restoration
66	South Pecan Island Freshwater Introduction	NMFS	Hydrologic Restoration
67	Marsh Creation Near Freshwater Bayou	NA	Marsh Creation
68	Sabine Refuge Marsh Creation (SA-01)	NA	Marsh Creation
69	Calcasieu River & Pass, LA - O&M *	USACE	Dredging
70	Mermentau River-O7M	USACE	Dredging
71	Marsh Creation via Beneficial Use (Phase 1)	NA	Marsh Creation

\* indicates mapping not available



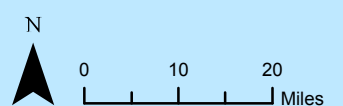
**Non-LACPR Projects To Be Completed After 2011 - PU3a, PU3b, and PU4**  
Figure 2.5-2





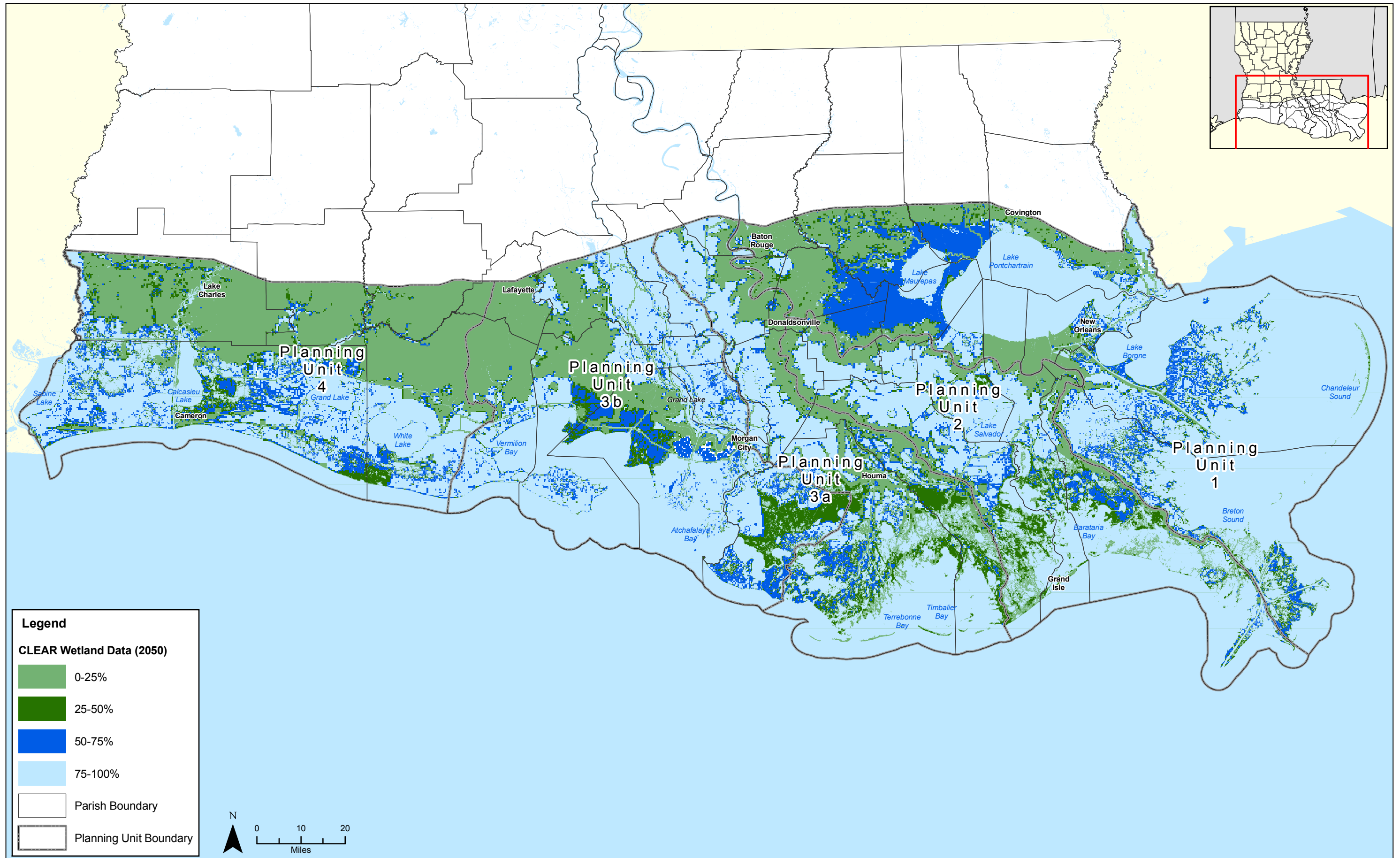
**Legend**

- Water
- Wetland Forest
- Wetland Shrub/Scrub
- Saline Marsh
- Fresh Marsh
- Brackish Marsh
- Intermediate Marsh
- Upland
- Developed
- Parish Boundary
- Planning Unit Boundary



Source: 2000 Louisiana Coastal Area (LCA) Desktop Habitat Data, U.S. Geological Survey, National Wetlands Research Center, Coastal Restoration Field Station

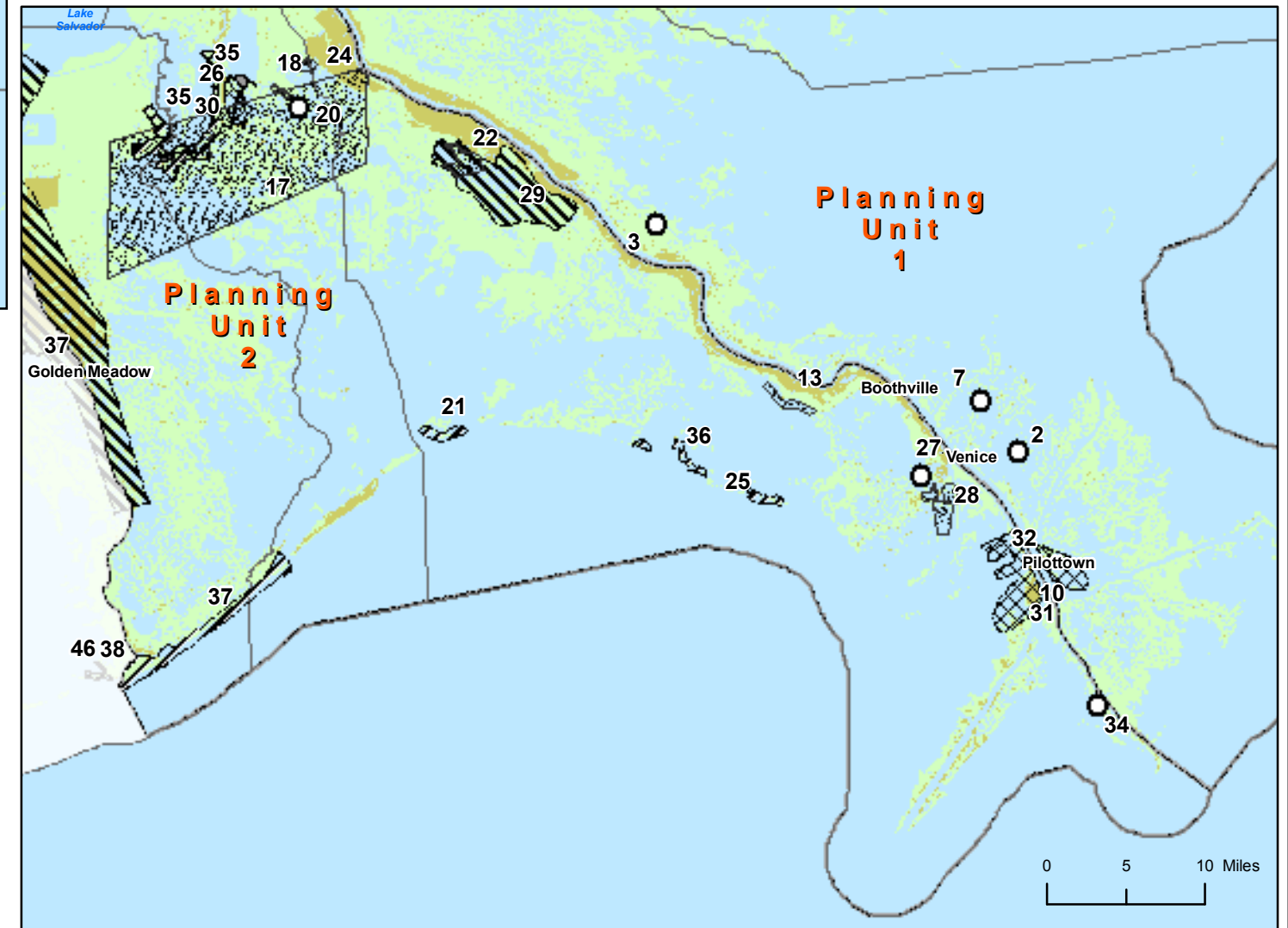
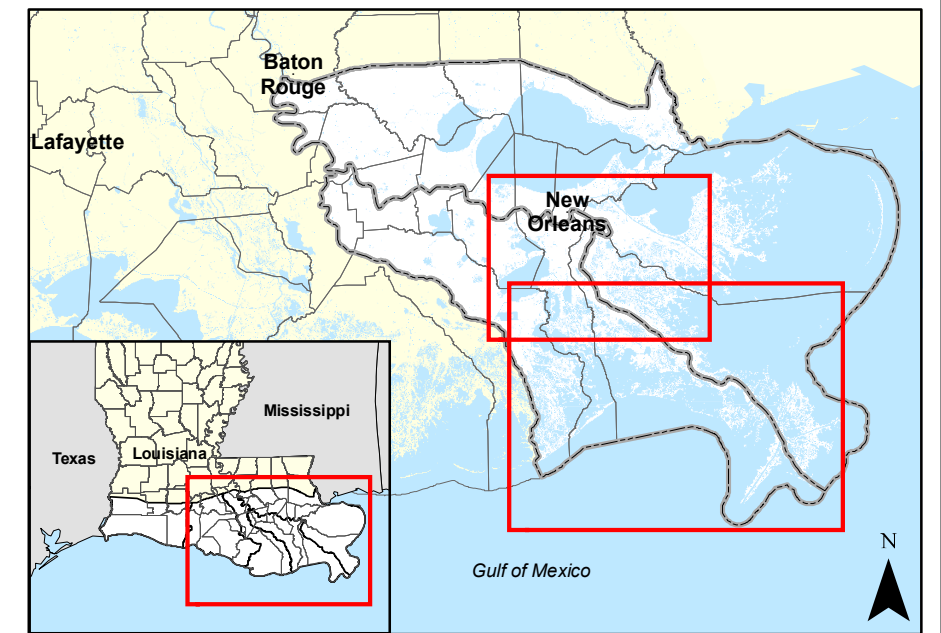
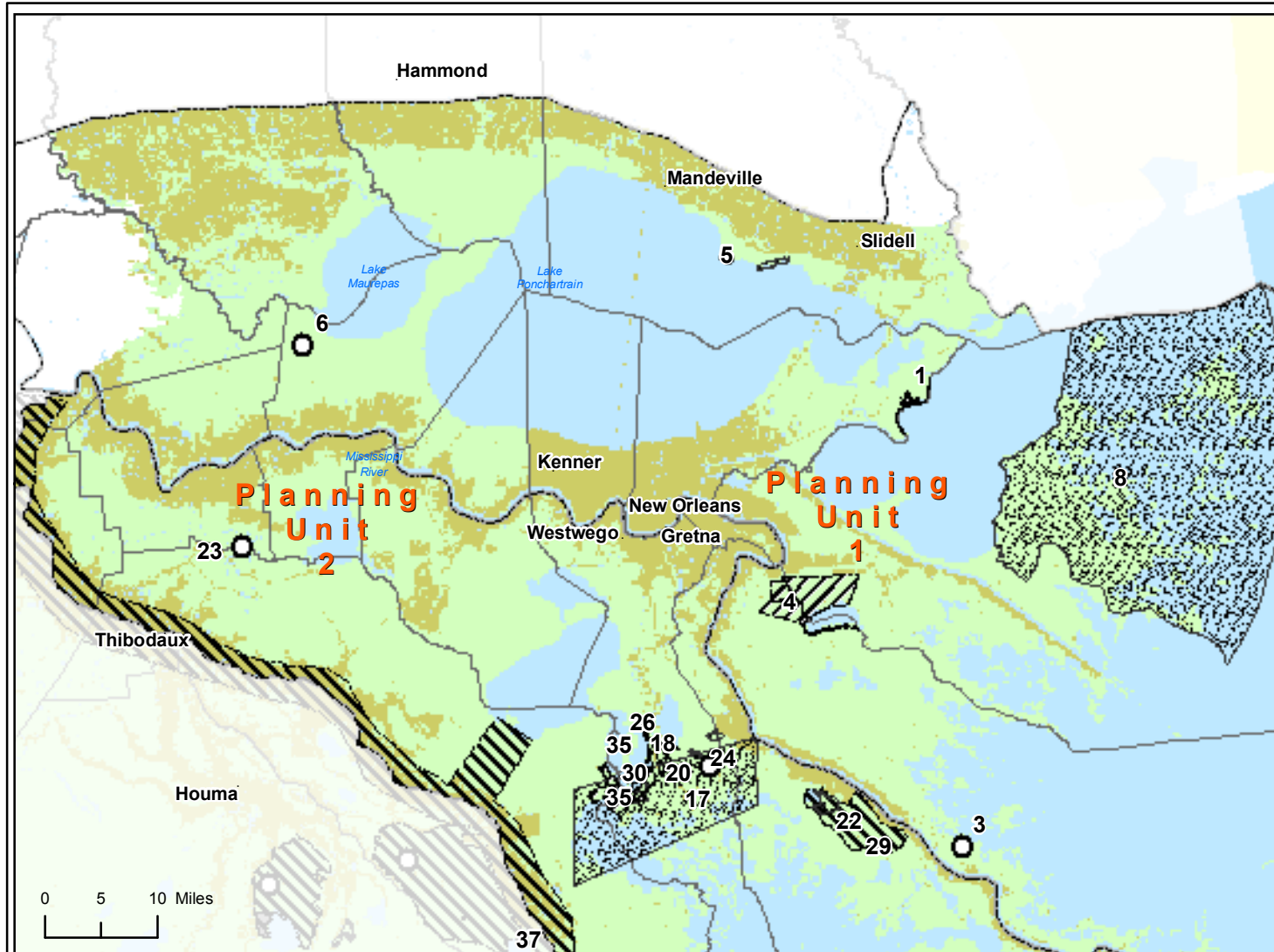
**Existing Conditions - Wetlands**  
**Figure 3.1-1**



Source: Coastal Louisiana  
Ecosystem Assessment and  
Restoration (CLEAR)

**CLEAR Wetland Data (2050)**  
**Figure 3.1-2**

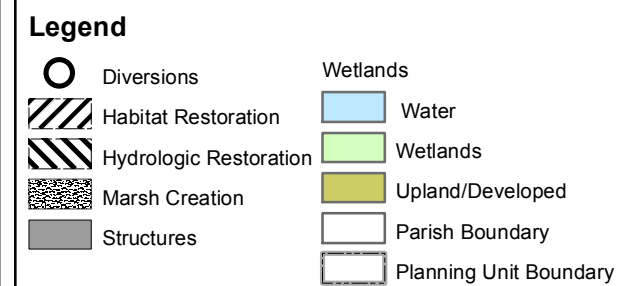




**Non-LACPR Projects To Be Completed After 2011**

ID #	Projects To Be Completed After 2011, Planning Unit 1		
1	Alligator Bend Marsh Restoration and Shoreline Protection	USACE/NRCS	Marsh Creation, Habitat Restoration
2	Benneys Bay Diversion	USACE	Diversion
3	Bohemia Mississippi River Reintroduction	EPA	Diversion
4	Caernarvon Outfall Management/Lake Lery Shoreline Restoration	USFWS/NRCS	Habitat Restoration
5	Goose Point/Point Platte Marsh Creation	USFWS	Marsh Creation
6	River Reintroduction into Maurepas Swamp	EPA	Diversion
7	Baptiste Collette Bayou Sediment Diversion	NA	Diversion?
8	Biloxi Marsh Creation	NA	Marsh Creation
9	MRGO Environmental Restoration *	NA	Dredging
10	Pass A Loutre Sediment Mining	NA	Dredging
11	Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana *	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
14	Central Wetlands Assimilation Project (Phase 1) *	NA	Habitat Restoration
	GIWW-O&M *	USACE	Dredging

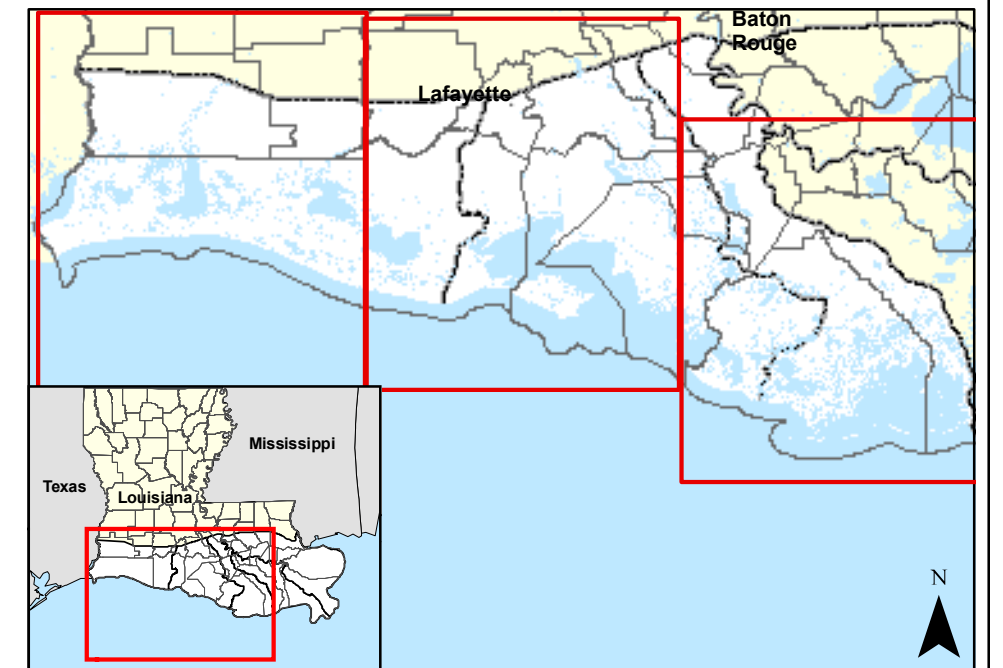
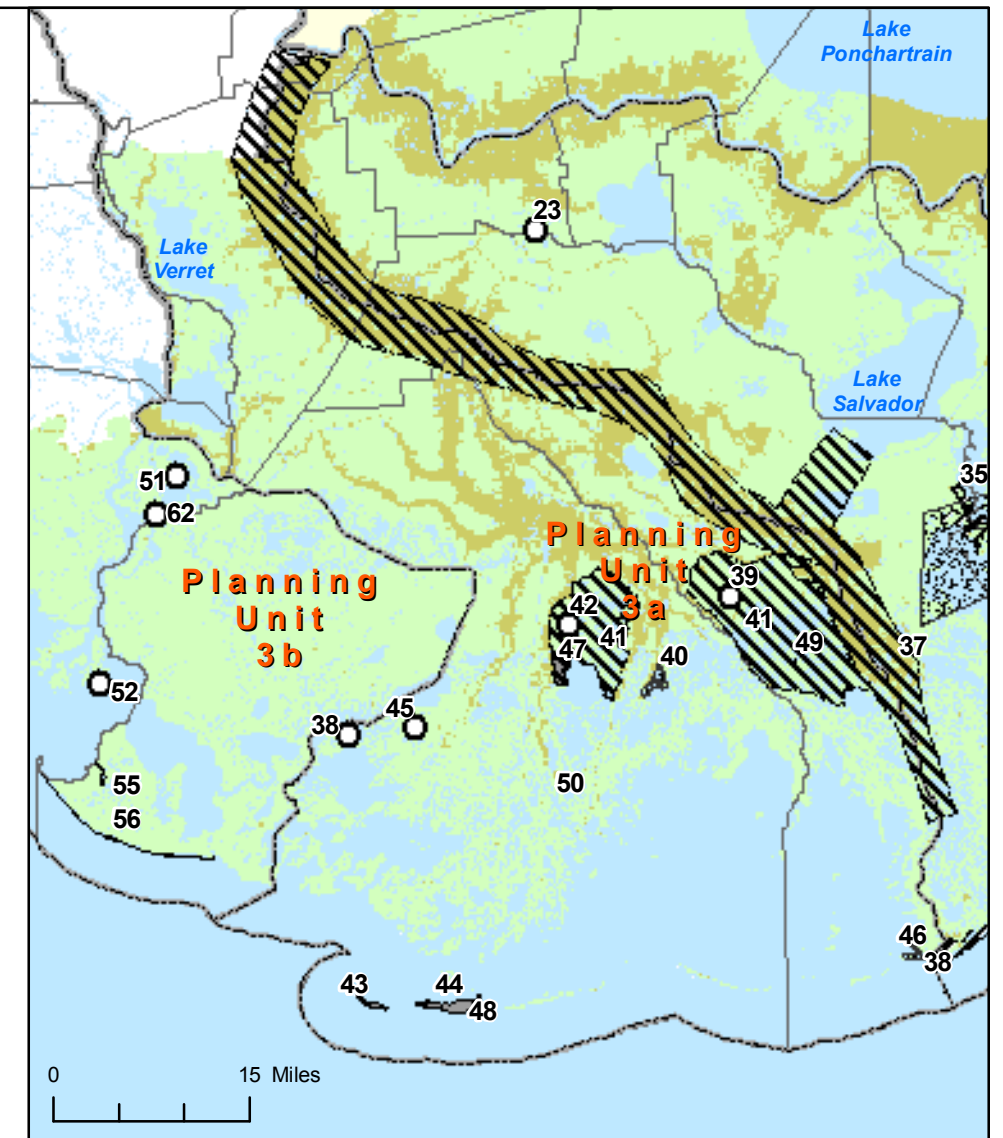
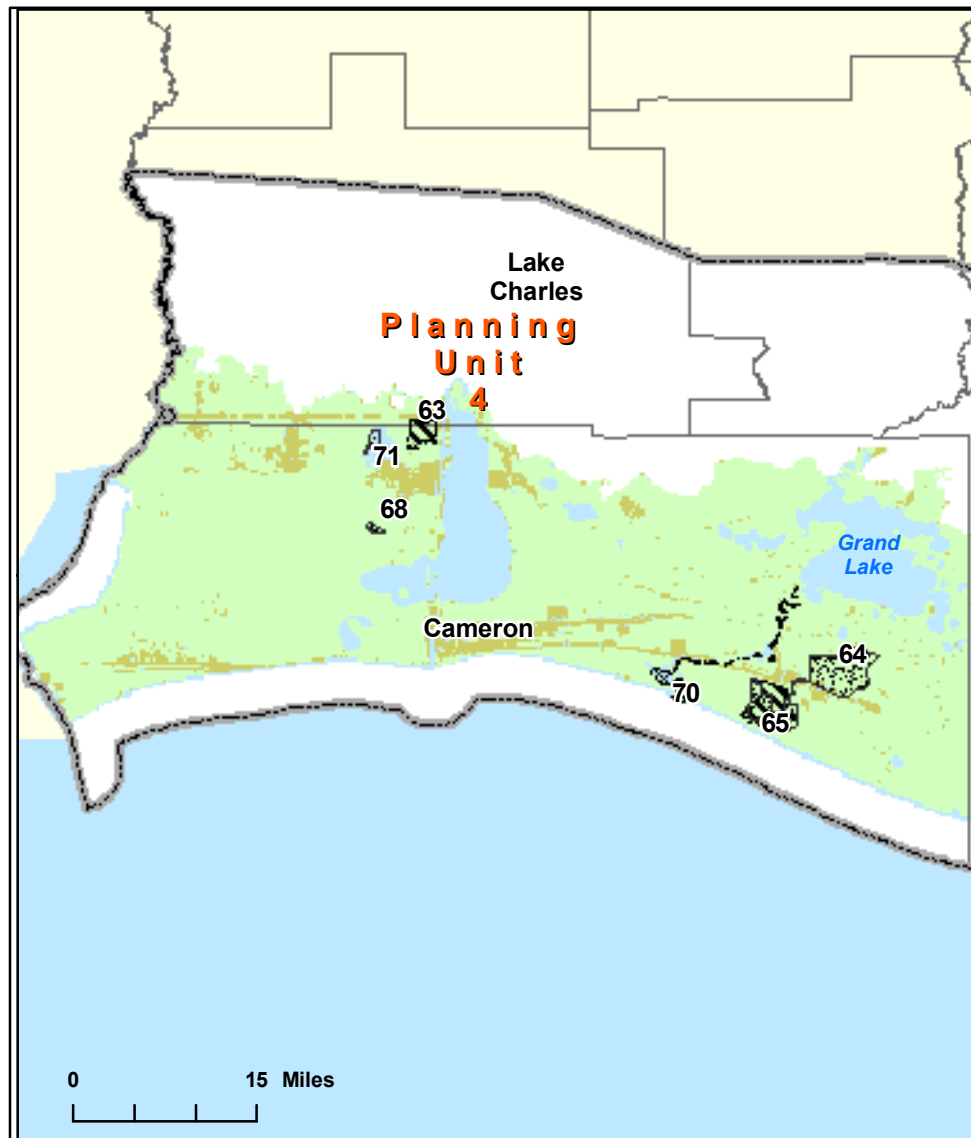
ID #	Projects To Be Completed After 2011, Planning Unit 2		
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
17	Long Distance MS River Sediment Pipeline	NA	Marsh Creation
18	Bayou Dupont Marsh and Ridge Creation	NMFS	Marsh Creation
19	Dedicated Dredging on the Barataria Basin Landbridge	USFWS	Marsh Creation
20	Delta Building Diversion at Myrtle Grove	USACE	Diversion
21	East/WEST Grand Terre Islands Restoration	NMFS	Habitat Restoration
22	Lake Hermitage Marsh Creation	USFWS	Marsh Creation
23	Mississippi River Reintroduction Into Northwest Barataria Basin	EPA	Diversion
24	Mississippi River Sediment Delivery System - Bayou Dupont	EPA	Marsh Creation
25	Riverine Sand Mining/Scofield Island Restoration	NMFS	Habitat Restoration
26	South Shore of the Pen Shoreline Protection and Marsh Creation	NRCS	Structures
27	Spanish Pas Diversion	USACE	Diversion
28	Venice Ponds Marsh Creation and Crevasses	EPA/USACE	Marsh Creation
29	West Pointe a la Hache Outfall Management	NRCS/EPA	Hydrologic Restoration
30	Barataria Bay Waterway Alternative Disposal Site	NA	Dredging
31	Channel Maintenance Dredging	NA	Dredging
32	Cutterhead/Dustpan Maintenance Dredging	NA	Dredging
33	Small Bayou Lafourche Reintroduction *	DNR/USACE	Diversion
34	South Pass Sediment Diversion	NA	Diversion
35	LCA - Barataria Basin Landbridge	DNR/USACE	Habitat Restoration
36	LCA - Barataria Basin Barrier Shoreline Restoration	DNR/USACE	Habitat Restoration
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
	GIWW-O&M *	USACE	Dredging



Source: US Geological Survey, National Wetlands Research Center, Coastal Restoration Office

**Wetlands and Non-LACPR Projects - PU1 and PU2**  
**Figure 3.1-3**



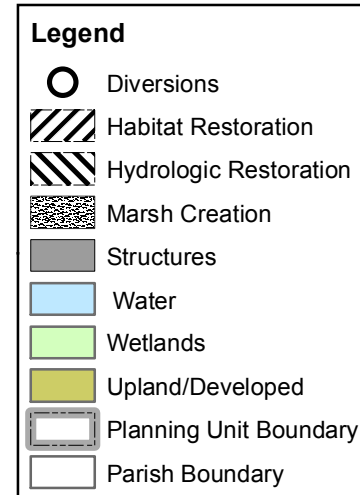


ID #	Project Name	Agency	Project Type
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
38	North Lake Mechant Landbridge Restoration	USFWS	Diversion
39	Grand Bayou/GIWW Freshwater Diversion	USFWS	Diversion
40	Madison Bay Marsh Creation and Terracing	NMFS	Marsh Creation
41	Move Existing Atchafalaya Water to Central Terrebonne	USFWS	Hydrologic Restoration
42	North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management	USFWS	Diversion
43	Raccoon Island Shoreline Protection/Marsh Creation	NCRS	Structures
44	Ship Shoal: Whiskey West Flank Restoration	EPA	Habitat Restoration
45	South Lake De Cade Freshwater Introduction	NCRS	Diversion
46	West Belle Pass Barrier Headland Restoration	NMFS	Marsh Creation
47	West Lake Boudreaux Shoreline Protection and Marsh Creation	USFWS	Structures; Marsh Creation
48	Whiskey Island Back Barrier Marsh Creation	EPA	Structures
49	Dedicated Dredging Program - Grand Bayou Blue	DNR	Dredging
50	Houma Navigation Canal - O&M	USACE	Dredging
	GIWW-O&M *	USACE	Dredging

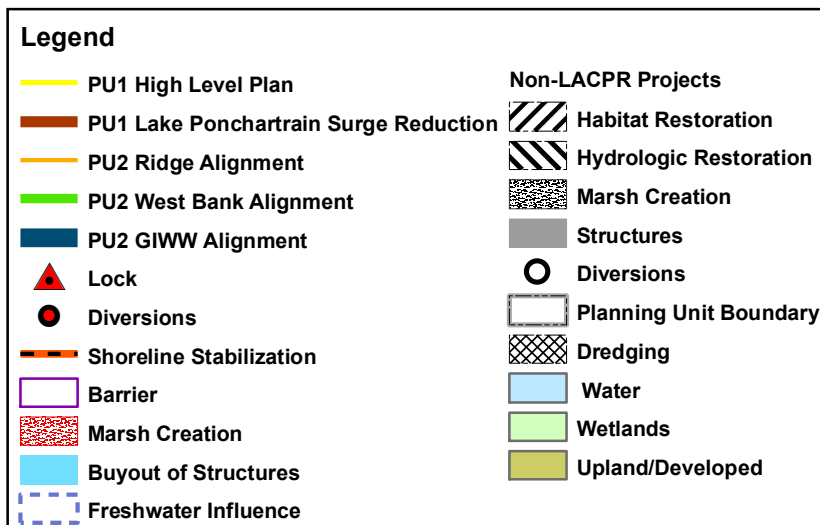
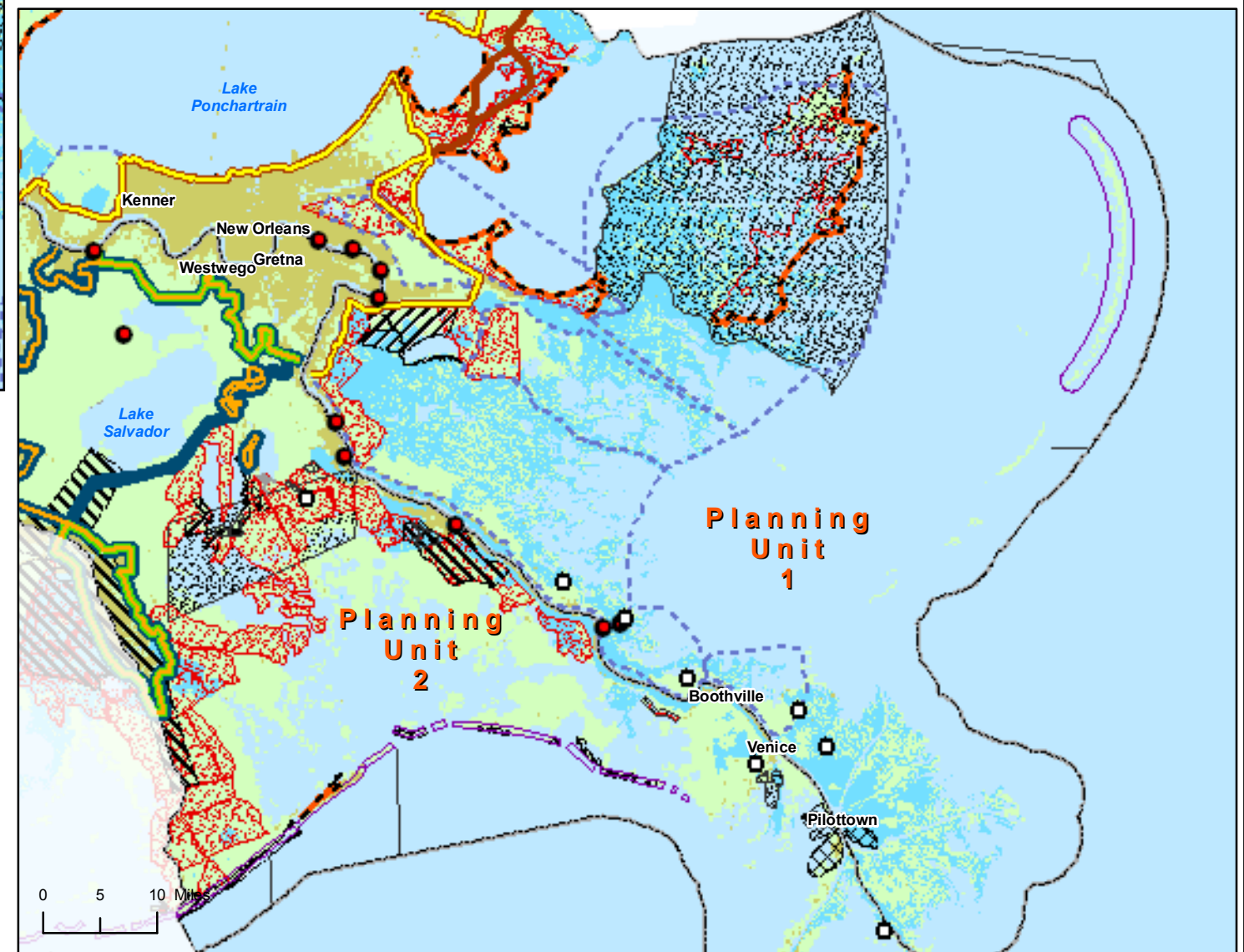
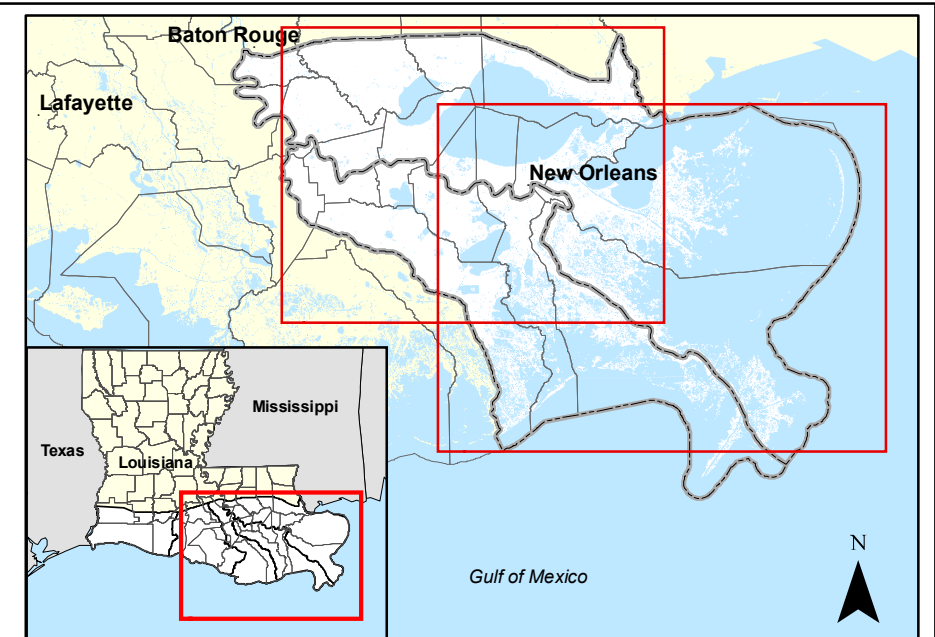
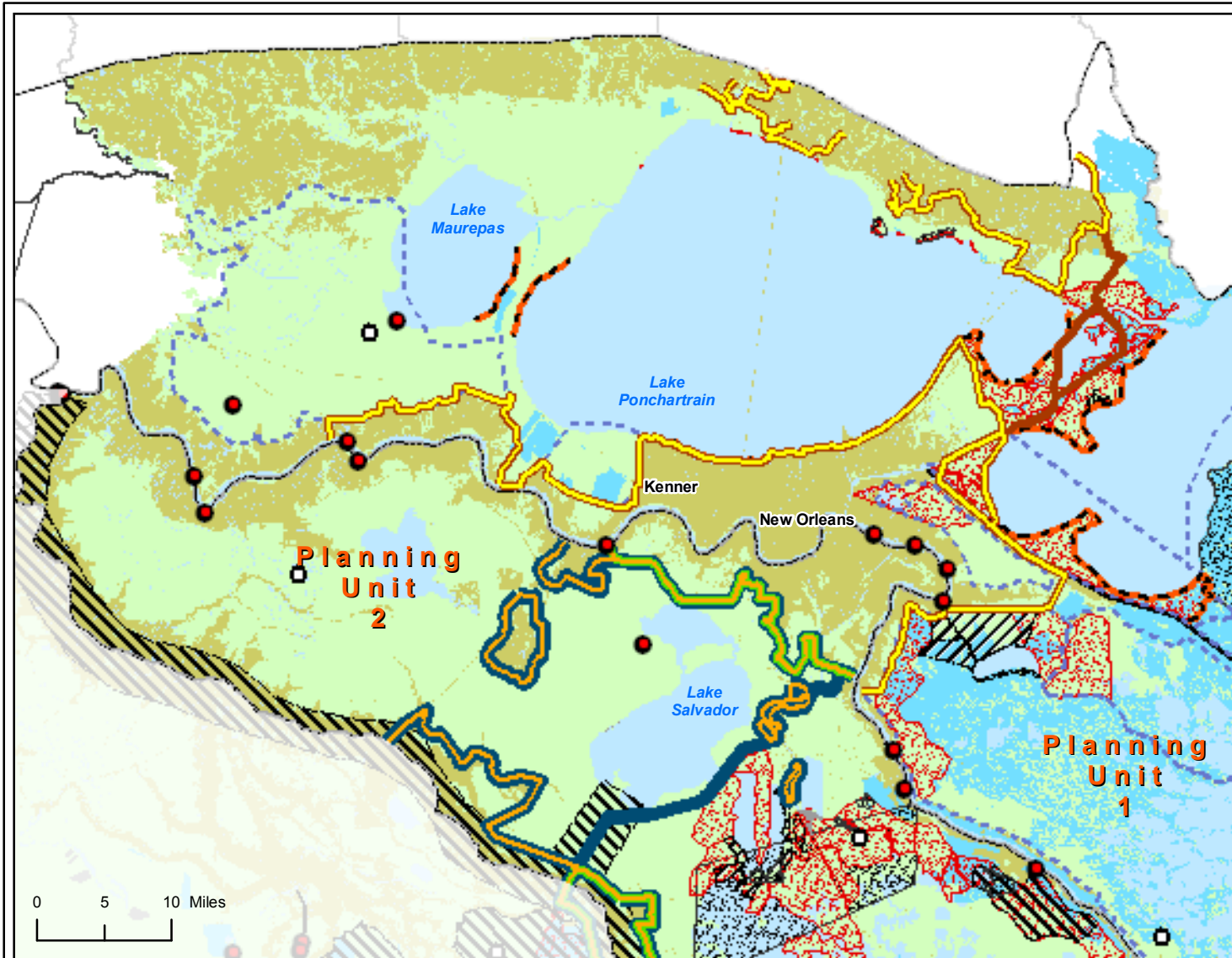
ID #	Project Name	Agency	Project Type
63	Brown Lake Hydrologic Restoration	NRCS	Hydrologic Restoration
64	Little Pecan Bayou Hydrologic Restoration	NRCS	Marsh Creation
65	South Grand Chenier Hydrologic Restoration Project	USFWS	Hydrologic Restoration
66	South Pecan Island Freshwater Introduction	NMFS	Hydrologic Restoration
67	Marsh Creation Near Freshwater Bayou	NA	Marsh Creation
68	Sabine Refuge Marsh Creation (SA-01)	NA	Marsh Creation
69	Calcasieu River & Pass, LA - O&M *	USACE	Dredging
70	Mermentau River-O7M	USACE	Dredging
71	Marsh Creation via Beneficial Use (Phase 1)	NA	Marsh Creation
	GIWW-O&M *	USACE	Dredging

ID #	Project Name	Agency	Project Type
51	Avoca Island Diversion and Land Building	USACE	Diversion
52	Castille Pass Channel Sediment Delivery	NMFS	Diversion
53	East Marsh Island Marsh Creation	EPA	Marsh Creation
54	Weeks Bay Marsh Creation and Shore Protection / Commercial Canal Freshwater Reintroduction/Dedicated	USACE	Marsh Creation
55	Dredging Program - Point au Fer Site	DNR	Dredging
56	Point au Fer Island Gulf Shoreline	DNR/USACE	Structures
57	Weeks Bay	NA	Marsh Creation
58	ABFS - Land Acquisition *	USACE	Hydrologic Restoration
59	Bayou Teche O7M	USACE	Dredging
60	CAP - 204 Shell Island Pass *	USACE	Habitat Restoration
61	Atchafalaya River, Bayous Chene, Boeuf, and Black, LA Maintenance *	USACE	Dredging
62	Convey Atchafalaya River to Northern Terrebonne Marshes	WRDA	Diversion
	GIWW-O&M *	USACE	Dredging

\* indicates mapping not available







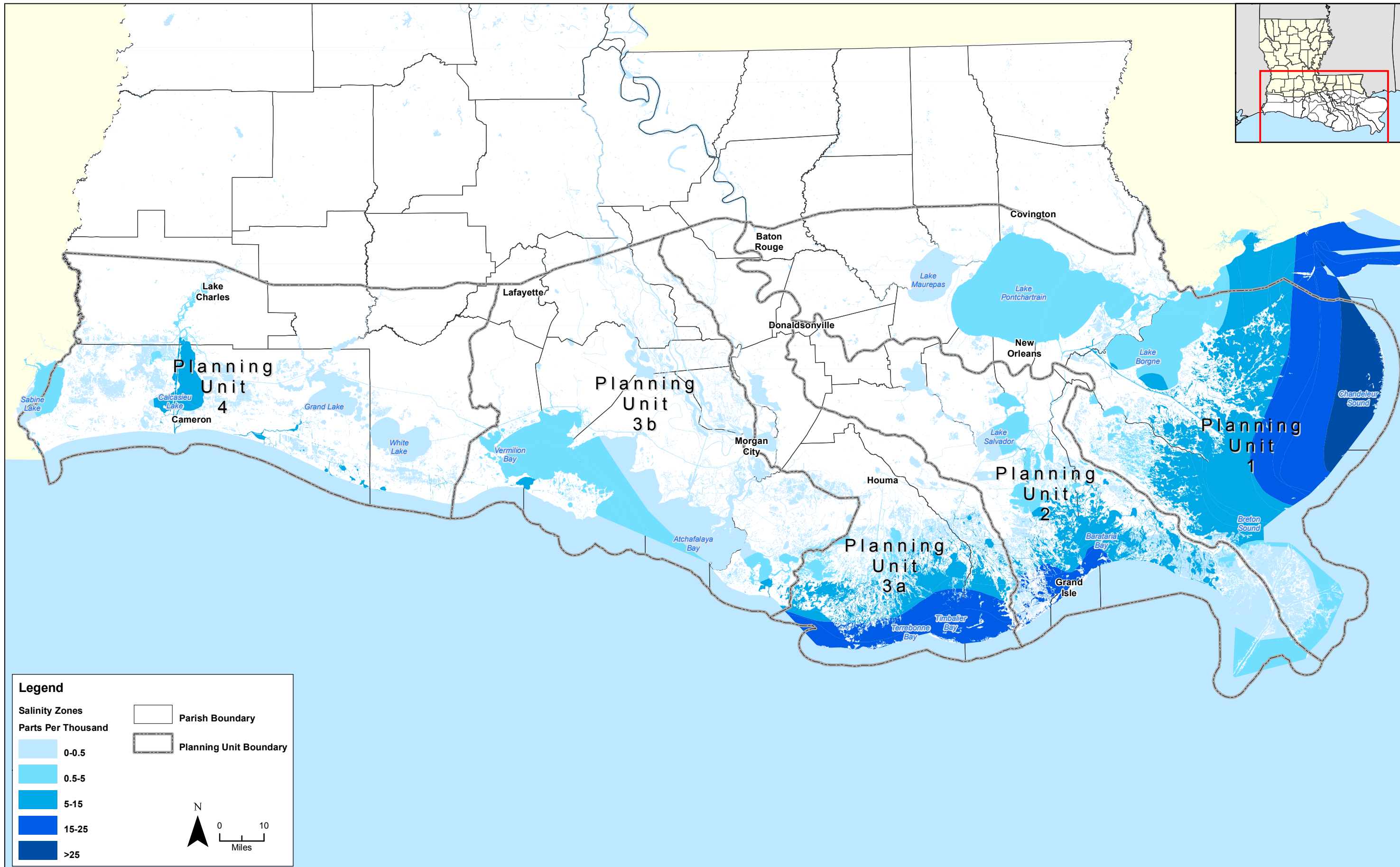
Note:

- 900 acres - Approximate number of acres of Marsh Creation per year per Planning Unit
- 42,500 acres - Approximate number of acres of Marsh Creation 2011-2075 within PU 1
- 35,900 acres - Approximate number of acres of Marsh Creation 2011-2075 within PU 2

Marsh creation areas noted below are not visible at the scale of this map.

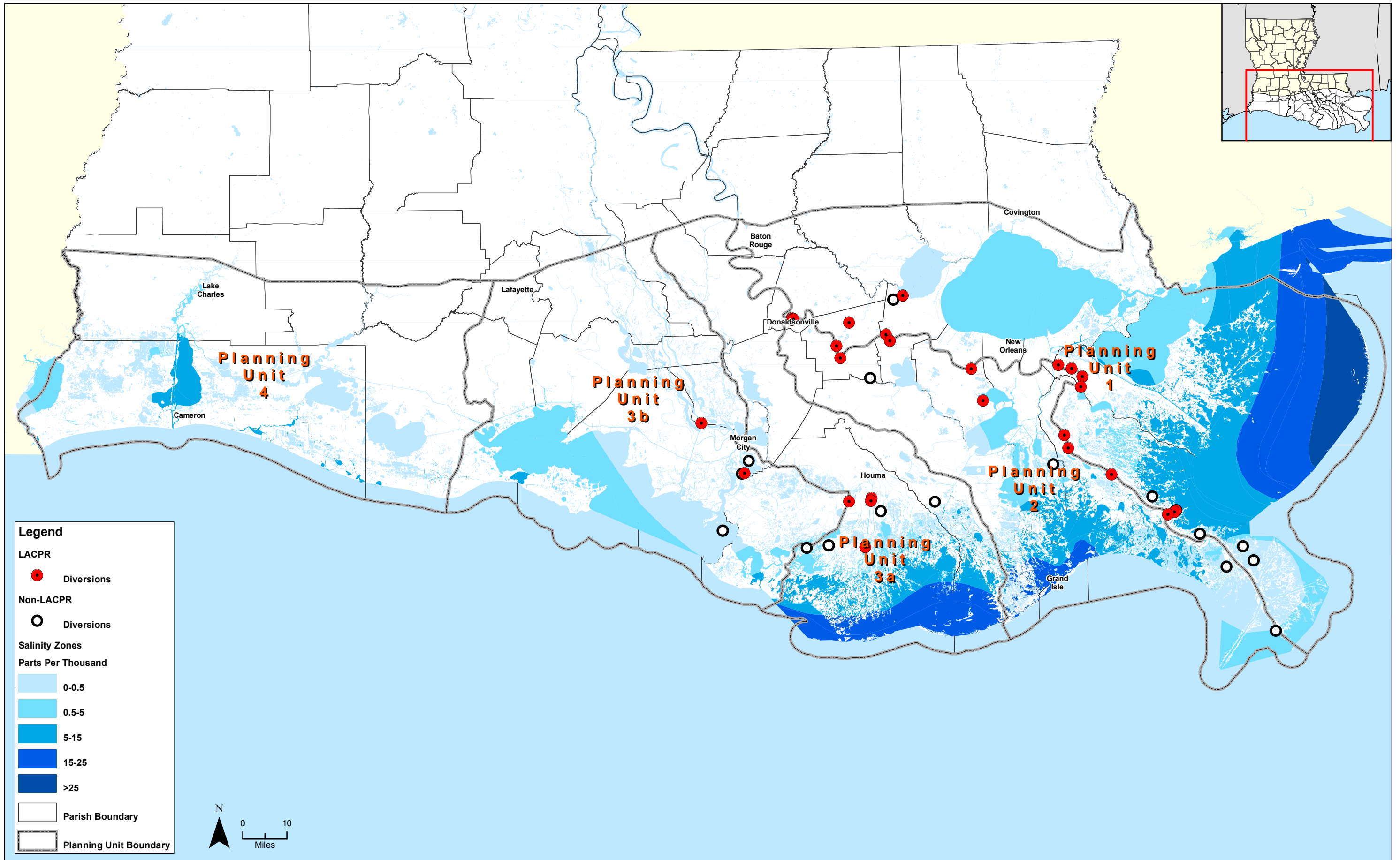
**Wetlands and Projects - PU1 and PU2**  
**Figure 3.1-5**





Source: NOAA, National Coastal Data Development Center, Salinity Zones in Estuaries Along the Gulf of Mexico

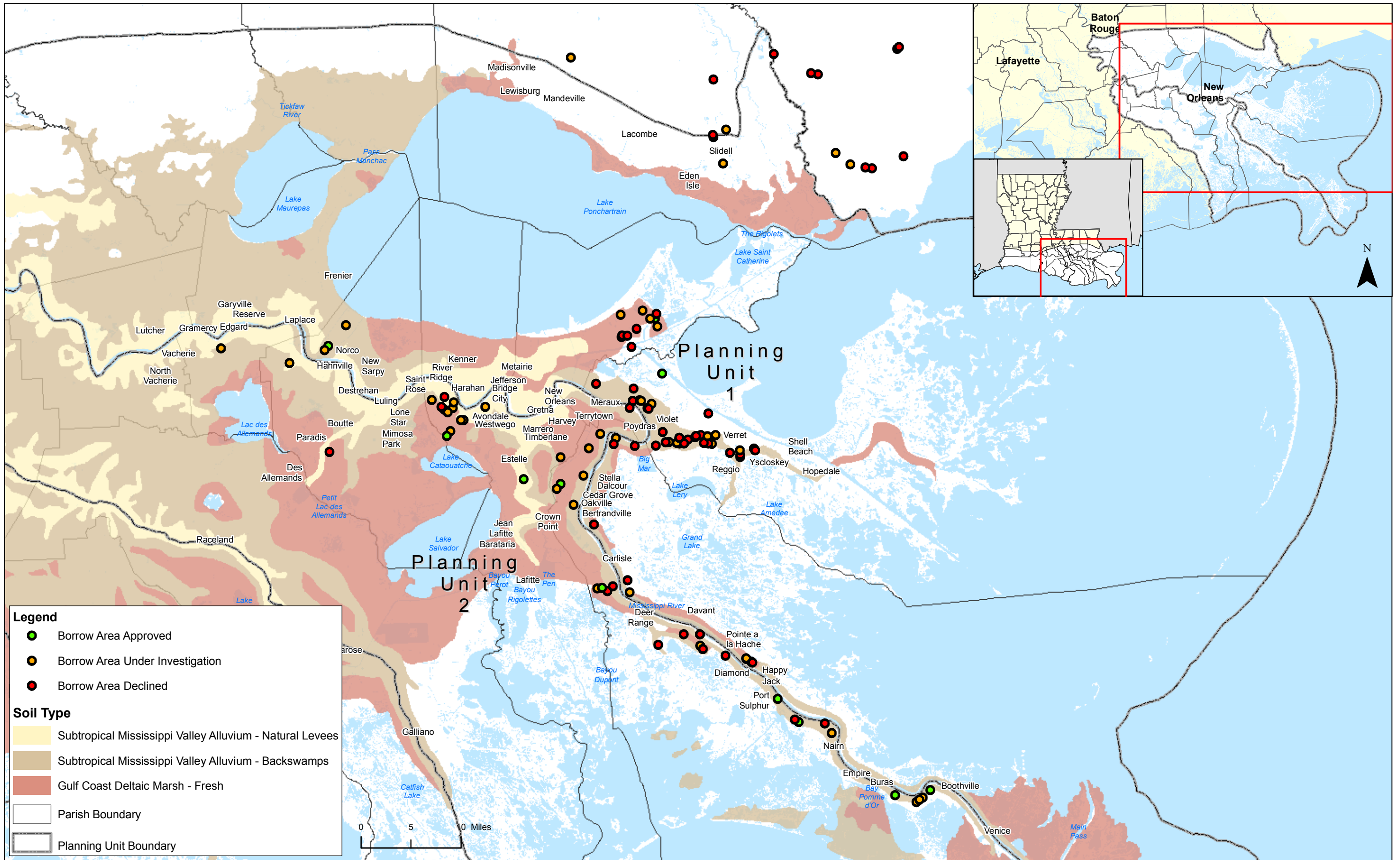
**Existing Conditions - Salinity Regime - PU1 - PU4**  
**Figure 3.2-1**



Source: NOAA, National Coastal Data Development Center, Salinity Zones in Estuaries Along the Gulf of Mexico

**Salinity Regime and Diversions - PU1 - PU4**  
**Figure 3.2-2**

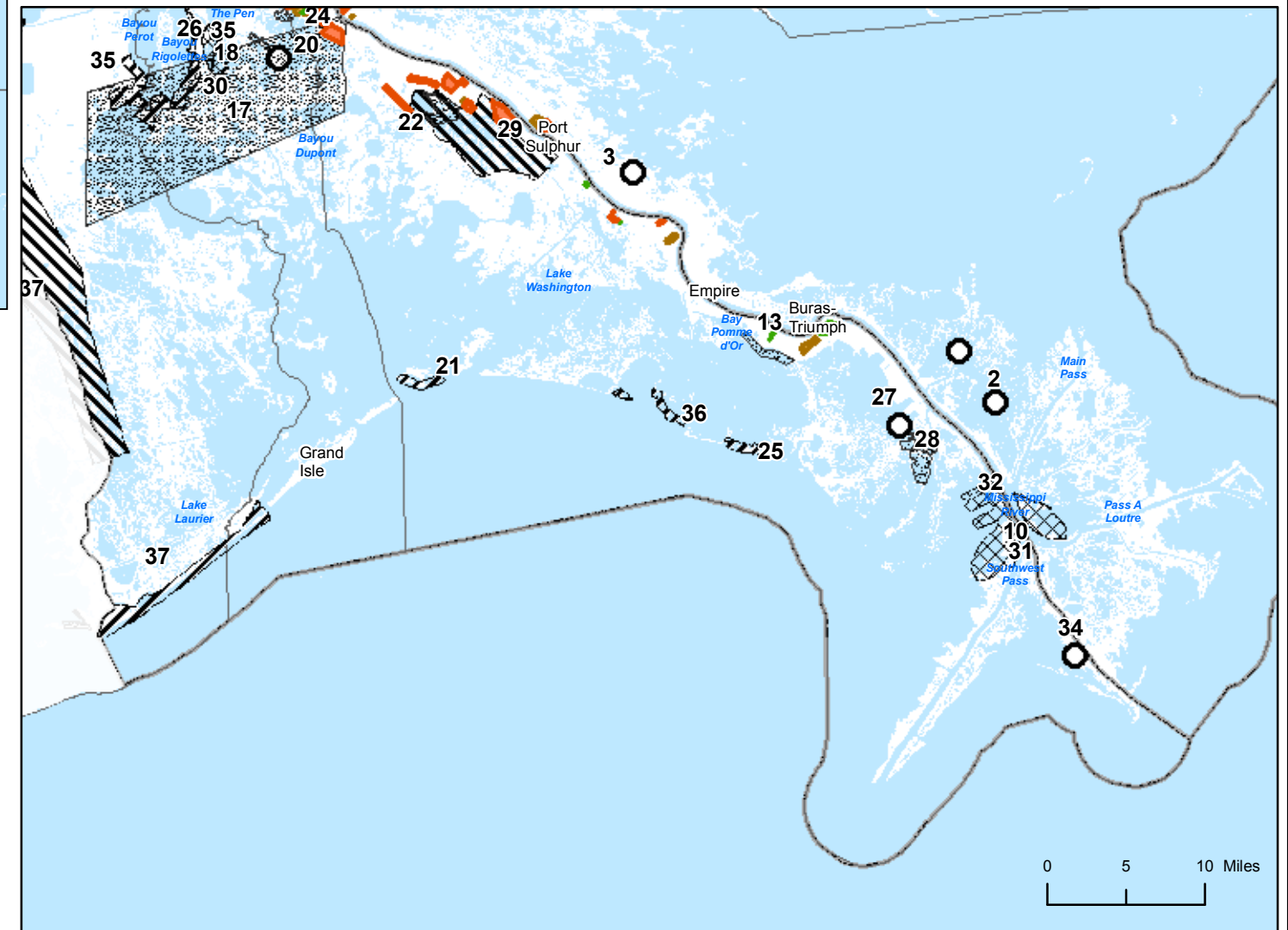
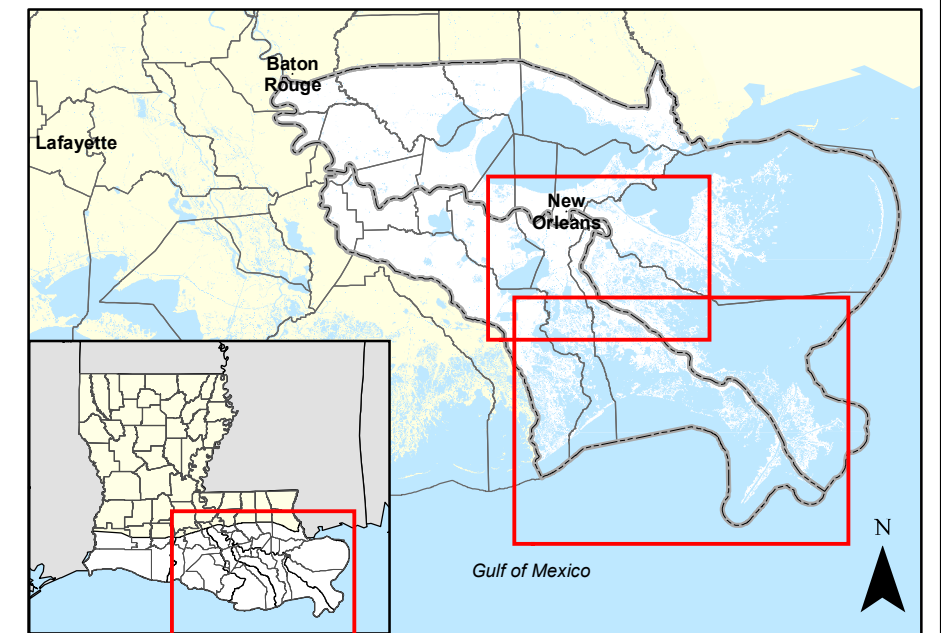
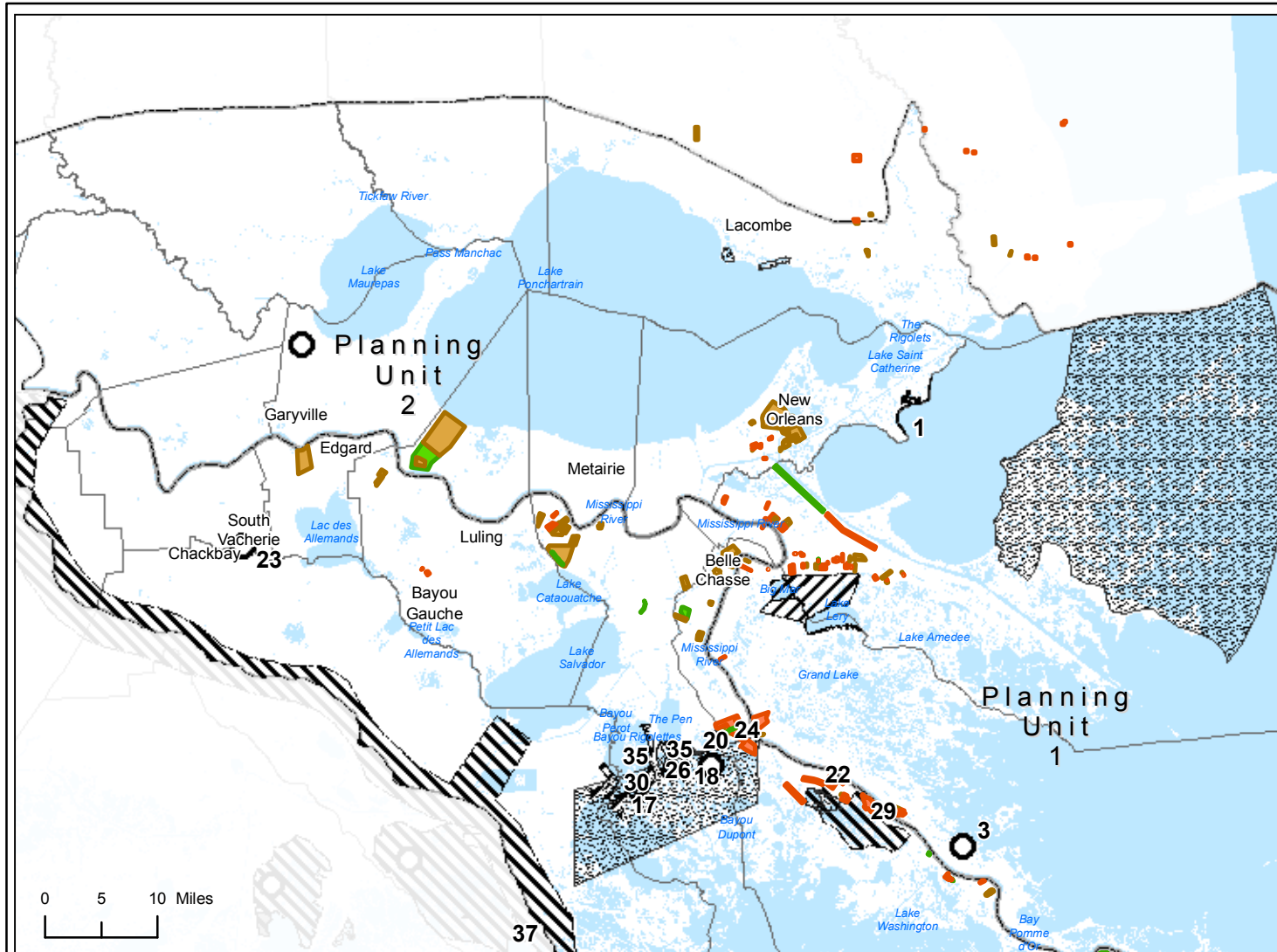




Sources: Borrow Team Protection & Restoration Office Planning, Programs & Project Management Division New Orleans District - USACE. 2008  
 U.S. Geological Survey, Biological Resource Division's, National Wetlands Research Center. 1998

**Existing Conditions - Borrow Areas, 2008 - PU1 - PU4**  
**Figure 3.4-1**



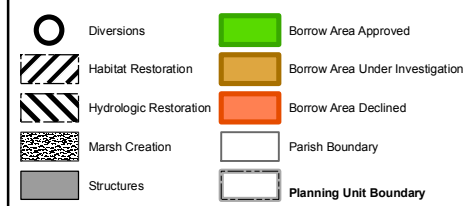


**Non-LACPR Projects To Be Completed After 2011**

ID #	Projects To Be Completed After 2011, Planning Unit 1	USACE/NRCS	Marsh Creation, Habitat Restoration
1	Alligator Bend Marsh Restoration and Shoreline Protection	USACE/NRCS	Habitat Restoration
2	Bennevis Bay Diversion	USACE	Diversion
3	Bohemia Mississippi River Reintroduction	EPA	Diversion
4	Caernarvon Outfall Management/Lake Lery Shoreline Restoration	USFWS/NRCS	Habitat Restoration
5	Goose Point/Point Platte Marsh Creation	USFWS	Marsh Creation
6	River Reintroduction into Maurepas Swamp	EPA	Diversion
7	Baptiste Collette Bayou Sediment Diversion	NA	Diversion?
8	Biloxi Marsh Creation	NA	Marsh Creation
9	MRGO Environmental Restoration *	NA	
10	Pass A Loutre Sediment Mining	NA	Dredging
11	Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana *	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
14	Central Wetlands Assimilation Project (Phase 1) *	NA	Habitat Restoration
	GIWW-O&M *	USACE	Dredging

ID #	Projects To Be Completed After 2011, Planning Unit 2	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
17	Long Distance MS River Sediment Pipeline	NA	Marsh Creation
18	Bayou Dupont Marsh and Ridge Creation	NMFS	Marsh Creation
19	Dedicated Dredging on the Barataria Basin Landbridge	USFWS	Marsh Creation
20	Delta Building Diversion at Myrtle Grove	USACE	Diversion
21	East/WEST Grand Terre Islands Restoration	NMFS	Habitat Restoration
22	Lake Hermitage Marsh Creation	USFWS	Marsh Creation
23	Mississippi River Reintroduction Into Northwest Barataria Basin	EPA	Diversion
24	Mississippi River Sediment Delivery System - Bayou Dupont	EPA	Marsh Creation
25	Riverine Sand Mining/Scofield Island Restoration	NMFS	Habitat Restoration
26	South Shore of the Pen Shoreline Protection and Marsh Creation	NRCS	Structures
27	Spanish Pas Diversion	USACE	Diversion
28	Venice Ponds Marsh Creation and Crevasses	EPA/USACE	Marsh Creation
29	West Pointe a la Hache Outfall Management	NRCS/EPA	Hydrologic Restoration
30	Barataria Bay Waterway Alternative Disposal Site	NA	Dredging
31	Channel Maintenance Dredging	NA	Dredging
32	Cutterhead/Dustpan Maintenance Dredging	NA	Dredging
33	Small Bayou Lafourche Reintroduction *	DNR/USACE	Diversion
34	South Pass Sediment Diversion	NA	Diversion
35	LCA - Barataria Basin Landbridge	DNR/USACE	Habitat Restoration
36	LCA - Barataria Basin Barrier Shoreline Restoration	DNR/USACE	Habitat Restoration
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
	GIWW-O&M *	USACE	Dredging

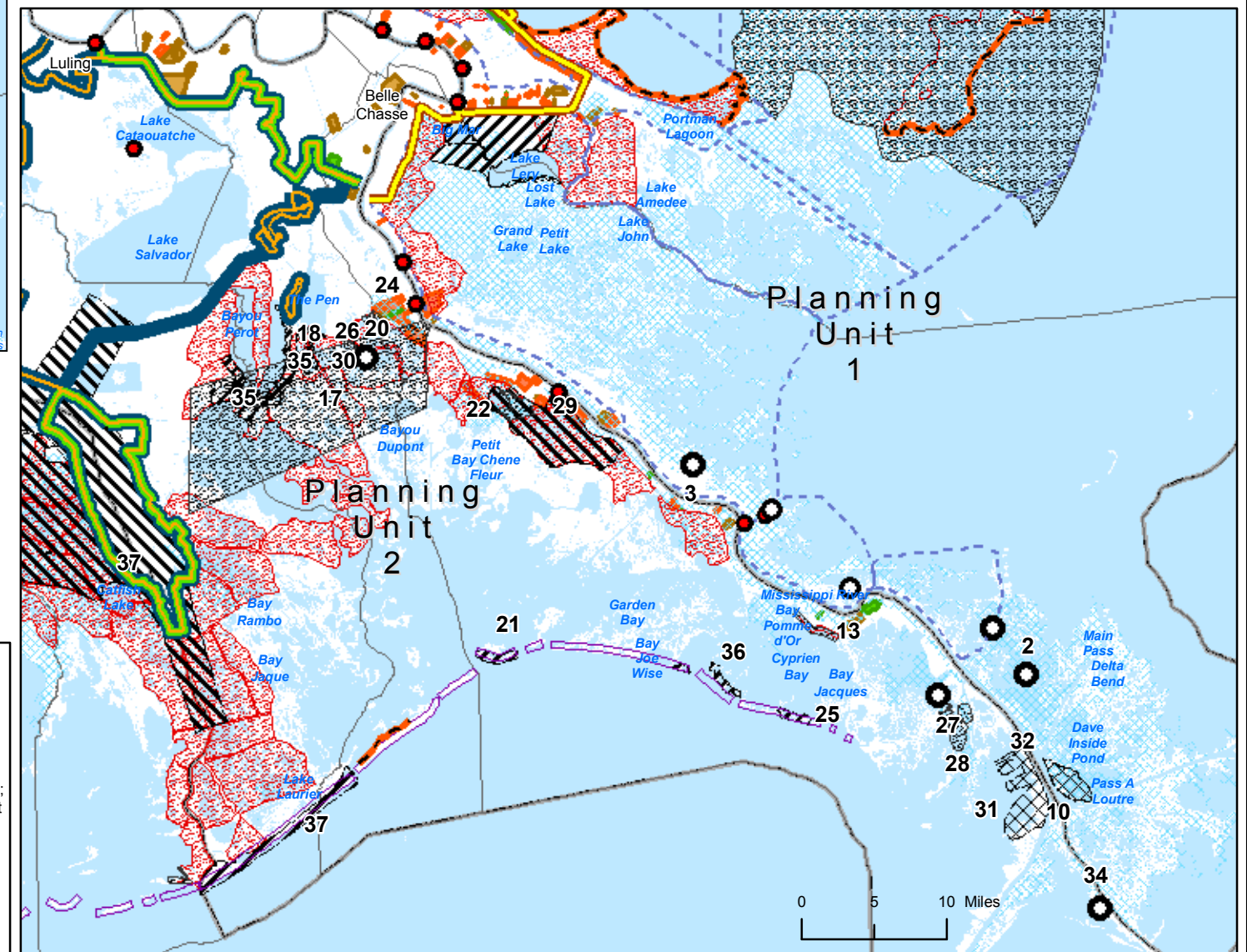
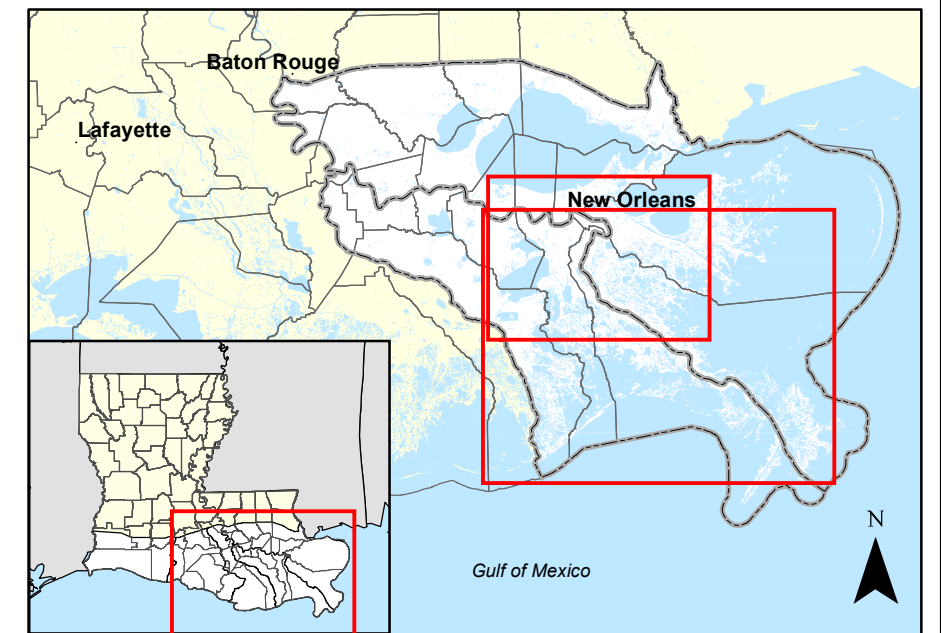
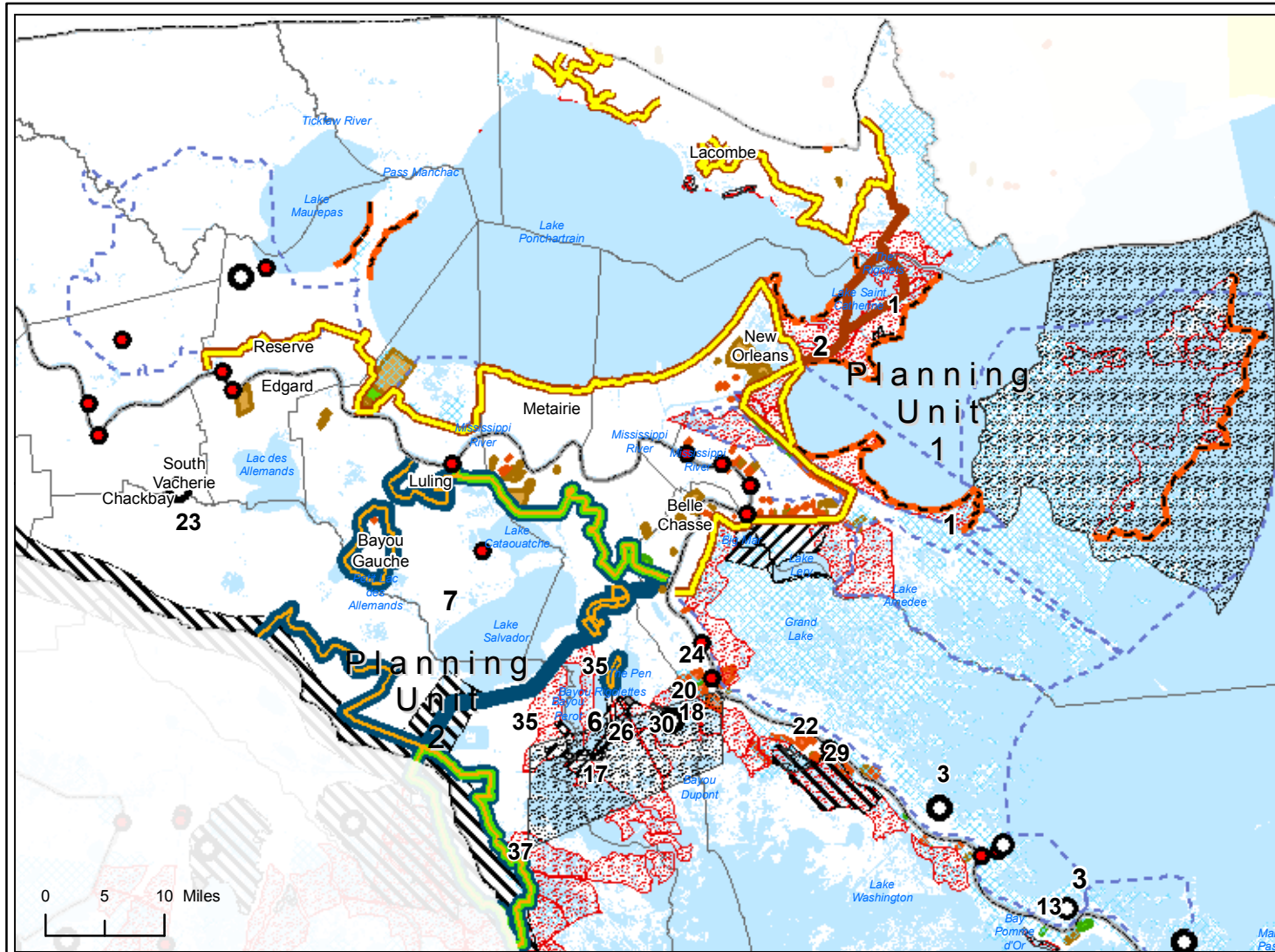
**Legend**



Sources: Borrow Team Protection & Restoration Office Planning, Programs & Project Management Division New Orleans District - USACE. 2008  
Soils, U.S. Geological Survey, Biological Resource Division's, National Wetlands Research Center. 1998

**Potential Borrow Areas and Non-LACPR Projects - PU1 and PU2**  
**Figure 3.4-2**





**Legend**

- |                                       |                        |                                 |
|---------------------------------------|------------------------|---------------------------------|
| Lock                                  | Diversions             | Diversions                      |
| PU1 High Level Plan                   | Habitat Restoration    | Hydrologic Restoration          |
| PU1 Lake Ponchartrain Surge Reduction | Marsh Creation         | Structures                      |
| PU2 Ridge Alignment                   | Borrow Area Approved   | Borrow Area Under Investigation |
| PU2 West Bank Alignment               | Borrow Area Declined   | Parish Boundary                 |
| PU2 GIWW Alignment                    | Planning Unit Boundary |                                 |
| Shoreline Stabilization               |                        |                                 |
| Barrier                               |                        |                                 |
| Freshwater Influence                  |                        |                                 |
| Marsh Creation                        |                        |                                 |
| Buyout of Structures                  |                        |                                 |

\* Refer to Figure 2.5-2 Table For Non-LACPR Projects To Be Completed After 2011

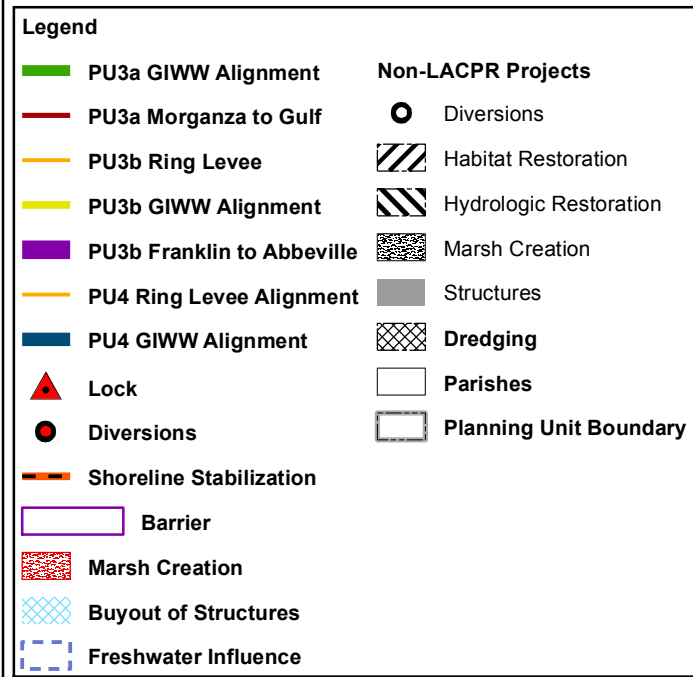
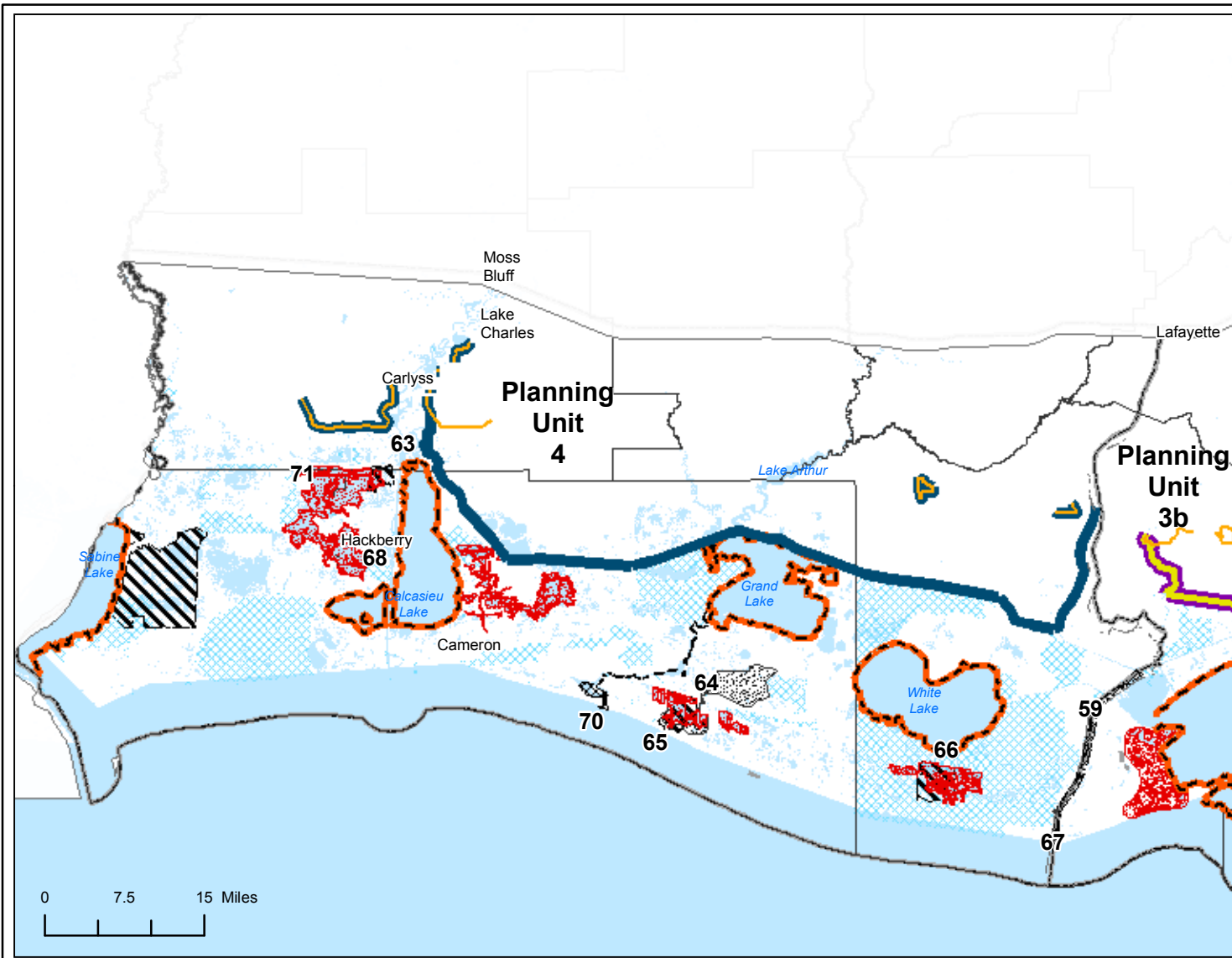
**Notes:**  
 Shapes shown above represent the approximate, cumulative size of borrow pits that would be needed to obtain 100 Million cubic yards of material for levee and related projects by year 2011. The borrow site "footprint" assumes a maximum borrow pit depth of 20 feet below grade; five feet of unusable material atop usable fill; and a borrow pit width of 1.5 miles. Depths of borrow sites can reach depths of 40 feet or more below grade depending on how the borrow material is acquired. Additionally, the depth of usable material will vary depending on site location, and borrow site location may include sites outside of the region and state.

Shapes shown above are not visible at the scale of this map.

Sources: Borrow Team Protection & Restoration Office Planning, Programs & Project Management Division New Orleans District - USACE. 2008  
 Soils, U.S. Geological Survey, Biological Resource Division's, National Wetlands Research Center. 1998

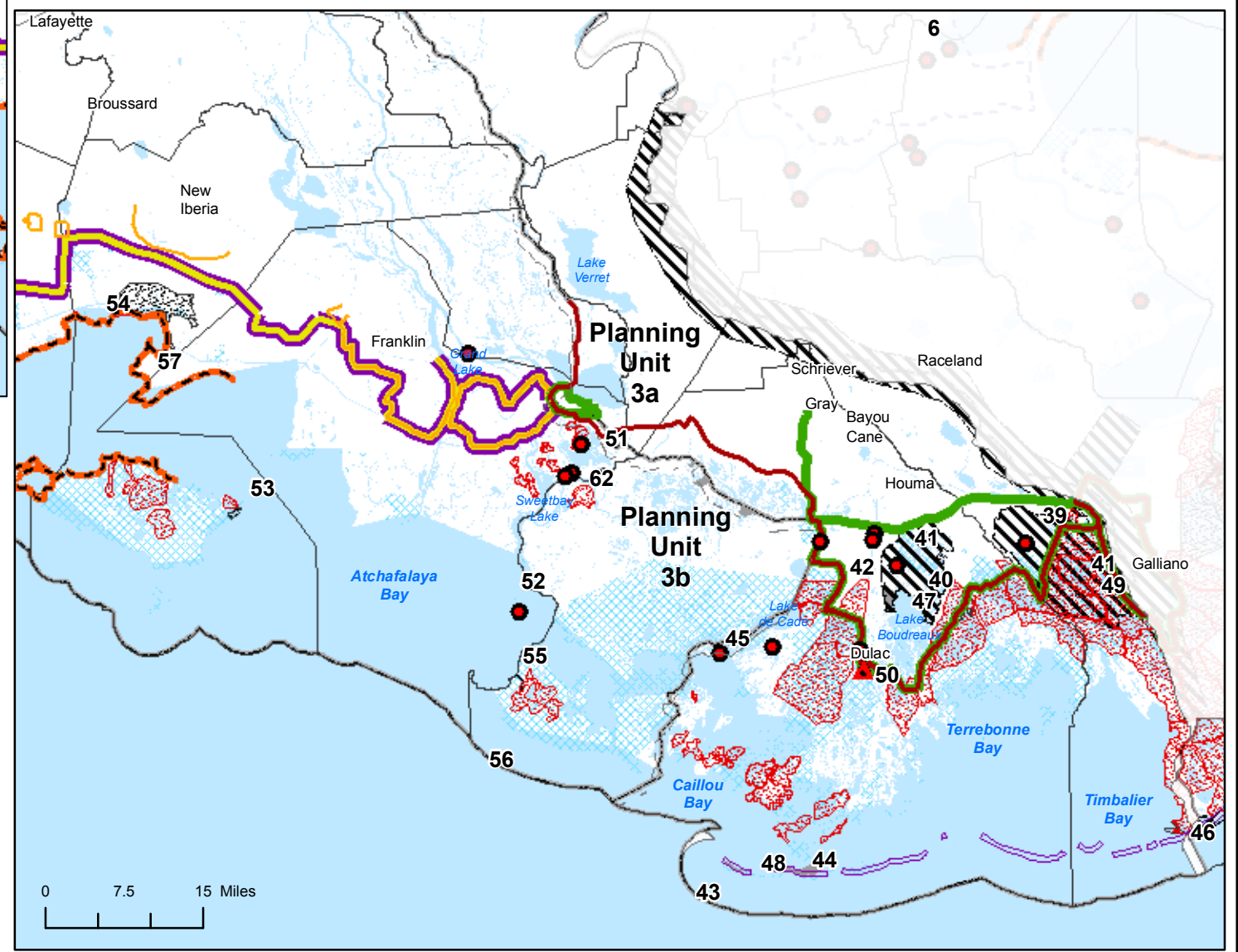
**Potential Borrow Areas and Projects - PU1 and PU2**  
**Figure 3.4-3**





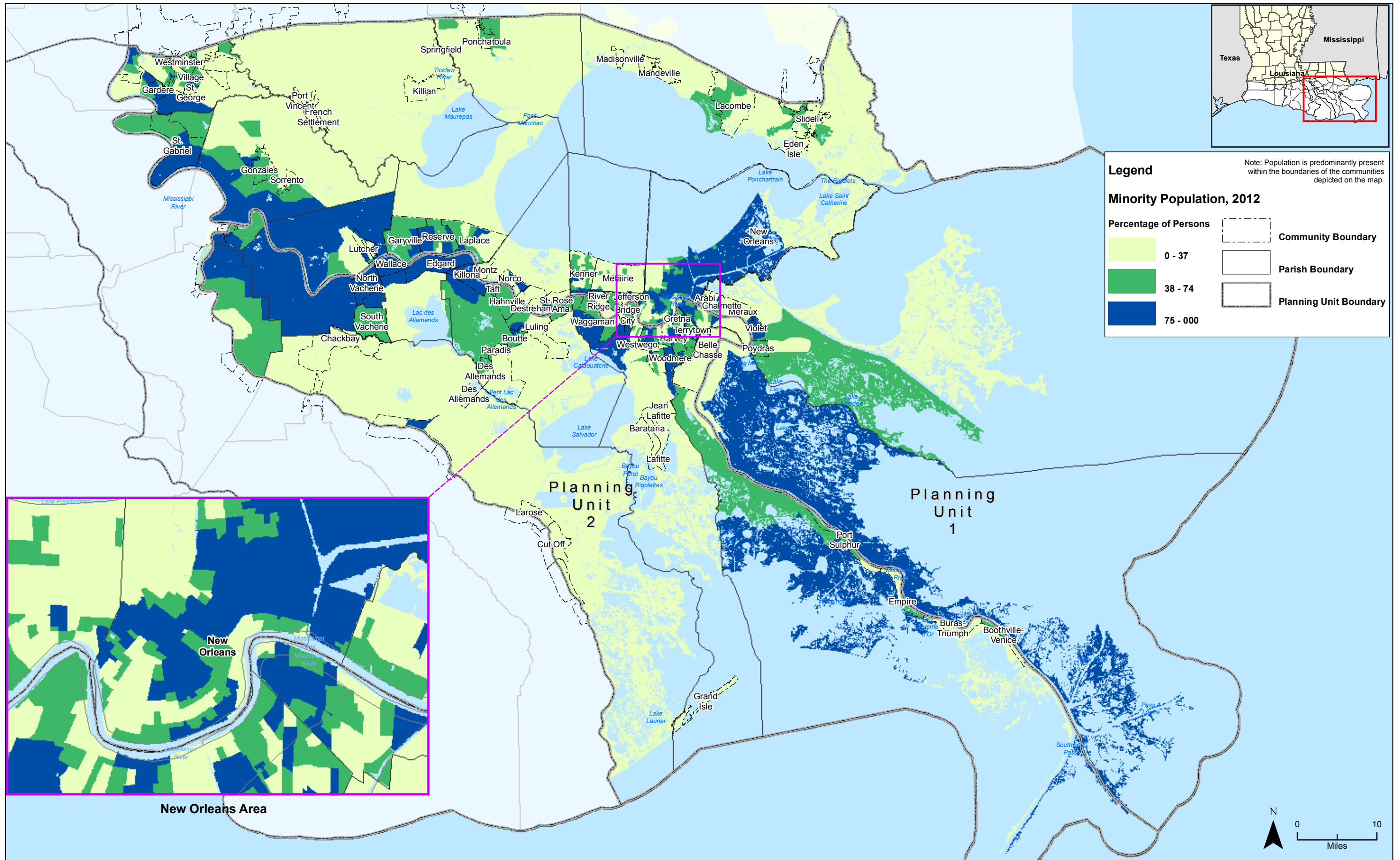
**Notes:**

Shapes shown above represent an approximate, cumulative size of borrow pits that would be needed to obtain estimated borrow need by 2075 for the various projects described in Section 3.4 of this evaluation. The borrow site "footprint" shown above assumes that the same proportional need for borrow material per mile of levee through year 2011 will continue through 2075. Furthermore, estimated footprints assume a maximum borrow pit depth of 20 feet below grade; five feet of unusable material atop usable fill; and a borrow pit width of 1.5 miles. Depths of borrow sites can reach depths of 40 feet or more below grade depending on how the borrow material is acquired. Additionally, the depth of usable material will vary depending on site location, and borrow site location may include sites outside of the region and state. None of the ongoing and future projects not associated with the LACPR will require substantial amounts of fill.



Source: Borrow Team Protection & Restoration Office Planning, Programs & Project Management Division New Orleans District - USACE. 2008  
Soils, U.S. Geological Survey, Biological Resource Division's, National Wetlands Research Center. 1998

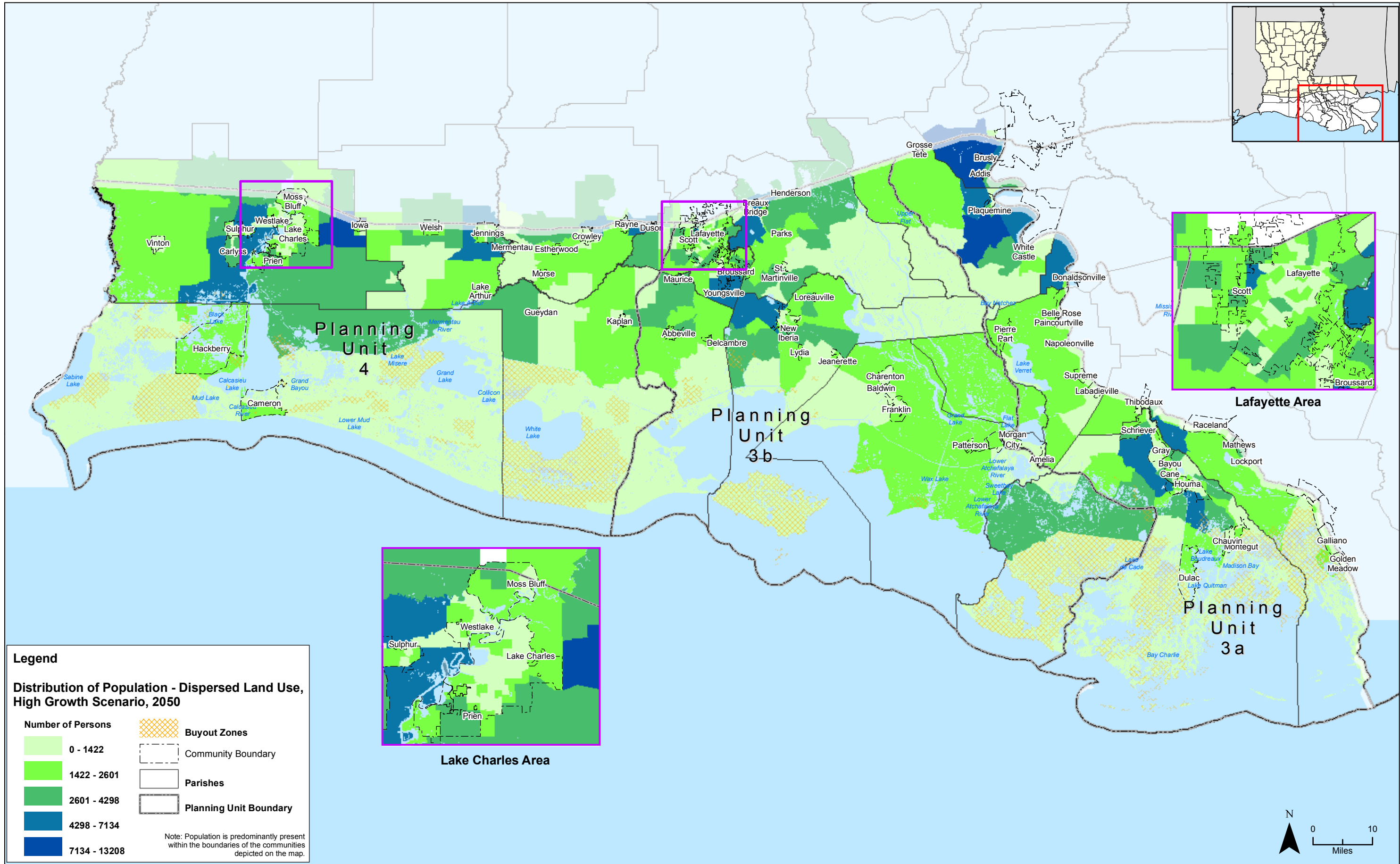
**Potential Borrow Areas and Projects - PU3a, PU3b and PU4**  
**Figure 3.4-4**



Source: ESRI Population Estimates, 2007

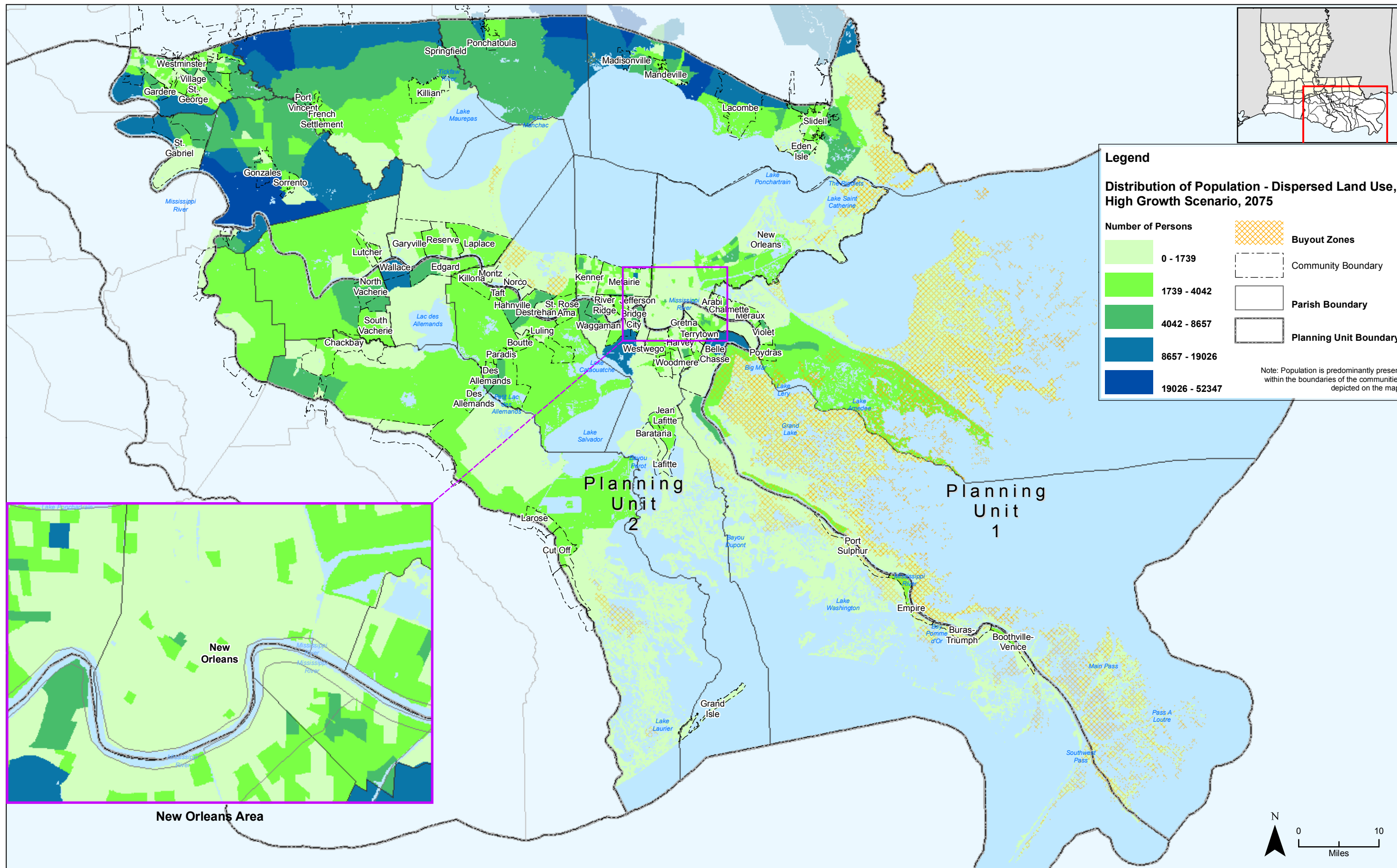
**Minority Population Within PU1 and PU2; 2012**  
**Figure 3.6-1**





Source: Calthorpe Associates, 2008. Data provided by USACE.

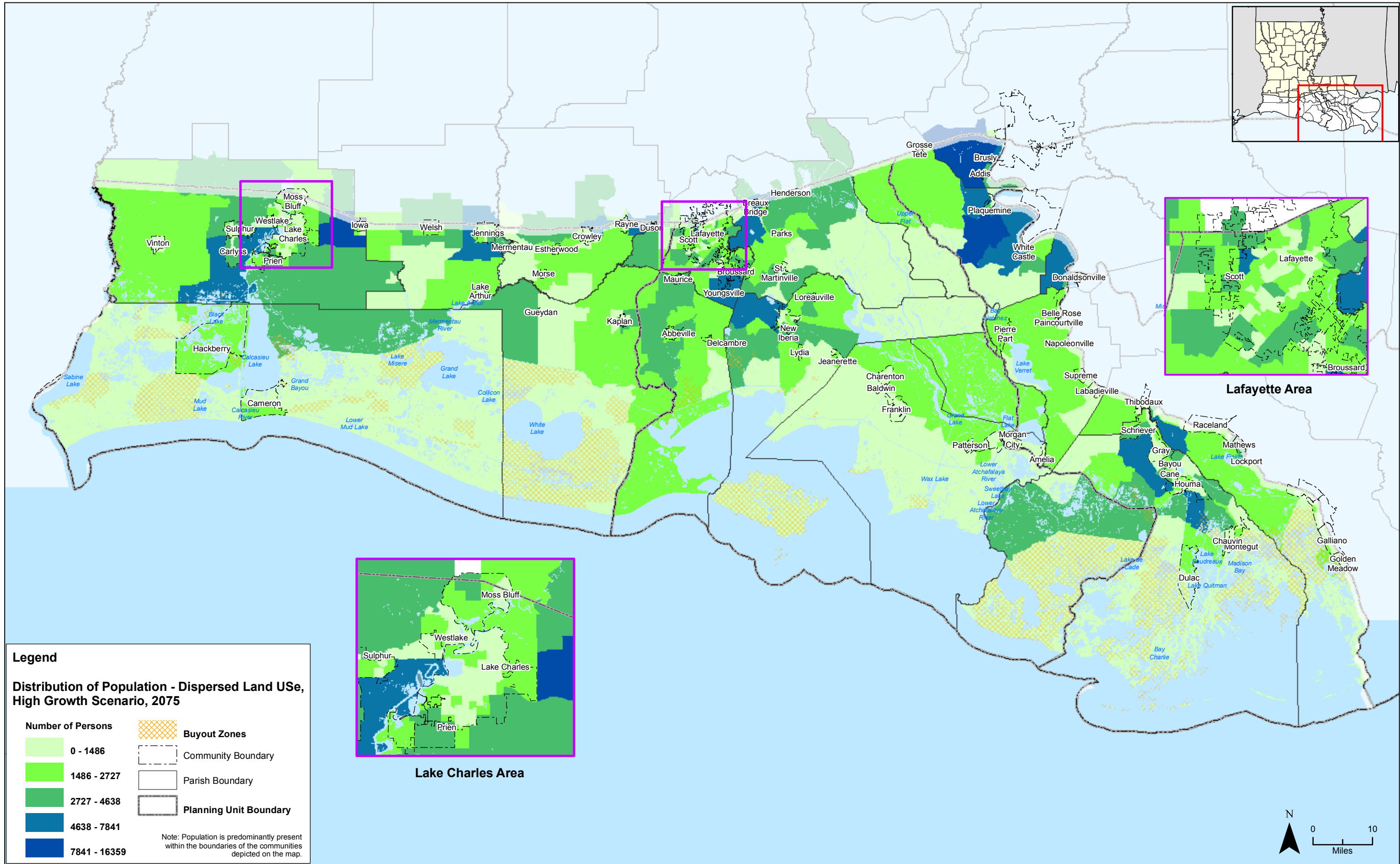
**Dispersed Land Use, High Growth Scenario; 2050 - PU3a, PU3b and PU4  
Figure 3.6-10**



Source: Calthorpe Associates, 2008. Data provided by USACE.

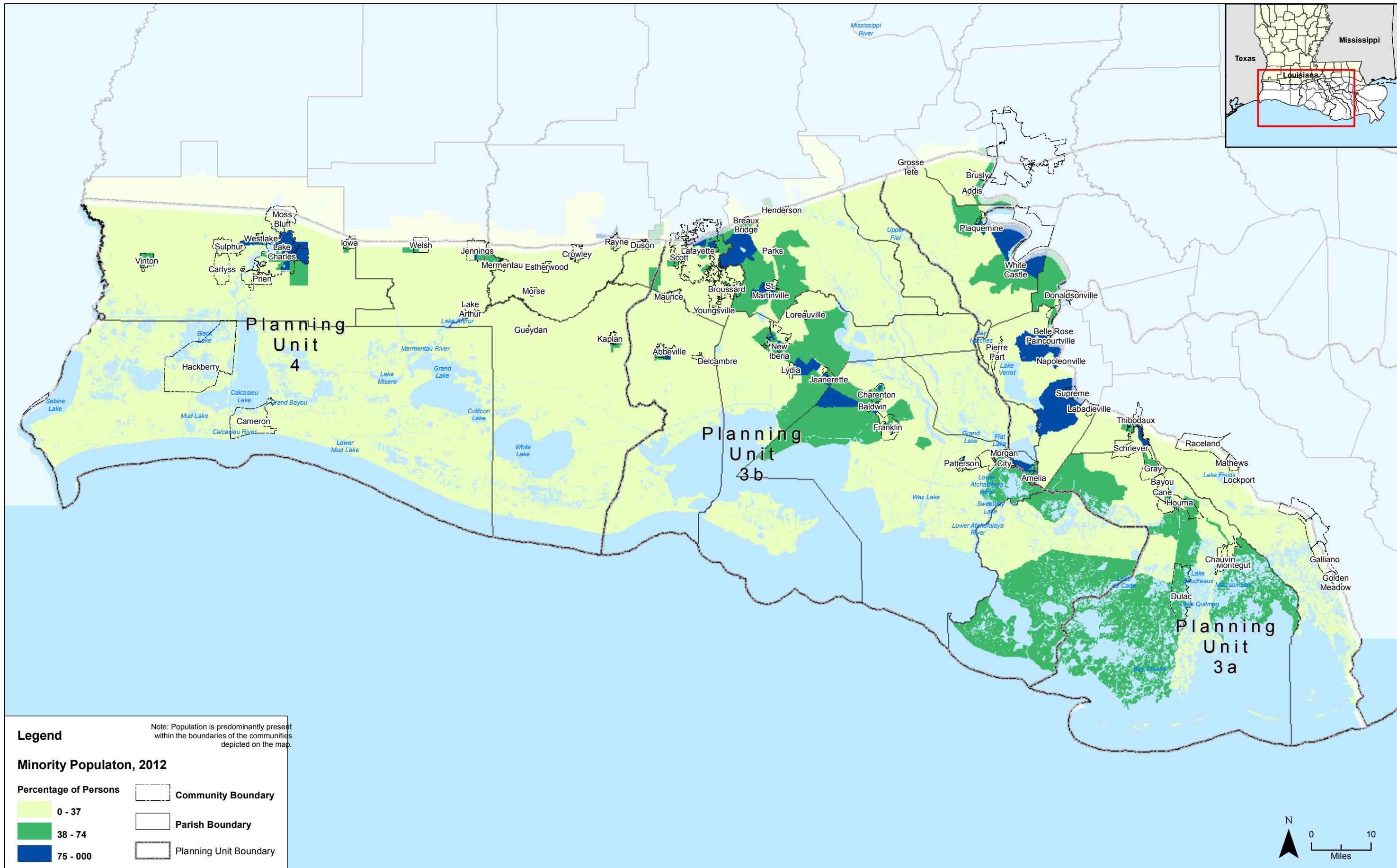
**Dispersed Land Use, High Growth Scenario; 2075 - PU1 and PU2**  
**Figure 3.6-11**





Source: Calthorpe Associates, 2008. Data provided by USACE.

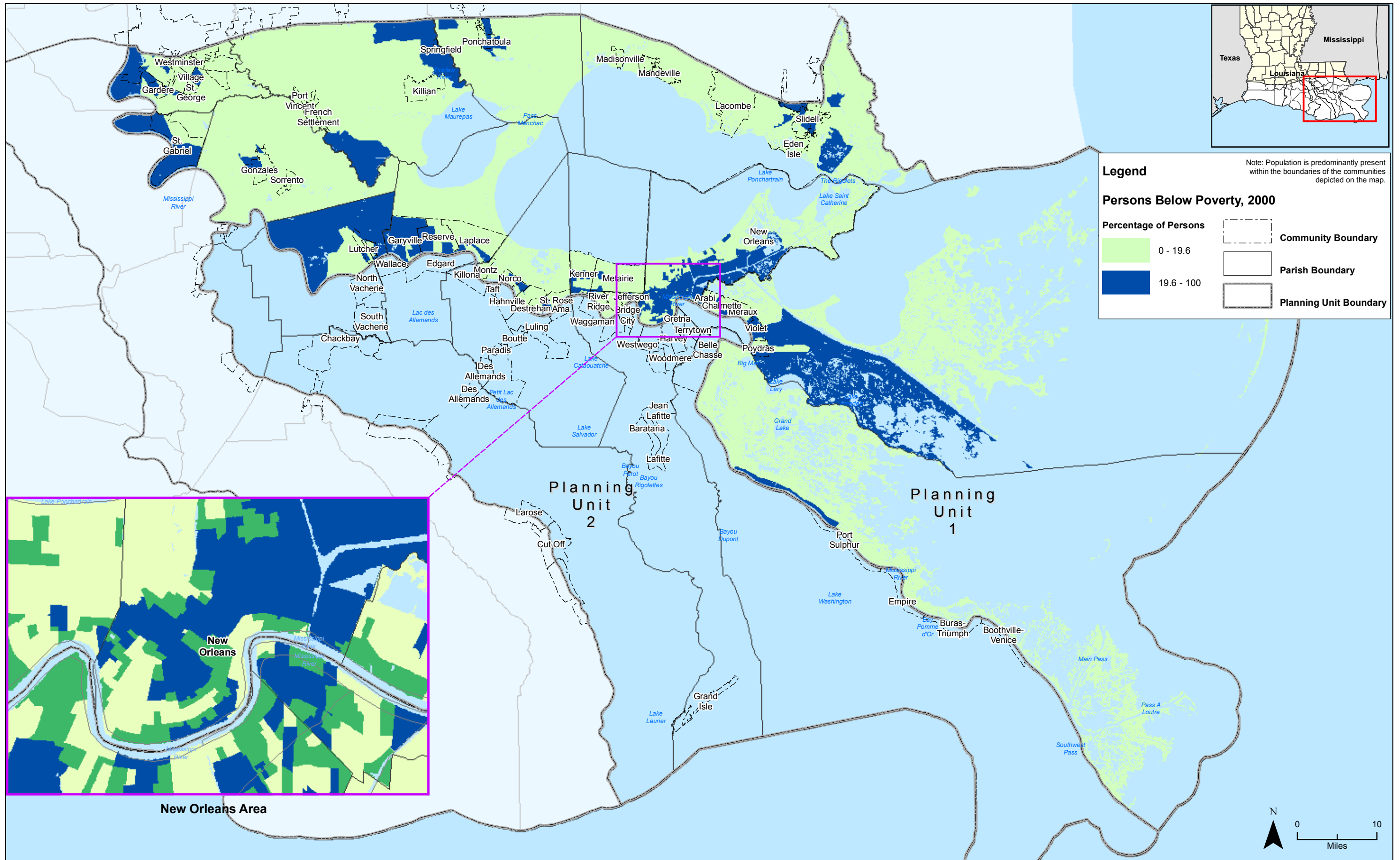
**Dispersed Land Use, High Growth Scenario; 2075 - PU3a, PU3b and PU4**  
**Figure 3.6-12**



Source: ESRI Population Estimates, 2007

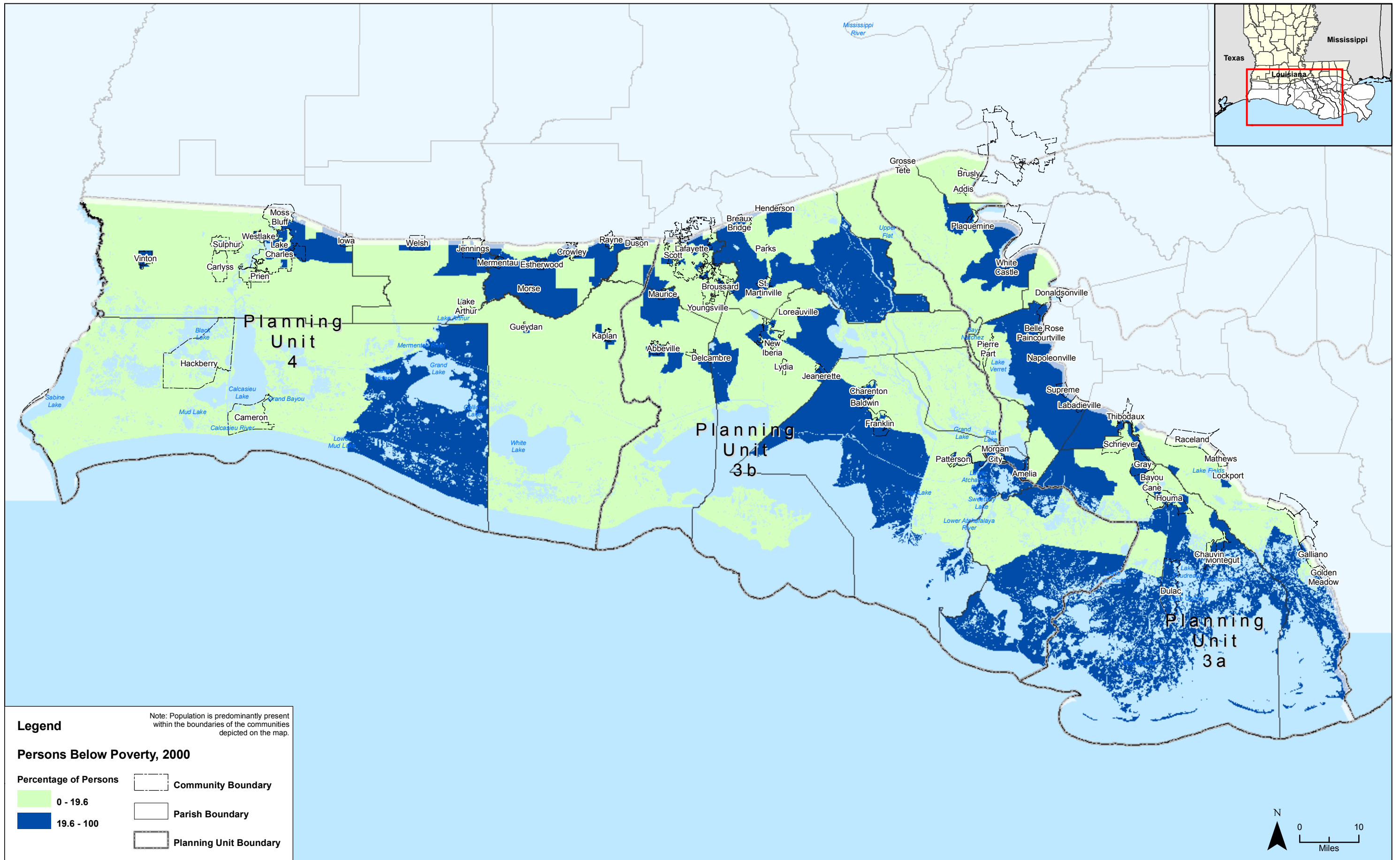
**Minority Population Within PU3a, PU3b and PU4: 2012**  
**Figure 3.6-2**





Source: ESRI Population Estimates, 2007






**Persons Below Poverty By Blockgroup, 2000; PU1 and PU2**  
**Figure 3.6-3**



**Legend**

Note: Population is predominantly present within the boundaries of the communities depicted on the map.

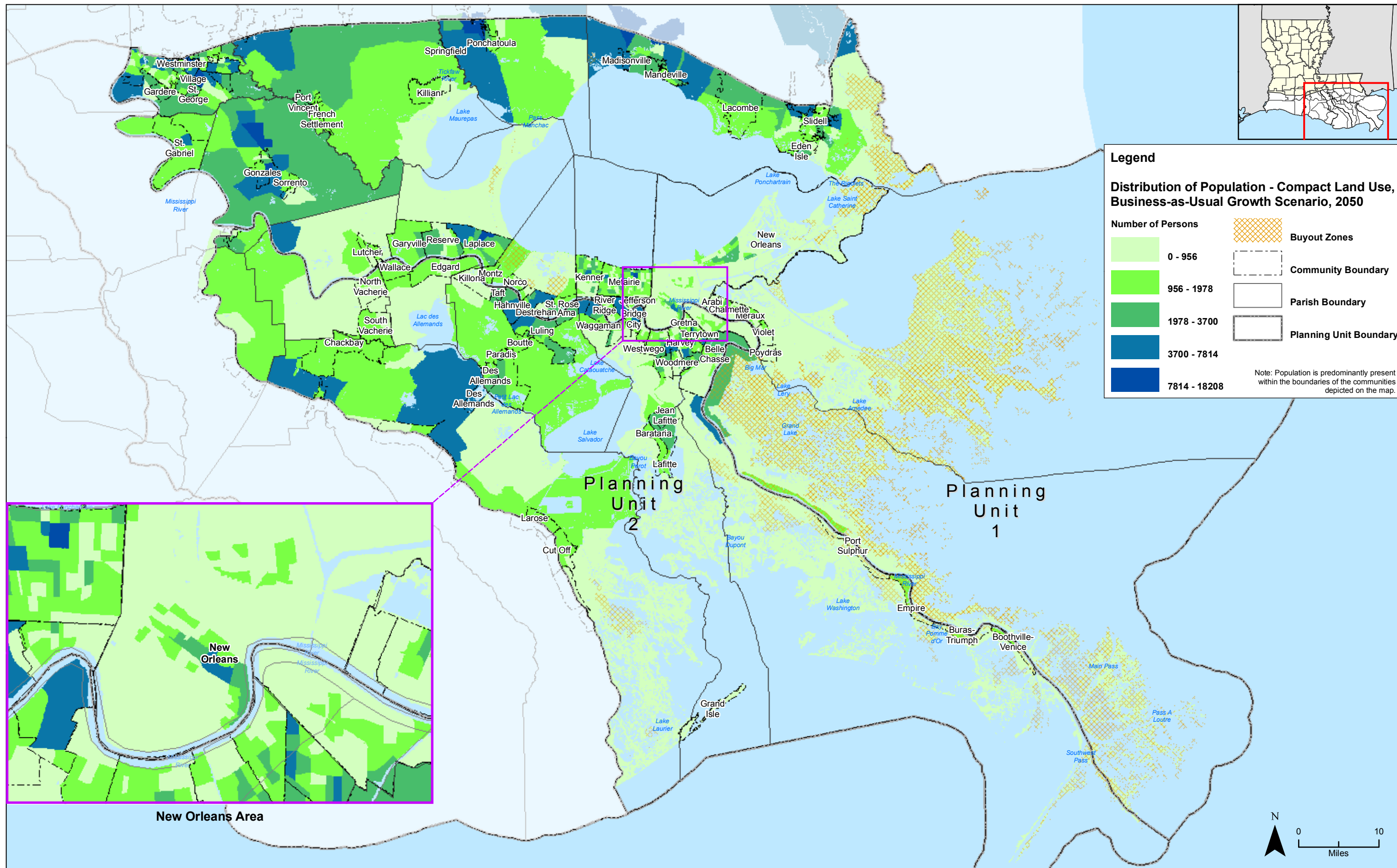
**Persons Below Poverty, 2000**

Percentage of Persons	 Community Boundary
 0 - 19.6	 Parish Boundary
 19.6 - 100	 Planning Unit Boundary

Source: ESRI Population Estimates, 2007

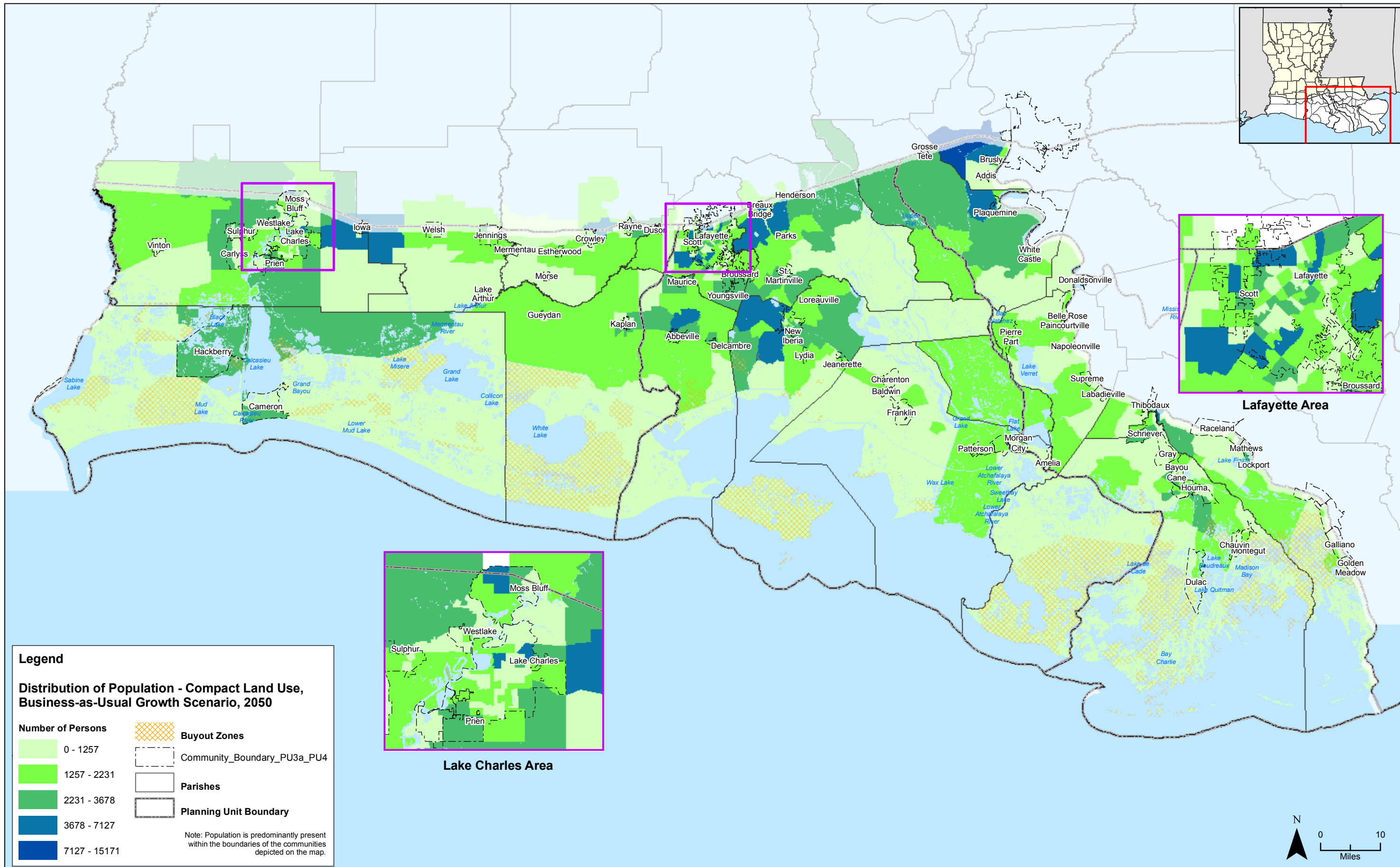
**Persons Below Poverty By Blockgroup, 2000; PU3a, PU3b and PU2**  
**Figure 3.6-4**





Source: Calthorpe Associates, 2008. Data provided by USACE.

**Compact Land Use, Business-as-Usual Growth Scenario; 2050 - PU1 and PU2**  
**Figure 3.6-5**



**Legend**

**Distribution of Population - Compact Land Use, Business-as-Usual Growth Scenario, 2050**

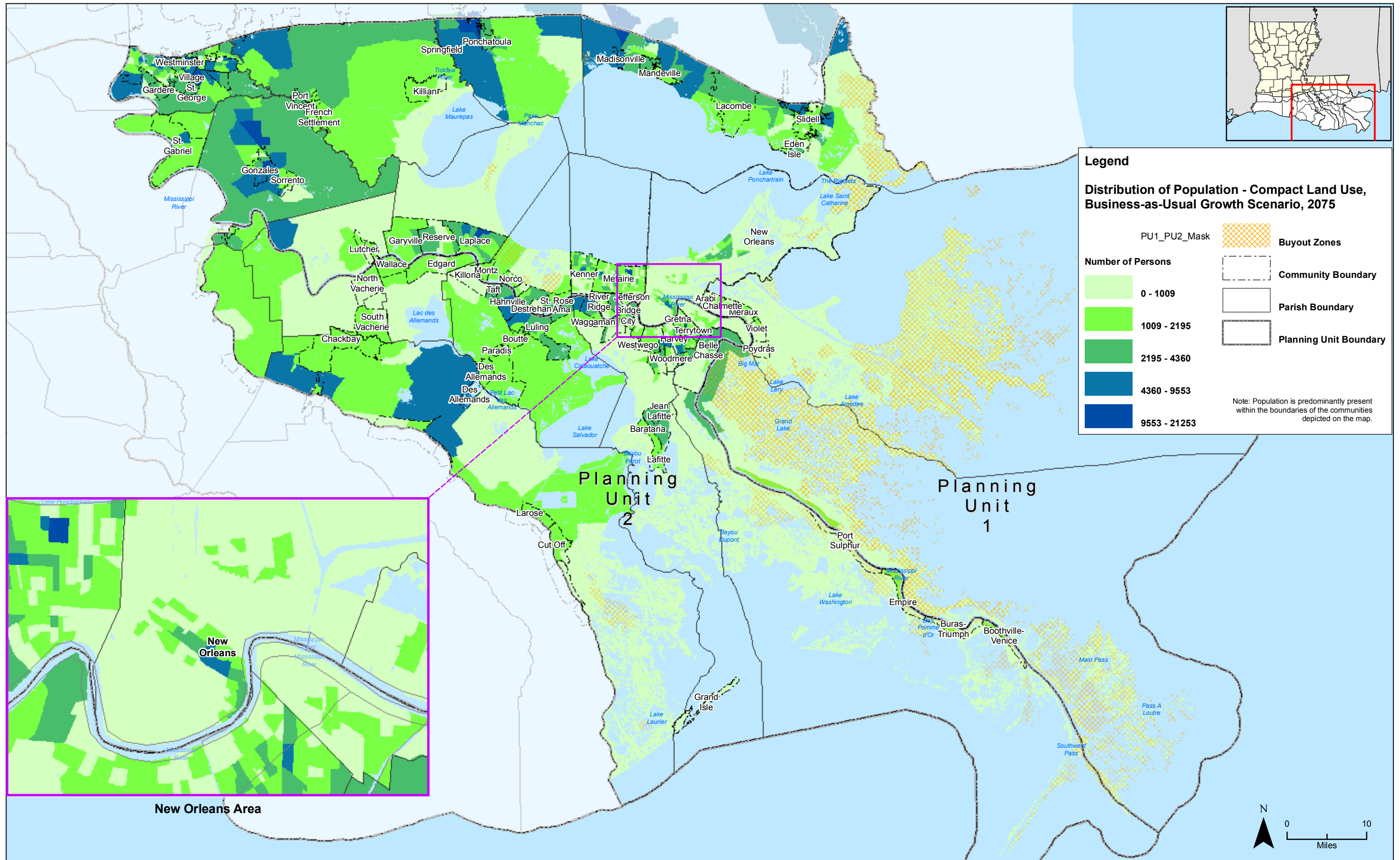
Number of Persons	Symbol	Description
0 - 1257	Light Green	Population Range
1257 - 2231	Medium Green	Population Range
2231 - 3678	Dark Green	Population Range
3678 - 7127	Blue-Green	Population Range
7127 - 15171	Dark Blue	Population Range
	Cross-hatch pattern	Buyout Zones
	Dashed line	Community_Boundary_PU3a_PU4
	Solid line	Parishes
	Thick solid line	Planning Unit Boundary

Note: Population is predominantly present within the boundaries of the communities depicted on the map.

Source: Calthorpe Associates, 2008. Data provided by USACE.

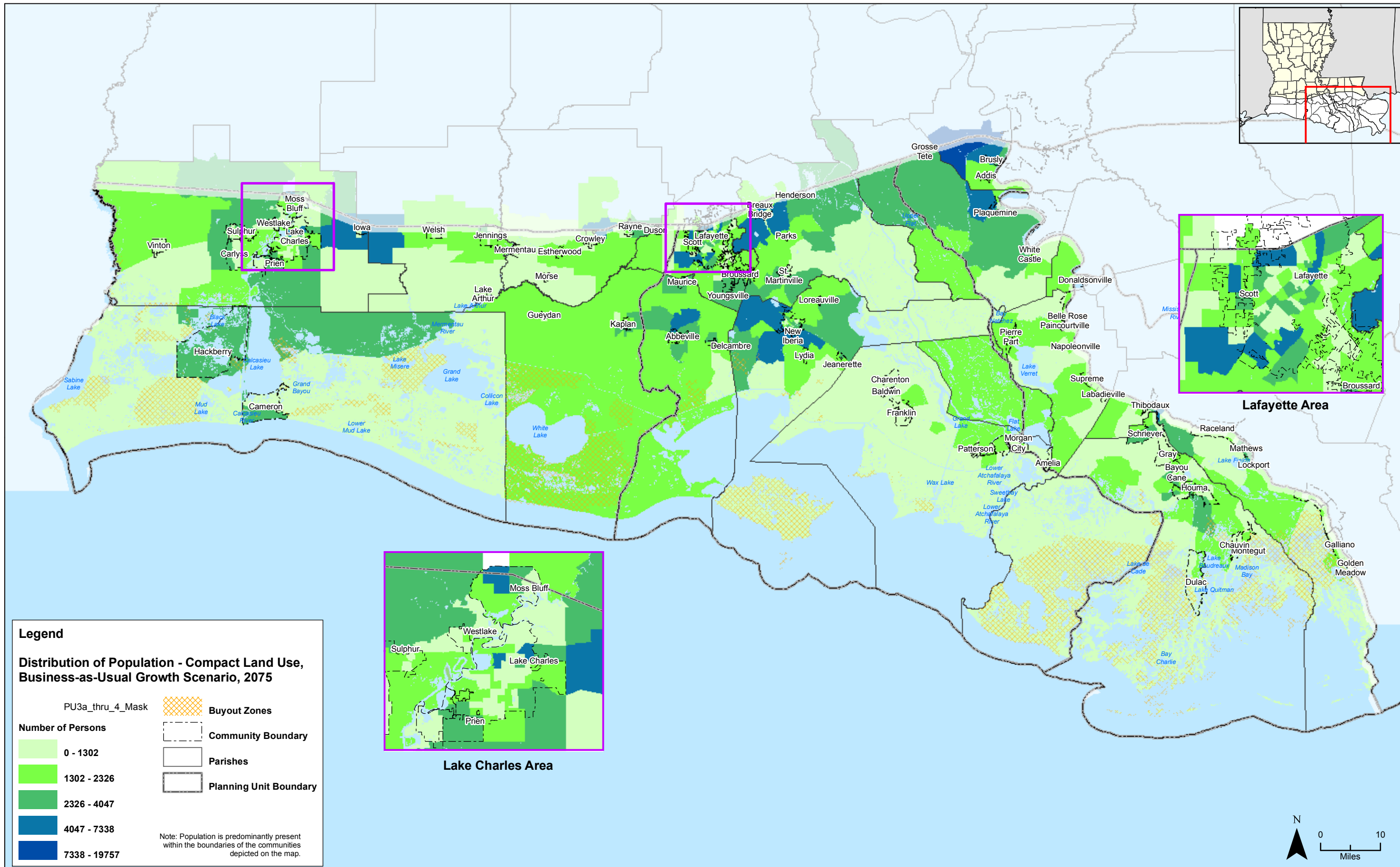
**Compact Land Use, Business-as-Usual Growth Scenario; 2050 - PU3a, PU3b and PU4**  
**Figure 3.6-6**





Source: Calthorpe Associates, 2008. Data provided by USACE.

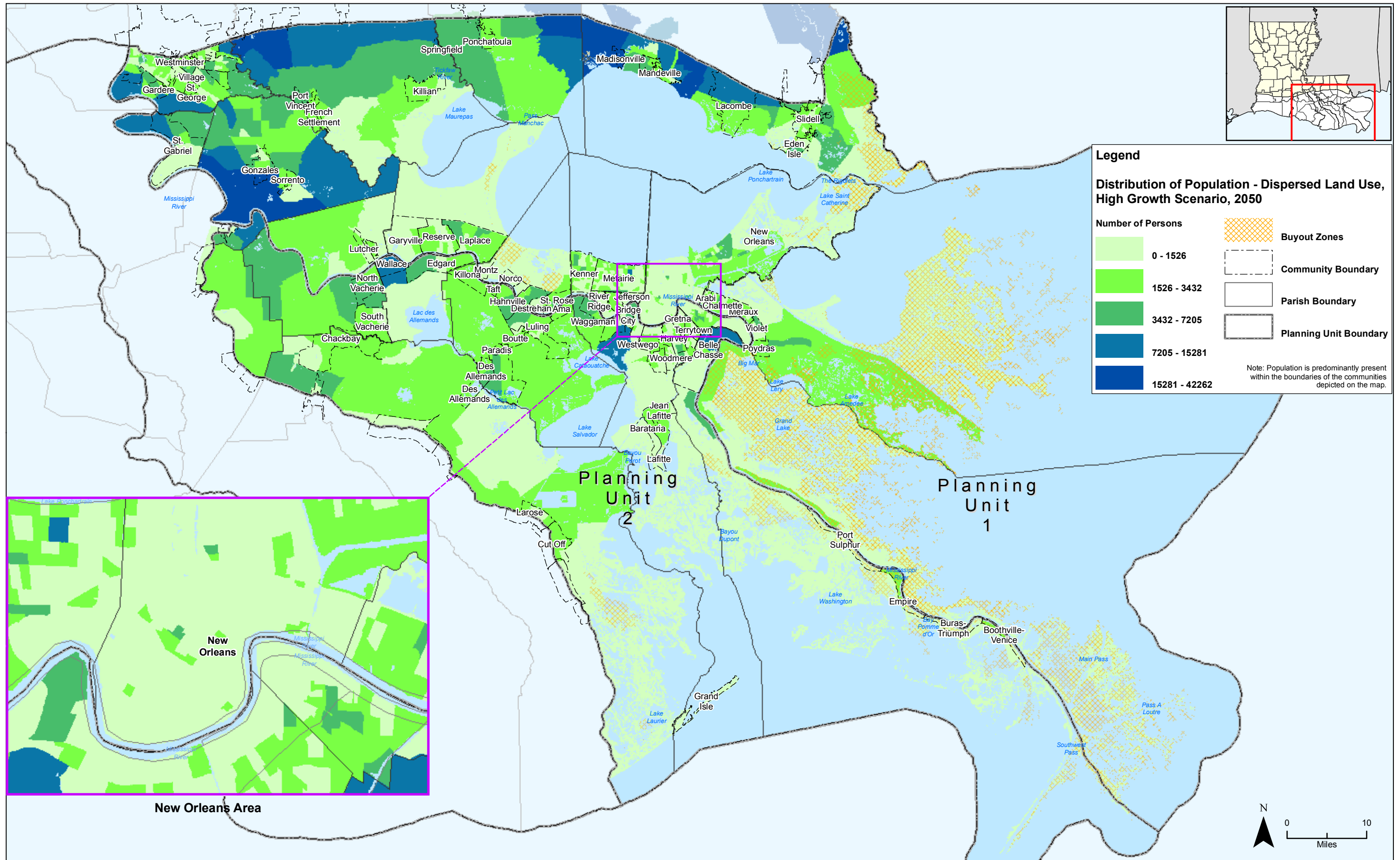
**Compact Land Use, Business-as-Usual Growth Scenario; 2075 - PU1 and PU2**  
**Figure 3.6-7**



Source: Calthorpe Associates, 2008. Data provided by USACE.

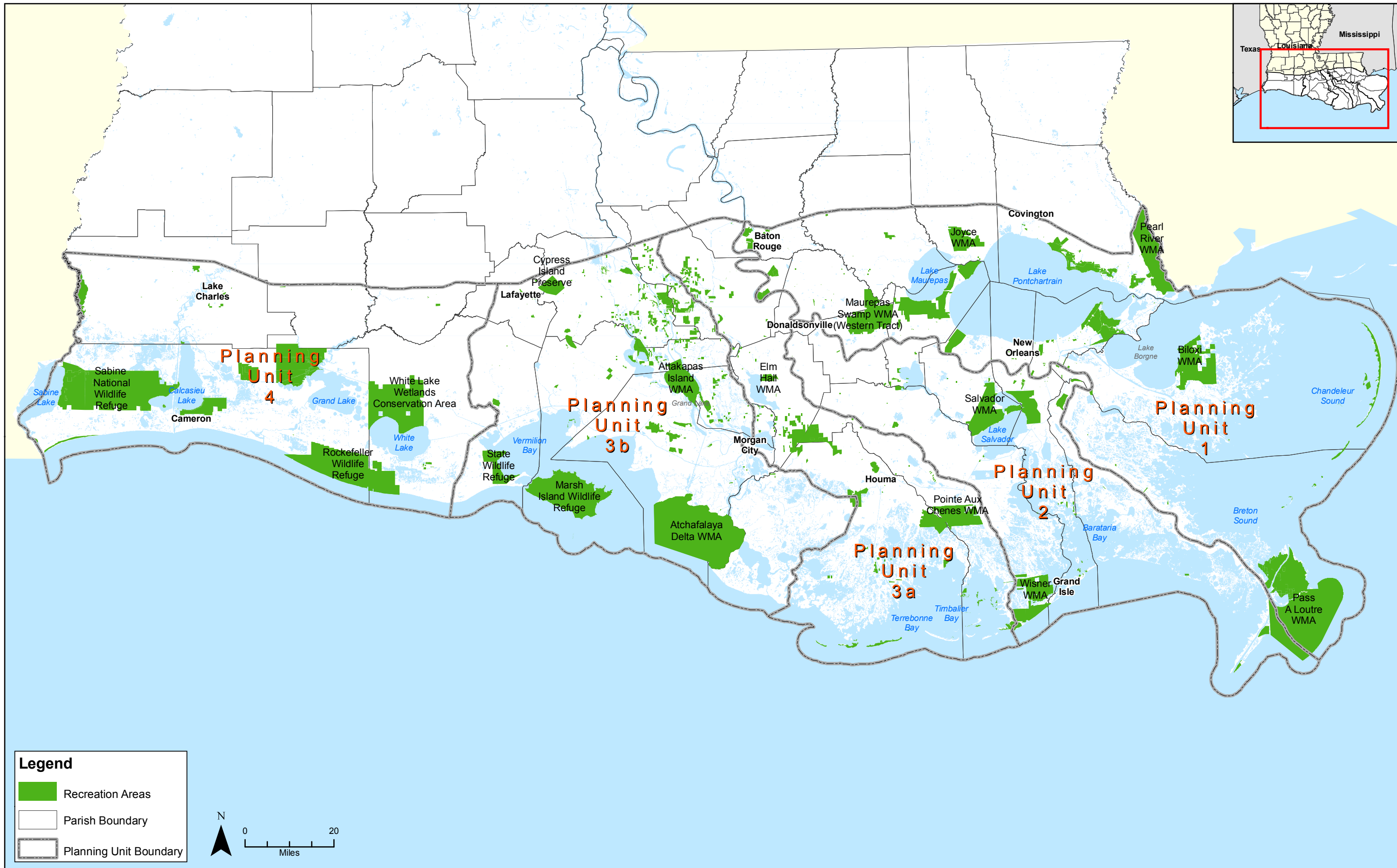
**Compact Land Use, Business-as-Usual Growth Scenario; 2075 - PU3a, PU3b and PU4**  
**Figure 3.6-8**





Source: Calthorpe Associates, 2008. Data provided by USACE.

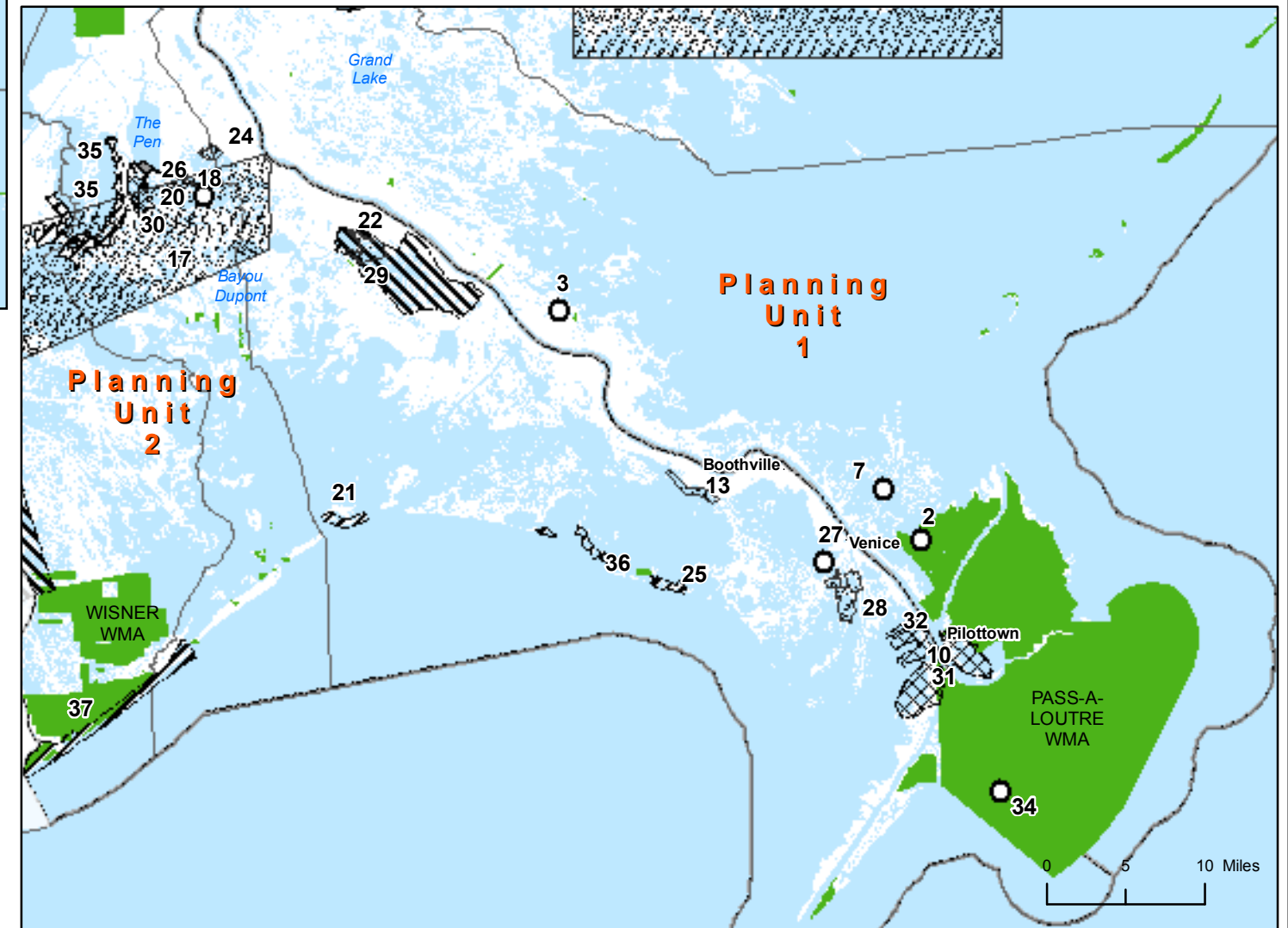
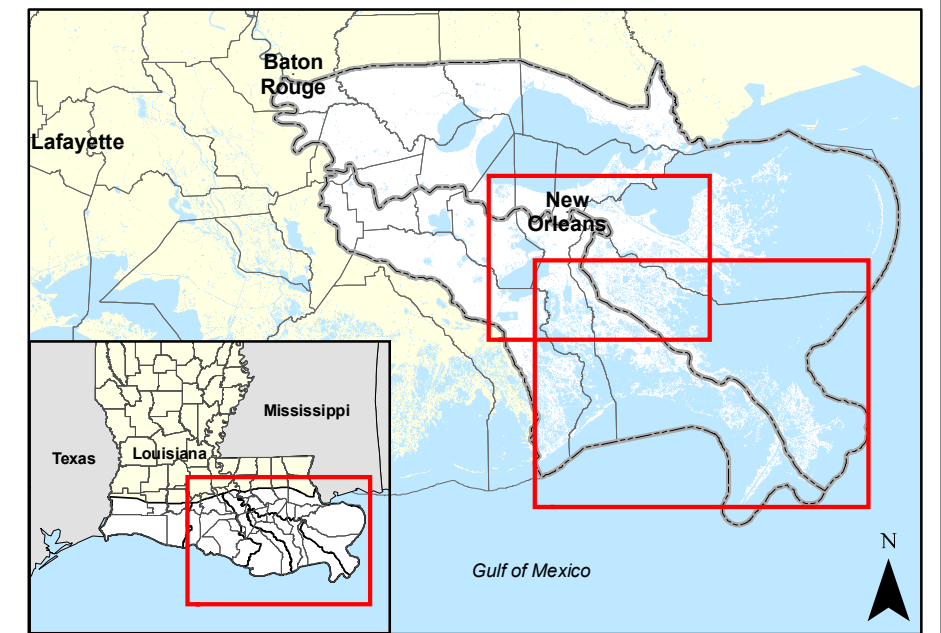
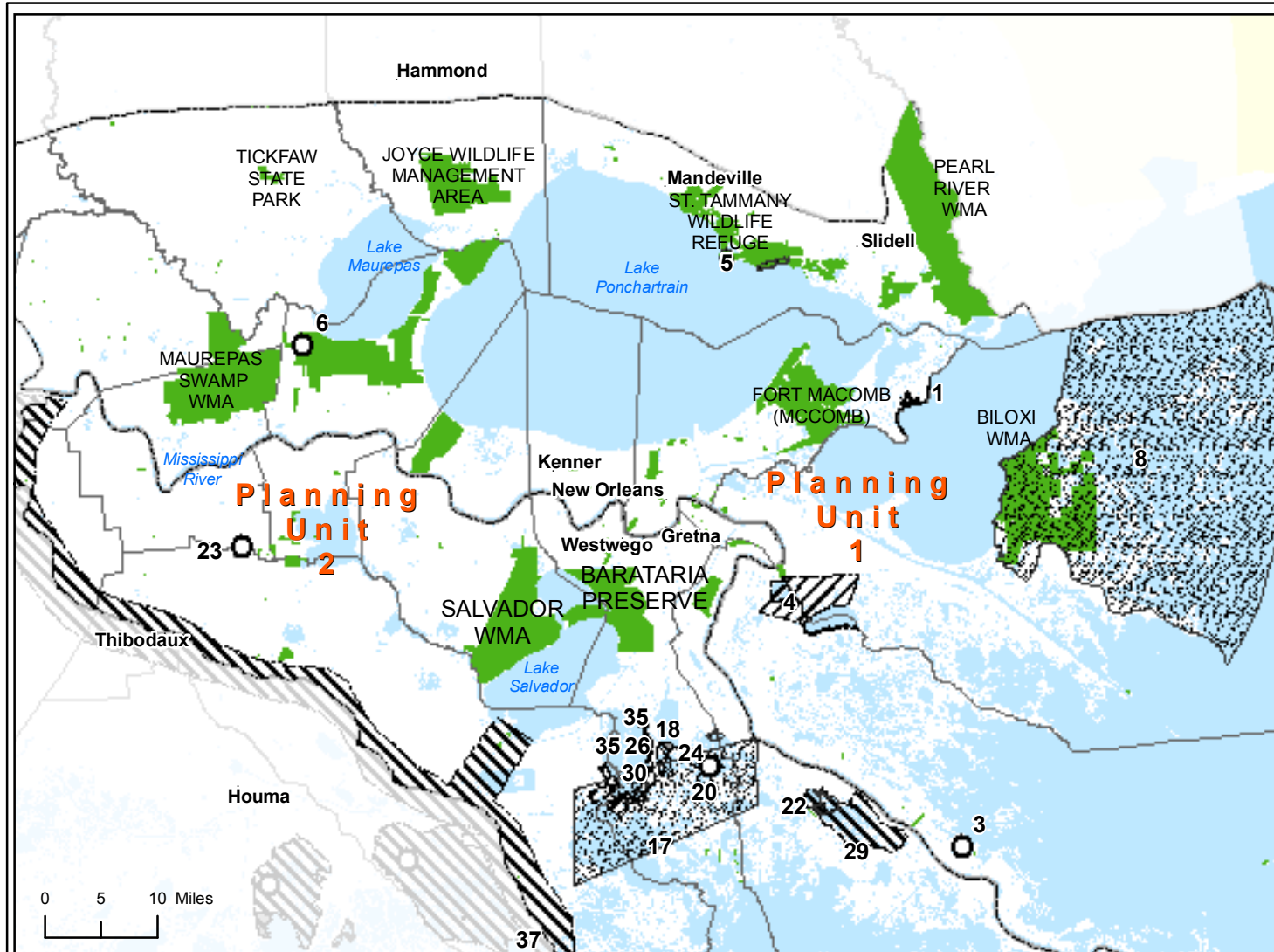
**Dispersed Land Use, High Growth Scenario; 2050 - PU1 and PU2**  
**Figure 3.6-9**



Source: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007.

**Existing Conditions - Recreation Areas, 2008 - PU1 - PU4**  
**Figure 3.7-1**

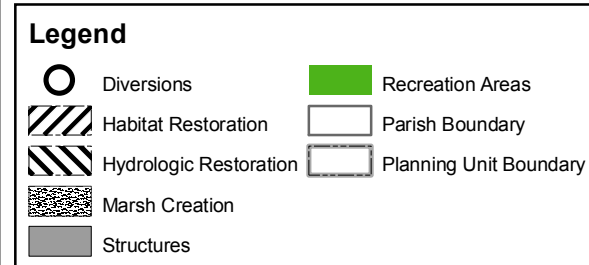




**Non-LACPR Projects To Be Completed After 2011**

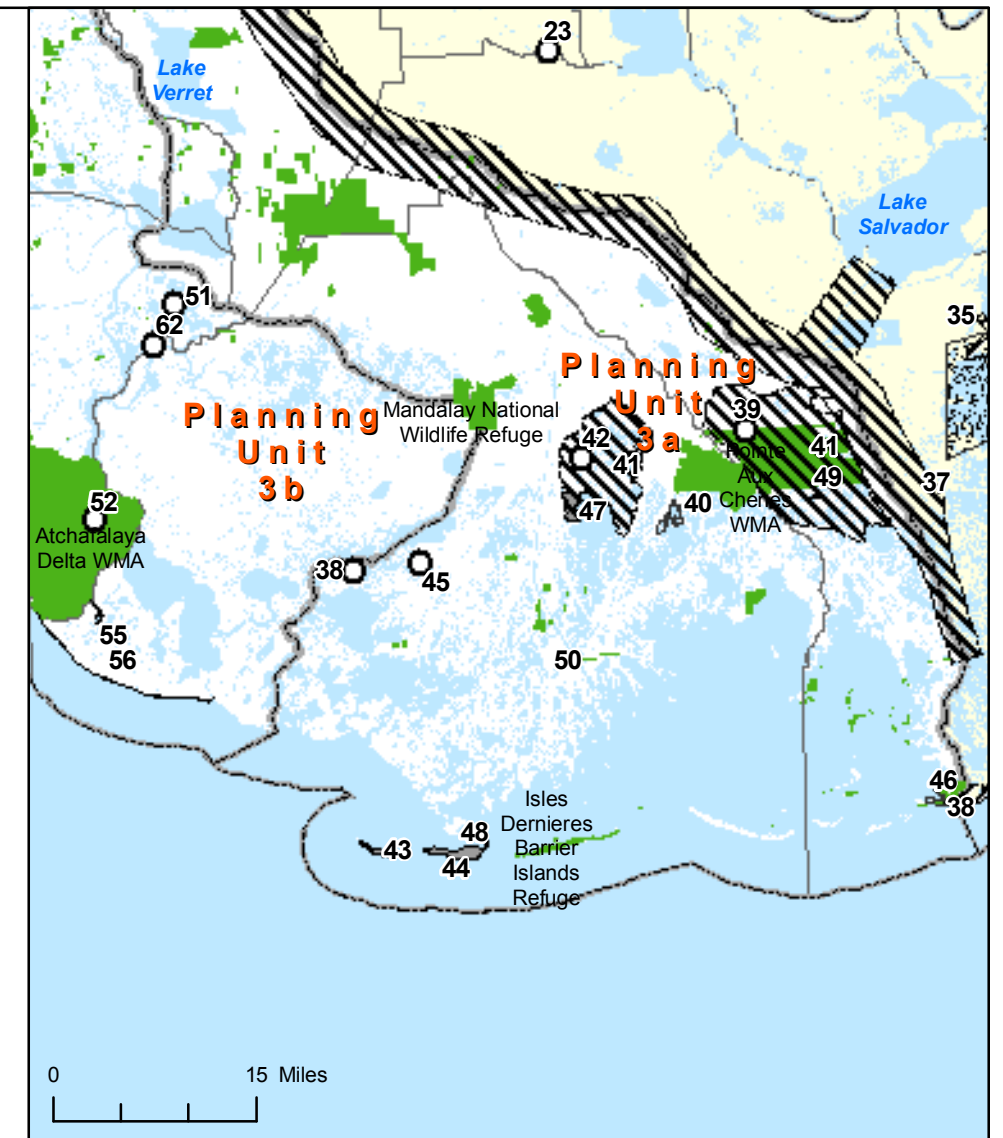
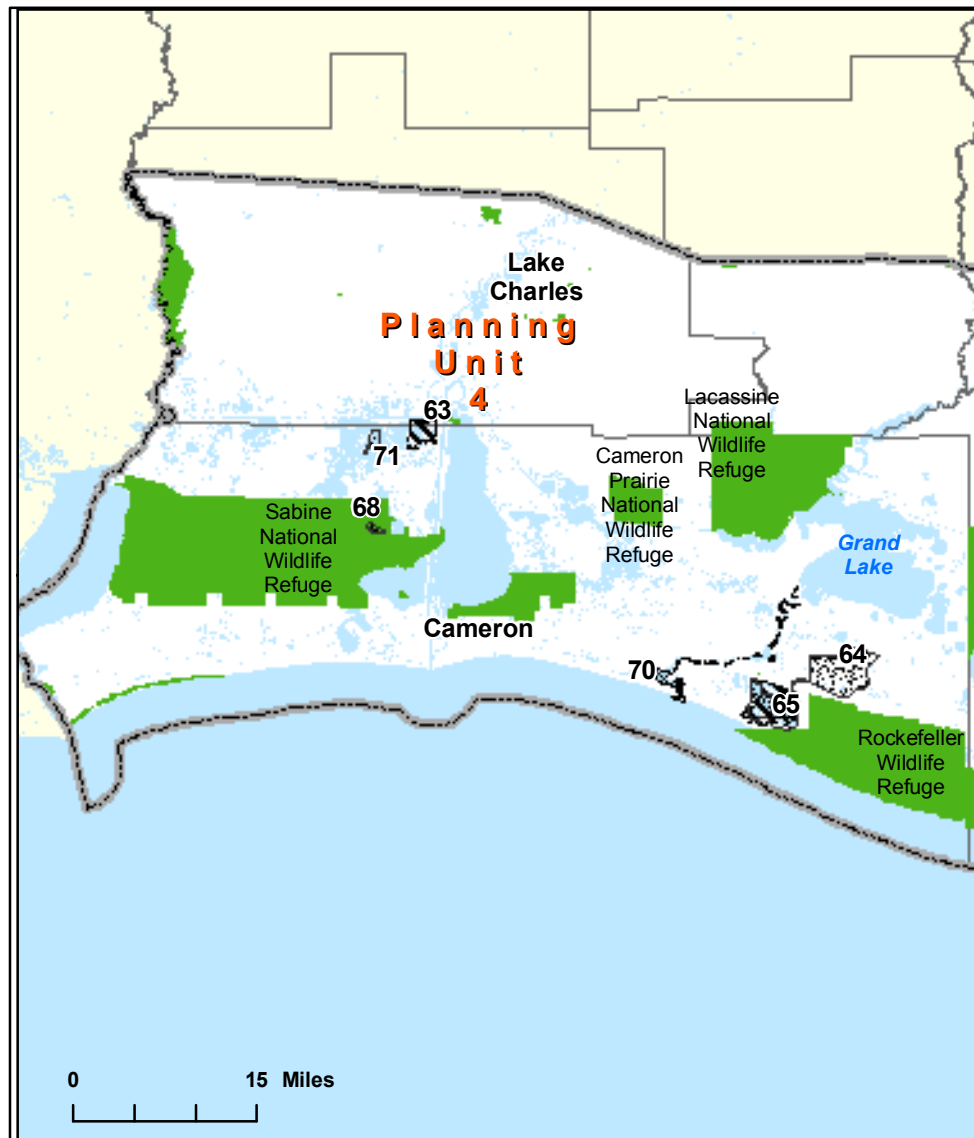
ID #	Projects To Be Completed After 2011, Planning Unit 1	USACE/NRCS	Marsh Creation, Habitat Restoration
1	Alligator Bend Marsh Restoration and Shoreline Protection	USACE/NRCS	Habitat Restoration
2	Benneys Bay Diversion	USACE	Diversion
3	Bohemia Mississippi River Reintroduction	EPA	Diversion
4	Caernarvon Outfall Management/Lake Lery Shoreline Restoration	USFWS/NRCS	Habitat Restoration
5	Goose Point/Point Platte Marsh Creation	USFWS	Marsh Creation
6	River Reintroduction into Maurepas Swamp	EPA	Diversion
7	Baptiste Collette Bayou Sediment Diversion	NA	Diversion?
8	BiLOXI Marsh Creation	NA	Marsh Creation
9	MRGO Environmental Restoration *	NA	Dredging
10	Pass A Loutre Sediment Mining	NA	Dredging
11	Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana *	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
14	Central Wetlands Assimilation Project (Phase 1) *	NA	Habitat Restoration
	GIWW-O&M *	USACE	Dredging

ID #	Projects To Be Completed After 2011, Planning Unit 2	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
17	Long Distance MS River Sediment Pipeline	NA	Marsh Creation
18	Bayou Dupont Marsh and Ridge Creation	NMFS	Marsh Creation
19	Dedicated Dredging on the Barataria Basin Landbridge	USFWS	Marsh Creation
20	Delta Building Diversion at Myrtle Grove	USACE	Diversion
21	East/WEST Grand Terre Islands Restoration	NMFS	Habitat Restoration
22	Lake Hermitage Marsh Creation	USFWS	Marsh Creation
23	Mississippi River Reintroduction Into Northwest Barataria Basin	EPA	Diversion
24	Mississippi River Sediment Delivery System - Bayou Dupont	EPA	Marsh Creation
25	Riverine Sand Mining/Scofield Island Restoration	NMFS	Habitat Restoration
26	South Shore of the Pen Shoreline Protection and Marsh Creation	NRCS	Structures
27	Spanish Pas Diversion	USACE	Diversion
28	Venice Ponds Marsh Creation and Crevasses	EPA/USACE	Marsh Creation
29	West Pointe a la Hache Outfall Management	NRCS/EPA	Hydrologic Restoration
30	Barataria Bay Waterway Alternative Disposal Site	NA	Dredging
31	Channel Maintenance Dredging	NA	Dredging
32	Cutterhead/Dustpan Maintenance Dredging	NA	Dredging
33	Small Bayou Lafourche Reintroduction *	DNR/USACE	Diversion
34	South Pass Sediment Diversion	NA	Diversion
35	LCA - Barataria Basin Landbridge	DNR/USACE	Habitat Restoration
36	LCA - Barataria Basin Barrier Shoreline Restoration	DNR/USACE	Habitat Restoration
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
	GIWW-O&M *	USACE	Dredging



Source: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007.

**Recreation Areas and Non-LACPR Projects - PU1 and PU2**  
**Figure 3.7-2**

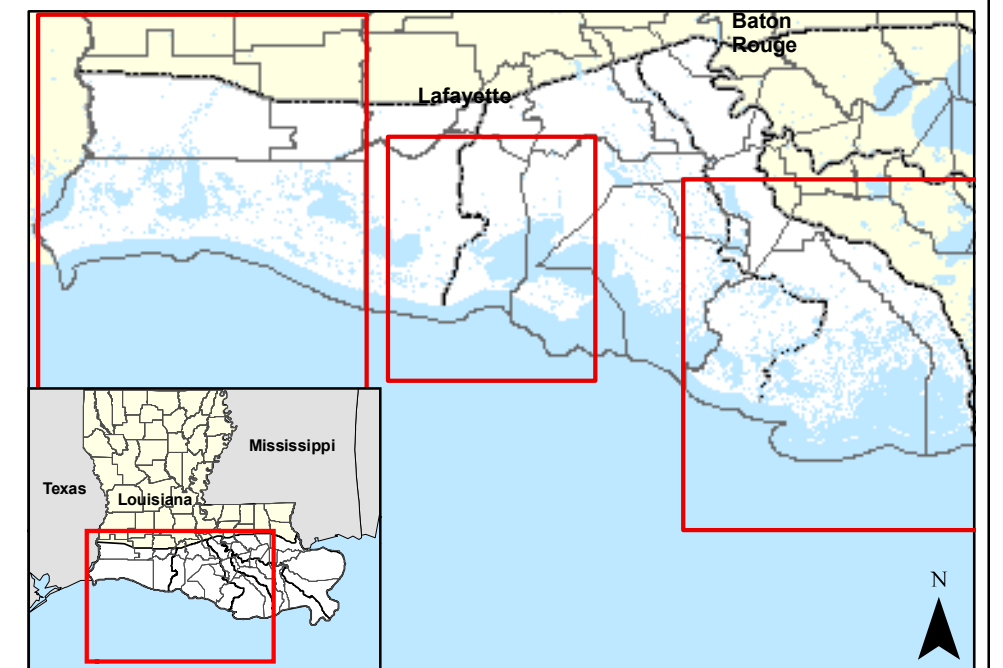
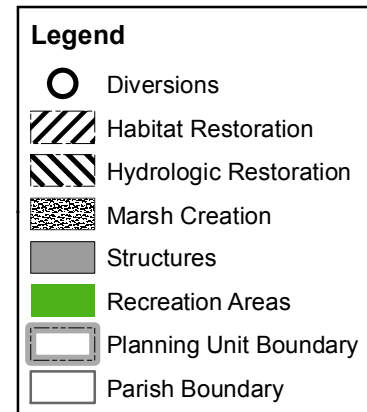


ID #	Project Name	Agency	Project Type
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
38	North Lake Mechant Landbridge Restoration	USFWS	Diversion
39	Grand Bayou/GIWW Freshwater Diversion	USFWS	Diversion
40	Madison Bay Marsh Creation and Terracing	NMFS	Marsh Creation
41	Move Existing Atchafalaya Water to Central Terrebonne	USFWS	Hydrologic Restoration
42	North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management	USFWS	Diversion
43	Raccoon Island Shoreline Protection/Marsh Creation	NCRS	Structures
44	Ship Shoal: Whiskey West Flank Restoration	EPA	Habitat Restoration
45	South Lake De Cade Freshwater Introduction	NCRS	Diversion
46	West Belle Pass Barrier Headland Restoration	NMFS	Marsh Creation
47	West Lake Boudreaux Shoreline Protection and Marsh Creation	USFWS	Structures; Marsh Creation
48	Whiskey Island Back Barrier Marsh Creation	EPA	Structures
49	Dedicated Dredging Program - Grand Bayou Blue	DNR	Dredging
50	Houma Navigation Canal - O&M	USACE	Dredging
51	GIWW-O&M *	USACE	Dredging

ID #	Project Name	Agency	Project Type
63	Brown Lake Hydrologic Restoration	NCRS	Hydrologic Restoration
64	Little Pecan Bayou Hydrologic Restoration	NCRS	Marsh Creation
65	South Grand Chenier Hydrologic Restoration Project	USFWS	Hydrologic Restoration
66	South Pecan Island Freshwater Introduction	NMFS	Hydrologic Restoration
67	Marsh Creation Near Freshwater Bayou	NA	Marsh Creation
68	Sabine Refuge Marsh Creation (SA-01)	NA	Marsh Creation
69	Calcasieu River & Pass, LA - O&M *	USACE	Dredging
70	Mermentau River-O7M	USACE	Dredging
71	Marsh Creation via Beneficial Use (Phase 1)	NA	Marsh Creation
	GIWW-O&M *	USACE	Dredging

ID #	Project Name	Agency	Project Type
51	Avoca Island Diversion and Land Building	USACE	Diversion
52	Castille Pass Channel Sediment Delivery	NMFS	Diversion
53	East Marsh Island Marsh Creation	EPA	Marsh Creation
54	Weeks Bay Marsh Creation and Shore Protection / Commercial Canal Freshwater Reintroduction/Dedicated	USACE	Marsh Creation
55	Dredging Program - Point au Fer Site	DNR	Dredging
56	Point au Fer Island Gulf Shoreline	DNR/USACE	Structures
57	Weeks Bay	NA	Marsh Creation
58	ABFS - Land Acquisition *	USACE	Hydrologic Restoration
59	Bayou Teche O7M	USACE	Dredging
60	CAP - 204 Shell Island Pass *	USACE	Habitat Restoration
61	Atchafalaya River, Bayous Chene, Boeuf, and Black, LA Maintenance *	USACE	Dredging
62	Convey Atchafalaya River to Northern Terrebonne Marshes	WRDA	Diversion
	GIWW-O&M *	USACE	Dredging

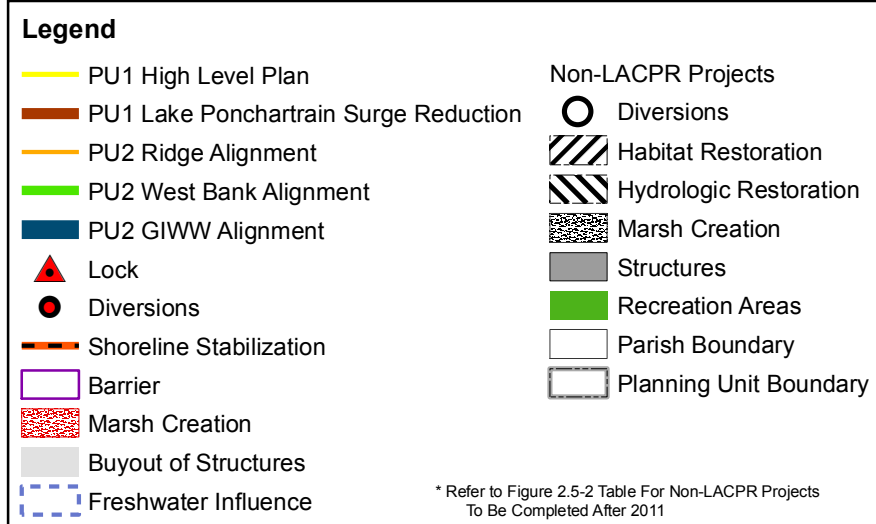
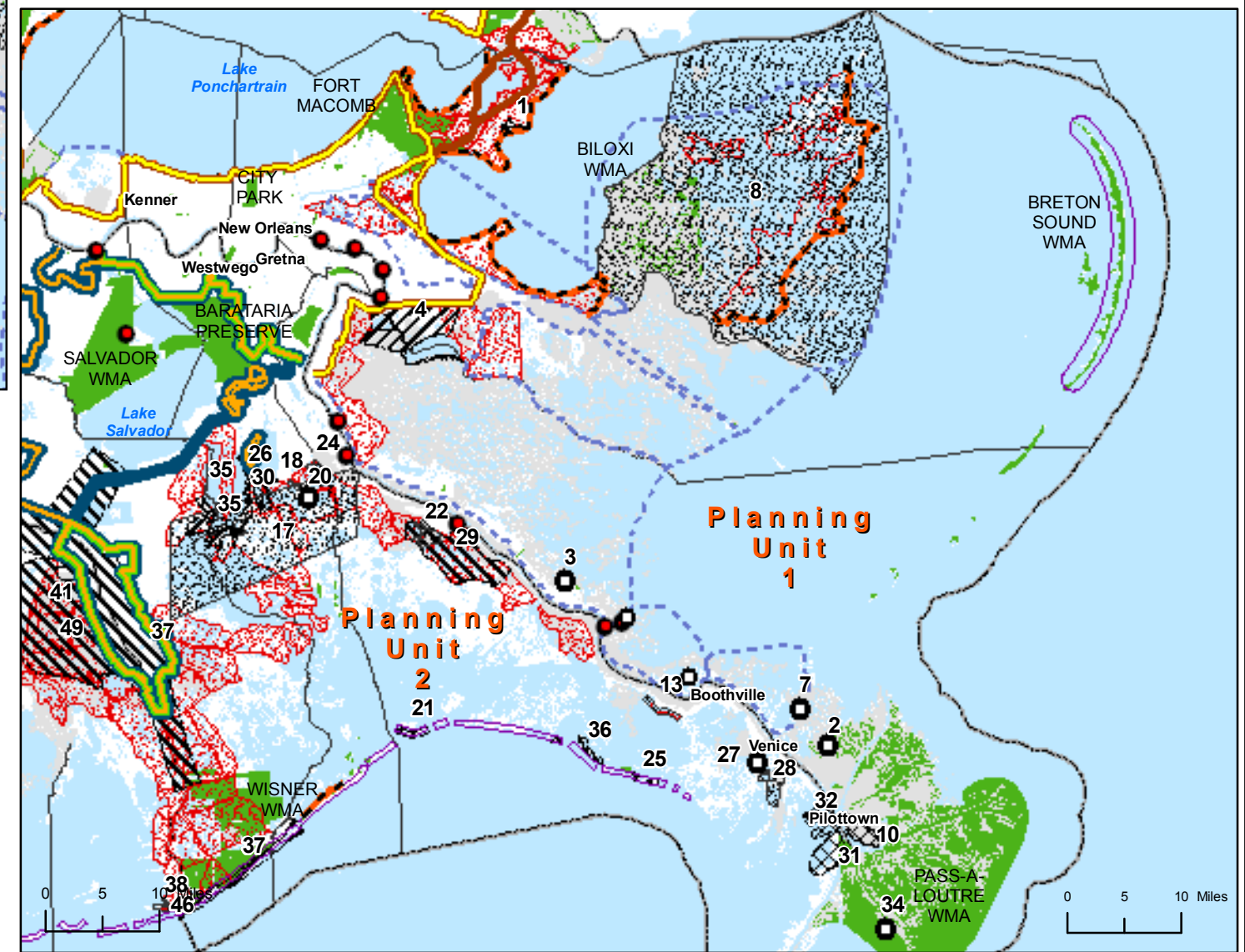
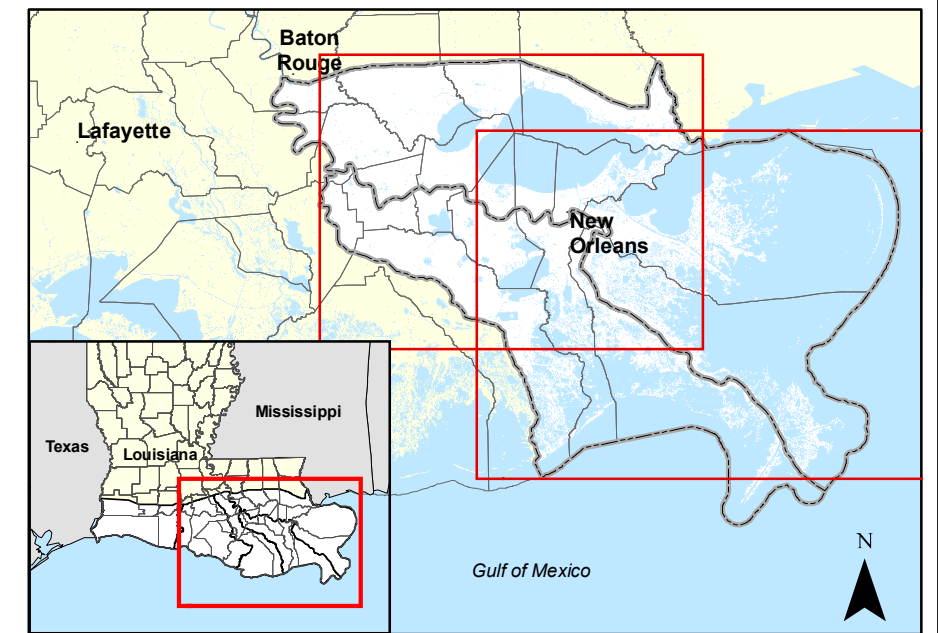
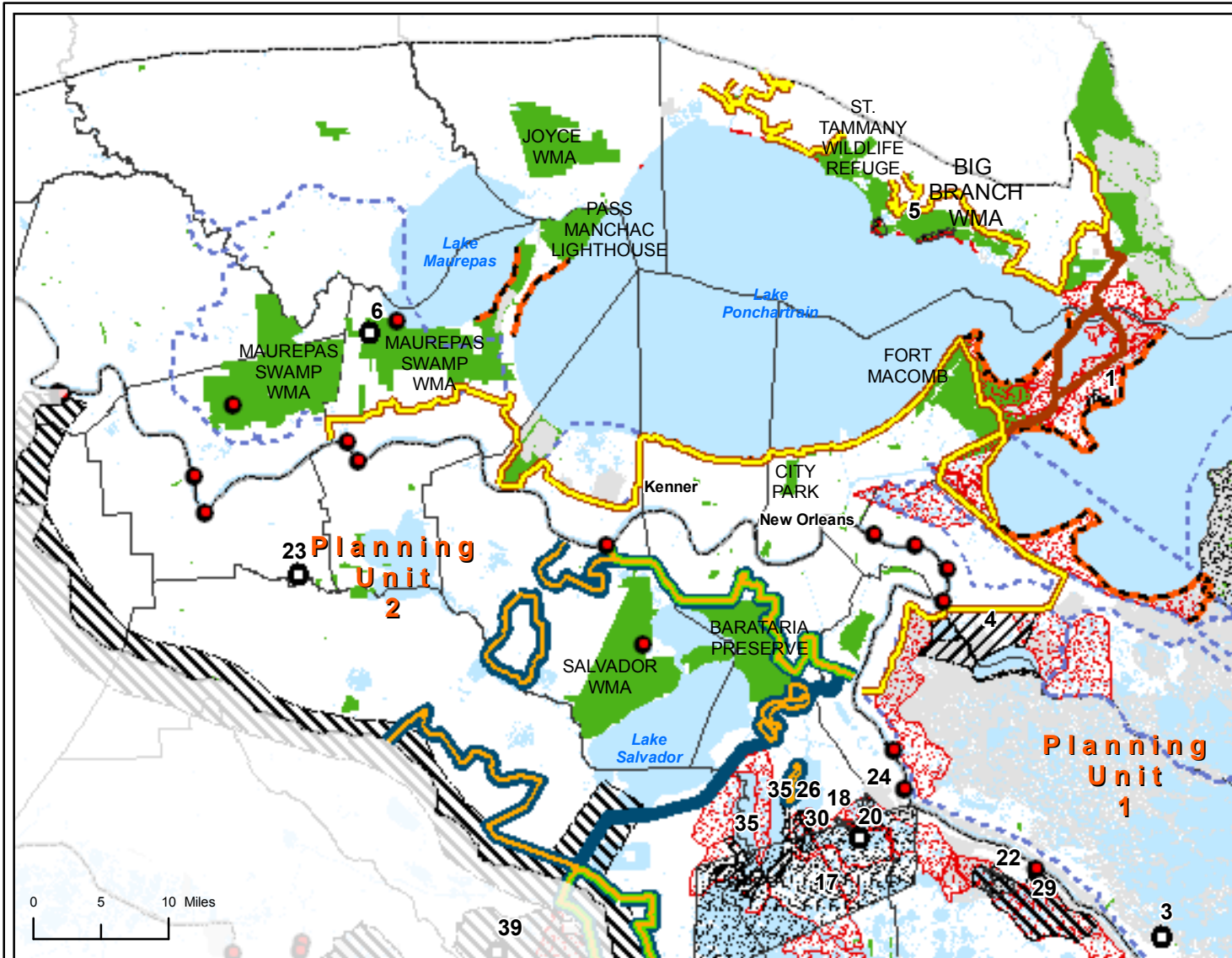
\* indicates mapping not available



Source: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007.

Recreation Areas and Non-LACPR Projects - PU3a, PU3b, and PU4  
Figure 3.7-3

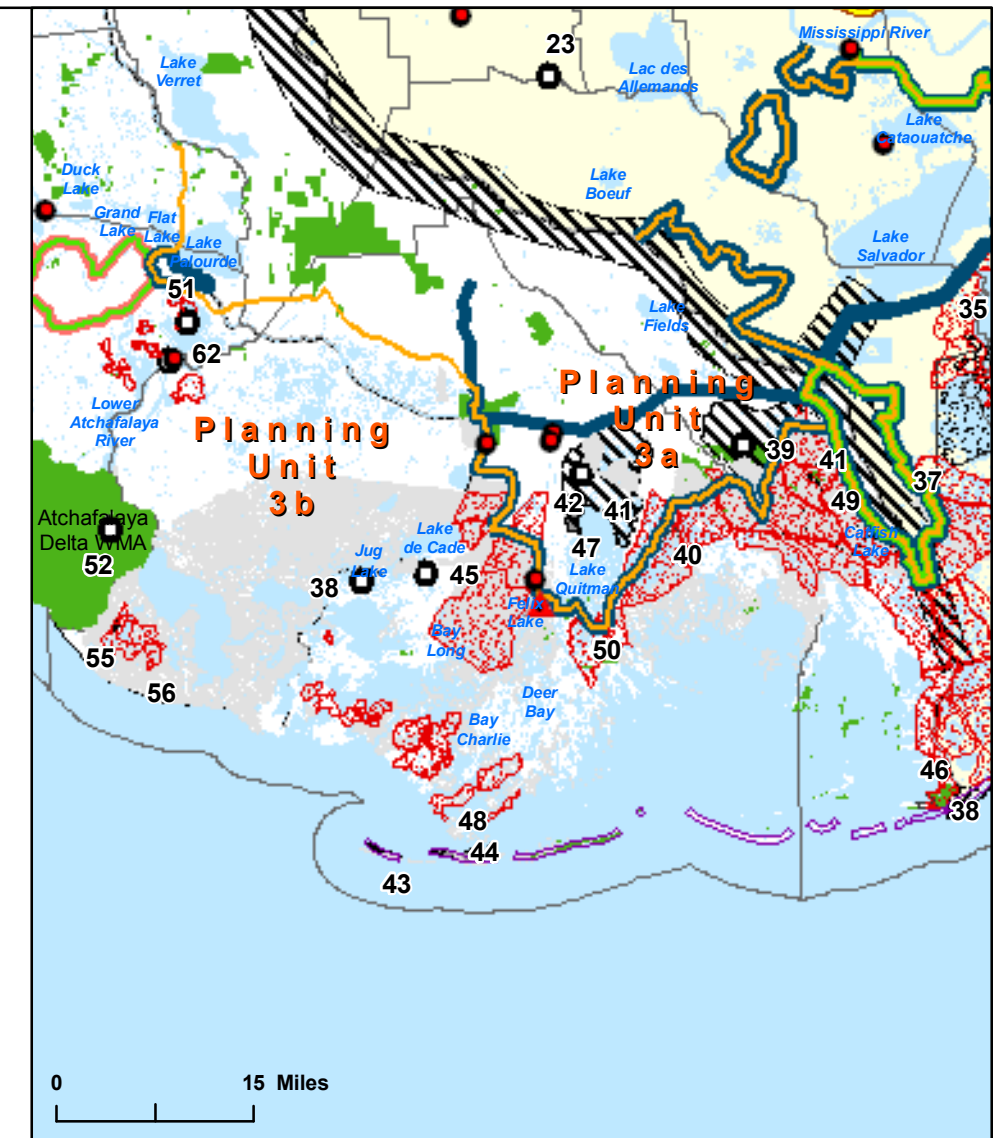
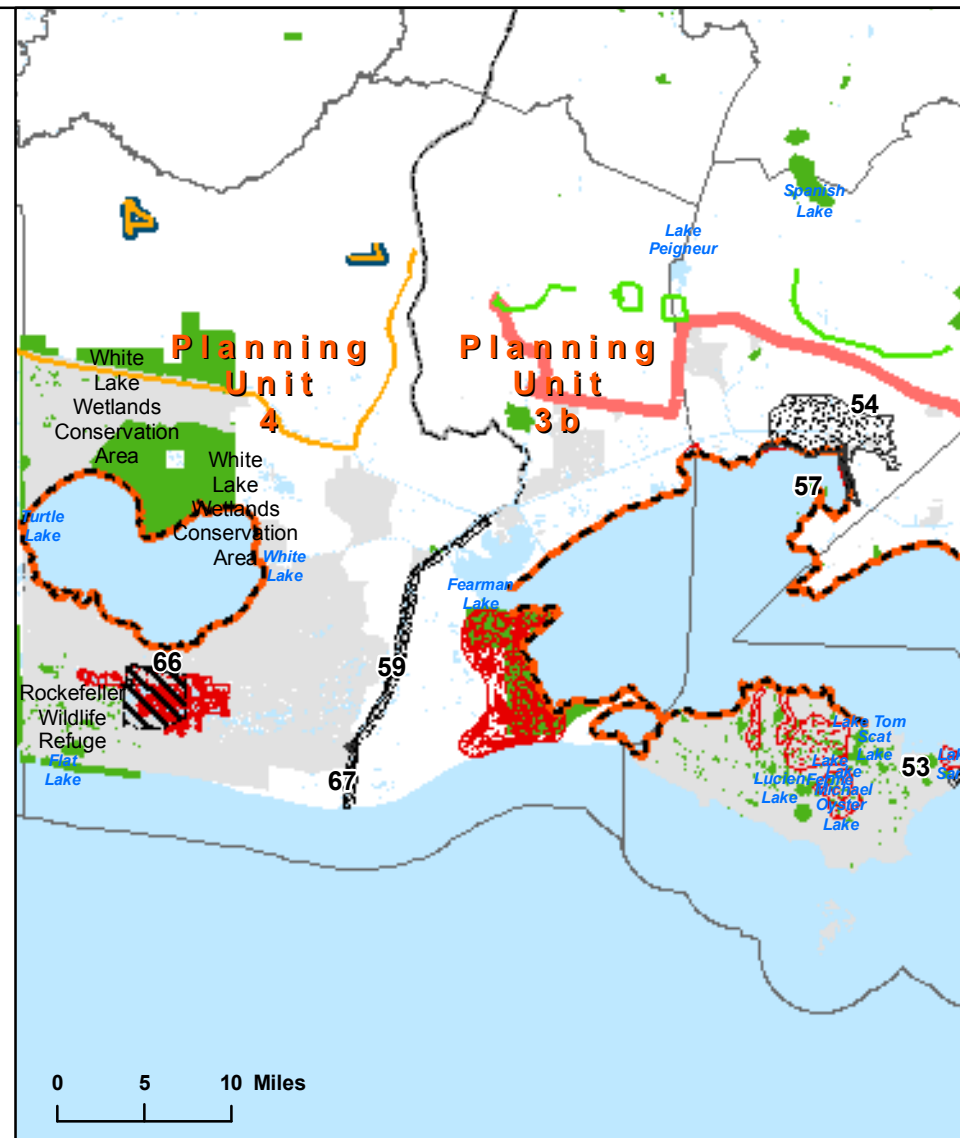




Source: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007.

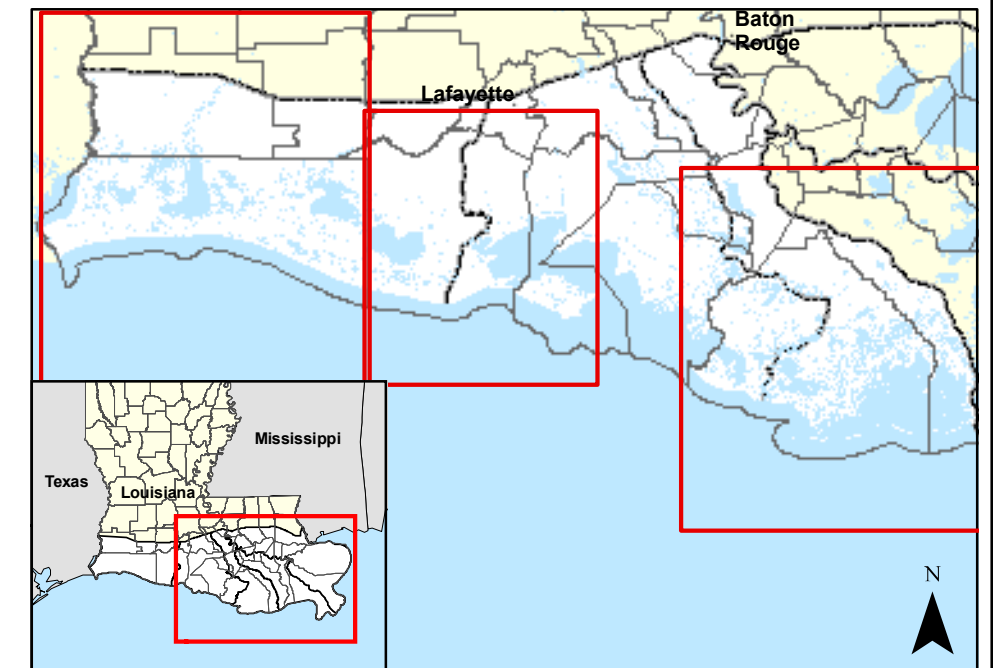
**Recreation Areas and Projects - PU1 and PU2**  
**Figure 3.7-4**





**Legend**

- |                            |                        |
|----------------------------|------------------------|
| Lock                       | Diversions             |
| PU3a Morganza to Gulf      | Habitat Restoration    |
| PU3a GIWW Alignment        | Hydrologic Restoration |
| PU3b Ring Levee            | Marsh Creation         |
| PU3b GIWW Alignment        | Structures             |
| PU3b Franklin to Abbeville | Recreation Areas       |
| PU4 GIWW Alignment         | Parishes               |
| PU4 Ring Levee Alignment   | Planning Unit Boundary |
| Shoreline Stabilization    |                        |
| Barrier                    |                        |
| Freshwater Influence       |                        |
| Marsh Creation             |                        |
| Buyout of Structures       |                        |
- \* Refer to Figure 2.5-2 Table For Non-LACPR Projects To Be Completed After 2011



Source: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007.

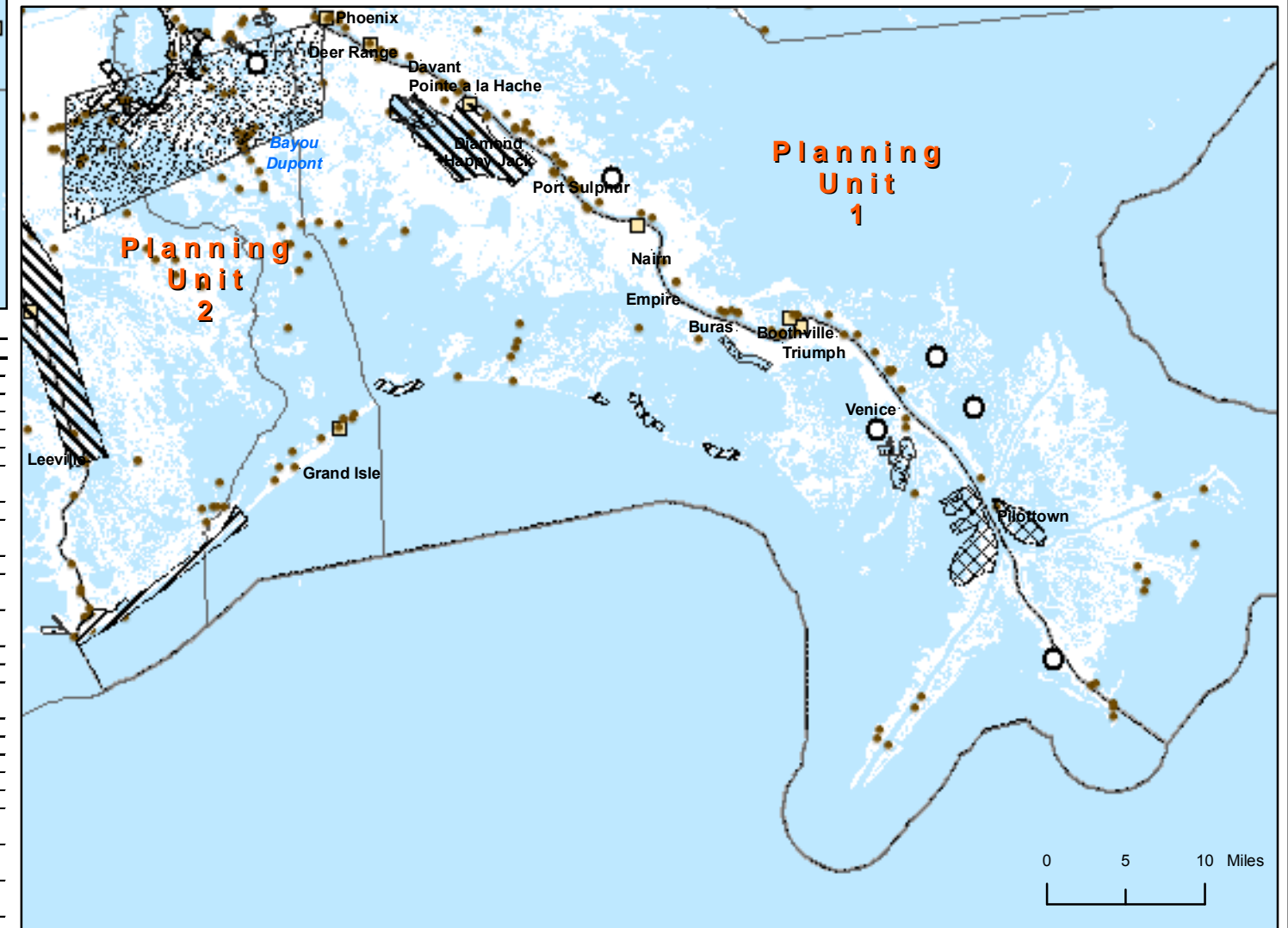
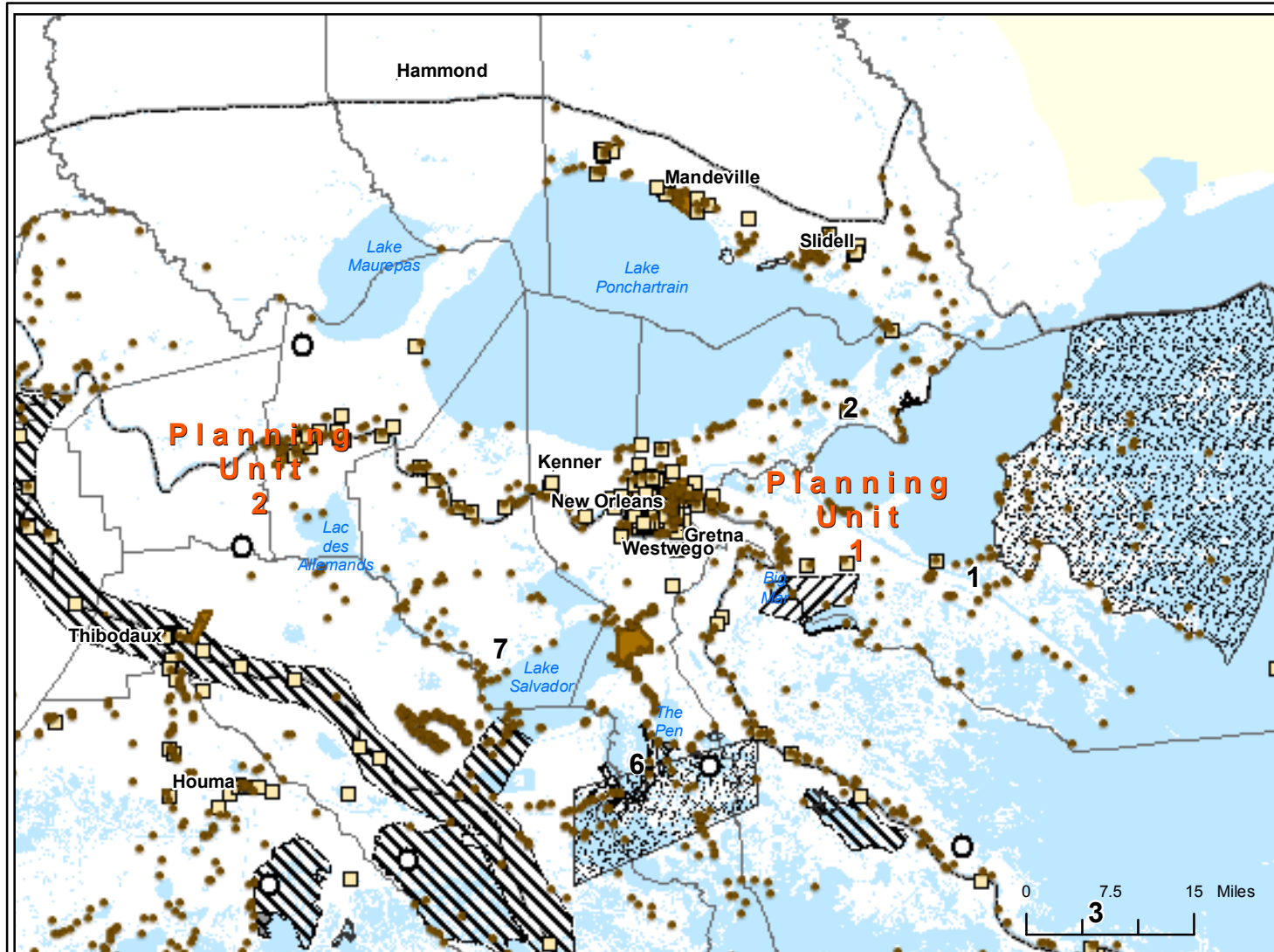
**Recreation Areas and Projects - PU3a, PU3b, and PU4  
Figure 3.7-5**





Source: Archaeological Site Records; Louisiana Department of Culture, Recreation and Tourism, Division of Archaeology  
 Historic Districts and Listed Sites; Department of the Interior, National Park Service, National Register of Historic Places

**Existing Conditions - Cultural Resources, 2008 - PU1 - PU4**  
**Figure 3.8-1**



**Non-LACPR Projects To Be Completed After 2011**

ID #	Projects To Be Completed After 2011, Planning Unit 1		
1	Alligator Bend Marsh Restoration and Shoreline Protection	USACE/NRCS	Marsh Creation, Habitat Restoration
2	Benneys Bay Diversion	USACE	Diversion
3	Bohemia Mississippi River Reintroduction	EPA	Diversion
4	Caernarvon Outfall Management/Lake Lery Shoreline Restoration	USFWS/NRCS	Habitat Restoration
5	Goose Point/Point Platte Marsh Creation	USFWS	Marsh Creation
6	River Reintroduction into Maurepas Swamp	EPA	Diversion
7	Baptiste Collette Bayou Sediment Diversion	NA	Diversion
8	Biloxi Marsh Creation	NA	Marsh Creation
9	MRGO Environmental Restoration *		
10	Pass A Loutre Sediment Mining	NA	Dredging
11	Mississippi River, Baton Rouge to the Gulf of Mexico, Louisiana *	USACE	Structures
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
14	Central Wetlands Assimilation Project (Phase 1) *	NA	Habitat Restoration
	GIWW-O&M *	USACE	Dredging

ID #	Projects To Be Completed After 2011, Planning Unit 2		
12	CAP - Fisher School Basin *	USACE	Structures
13	Fringe Marsh Repair	NA	Marsh Creation
17	Long Distance MS River Sediment Pipeline	NA	Marsh Creation
18	Bayou Dupont Marsh and Ridge Creation	NMFS	Marsh Creation
19	Dedicated Dredging on the Barataria Basin Landbridge	USFWS	Marsh Creation
20	Delta Building Diversion at Myrtle Grove	USACE	Diversion
21	East/WEST Grand Terre Islands Restoration	NMFS	Habitat Restoration
22	Lake Hermitage Marsh Creation	USFWS	Marsh Creation
23	Mississippi River Reintroduction Into Northwest Barataria Basin	EPA	Diversion
24	Mississippi River Sediment Delivery System - Bayou Dupont	EPA	Marsh Creation
25	Riverine Sand Mining/Scofield Island Restoration	NMFS	Habitat Restoration
26	South Shore of the Pen Shoreline Protection and Marsh Creation	NRCS	Structures
27	Spanish Pas Diversion	USACE	Diversion
28	Venice Ponds Marsh Creation and Crevasses	EPA/USACE	Marsh Creation
29	West Pointe a la Hache Outfall Management	NRCS/EPA	Restoration
30	Barataria Bay Waterway Alternative Disposal Site	NA	Dredging
31	Channel Maintenance Dredging	NA	Dredging
32	Cutterhead/Dustpan Maintenance Dredging	NA	Dredging
33	Small Bayou Lafourche Reintroduction *	DNR/USACE	Diversion
34	South Pass Sediment Diversion	NA	Diversion
35	LCA - Barataria Basin Landbridge	DNR/USACE	Habitat Restoration
36	LCA - Barataria Basin Barrier Shoreline Restoration	DNR/USACE	Habitat Restoration
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
	GIWW-O&M *	USACE	Dredging

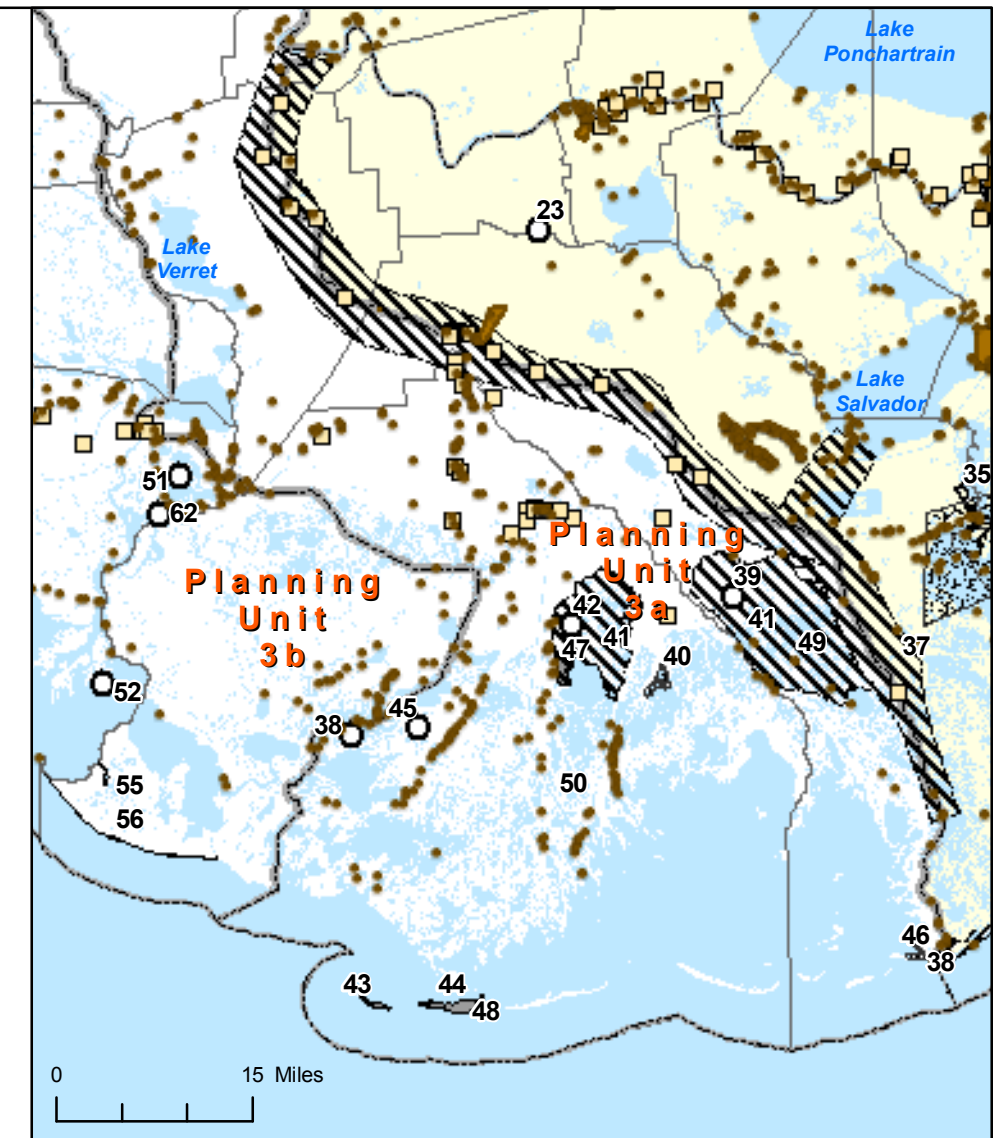
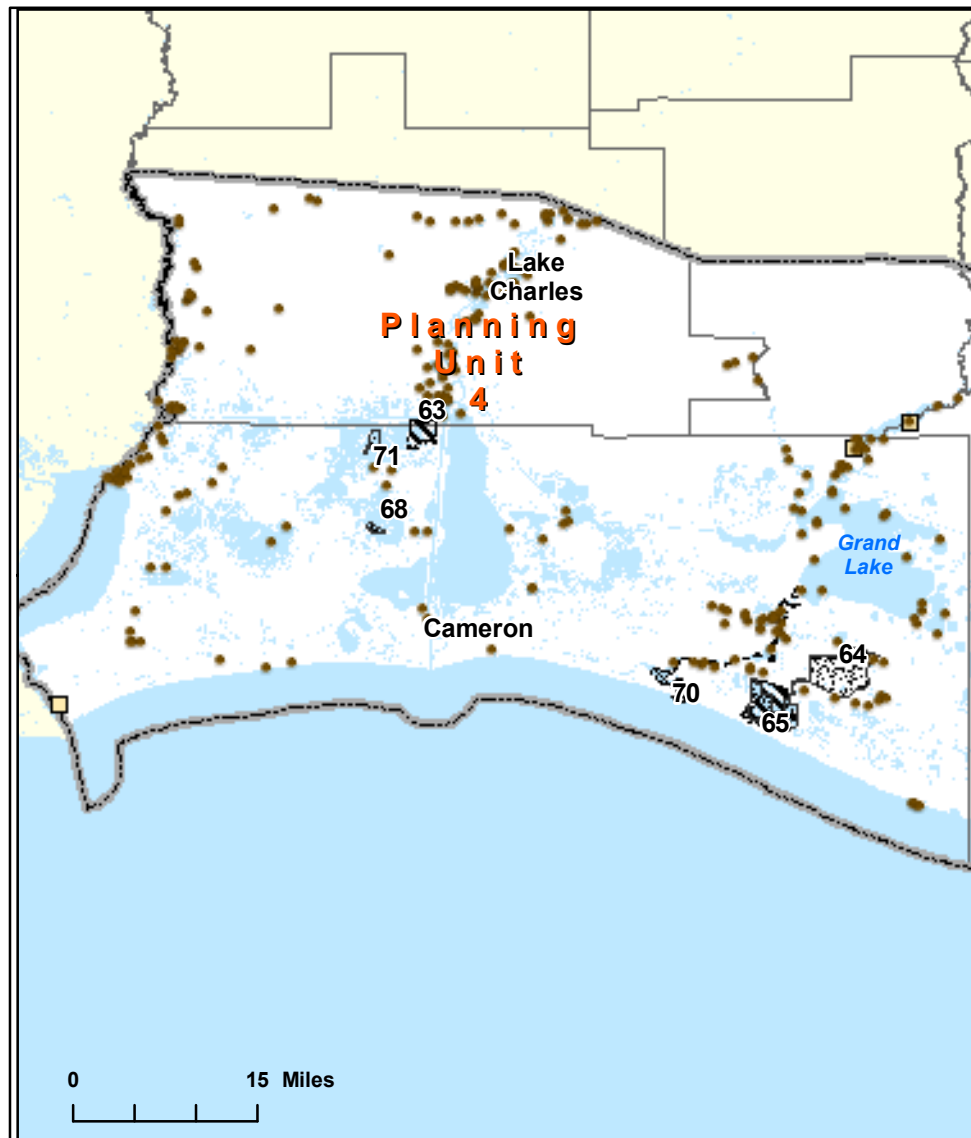
**Legend**

- Diversions
- Habitat Restoration
- Hydrologic Restoration
- Marsh Creation
- Structures
- Archaeological Sites
- Historic Properties
- Historic Districts
- Parish Boundary
- Planning Unit Boundary

Source: Archaeological Site Records; Louisiana Department of Culture, Recreation and Tourism, Division of Archaeology; Historic Districts and Listed Sites; Department of the Interior, National Park Service, National Register of Historic Places

**Cultural Resources and Non-LACPR Projects - PU1 and PU2**  
**Figure 3.8-2**



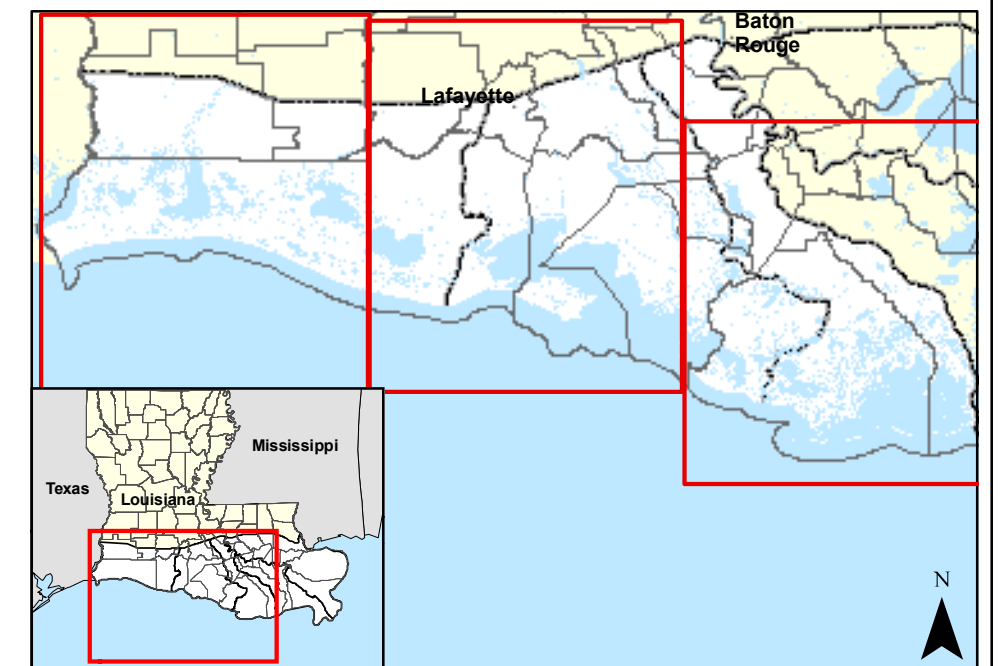
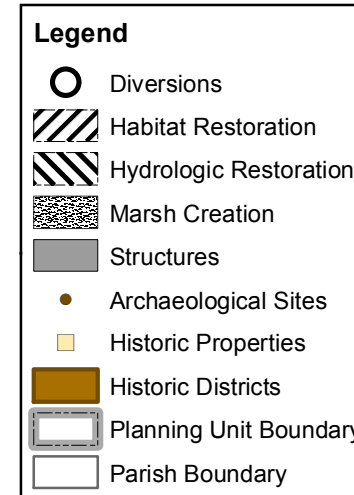


ID #	Project Name	Agency	Project Type
37	Mississippi River Reintroduction into Bayou Lafourche	DNR	Hydrologic Restoration
38	North Lake Mechant Landbridge Restoration	USFWS	Diversion
39	Grand Bayou/GIWW Freshwater Diversion	USFWS	Diversion
40	Madison Bay Marsh Creation and Terracing	NMFS	Marsh Creation
41	Move Existing Atchafalaya Water to Central Terrebonne	USFWS	Hydrologic Restoration
42	North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management	USFWS	Diversion
43	Raccoon Island Shoreline Protection/Marsh Creation	NCRS	Structures
44	Ship Shoal: Whiskey West Flank Restoration	EPA	Habitat Restoration
45	South Lake De Cade Freshwater Introduction	NCRS	Diversion
46	West Belle Pass Barrier Headland Restoration	NMFS	Marsh Creation
47	West Lake Boudreaux Shoreline Protection and Marsh Creation	USFWS	Creation
48	Whiskey Island Back Barrier Marsh Creation	EPA	Structures
49	Dedicated Dredging Program - Grand Bayou Blue	DNR	Dredging
50	Houma Navigation Canal - O&M	USACE	Dredging
	GIWW-O&M *	USACE	Dredging

ID #	Project Name	Agency	Project Type
63	Brown Lake Hydrologic Restoration	NCRS	Hydrologic Restoration
64	Little Pecan Bayou Hydrologic Restoration	NCRS	Marsh Creation
65	South Grand Chenier Hydrologic Restoration Project	USFWS	Hydrologic Restoration
66	South Pecan Island Freshwater Introduction	NMFS	Hydrologic Restoration
67	Marsh Creation Near Freshwater Bayou	NA	Marsh Creation
68	Sabine Refuge Marsh Creation (SA-01)	NA	Marsh Creation
69	Calcasieu River & Pass, LA - O&M *	USACE	Dredging
70	Mermentau River-O7M	USACE	Dredging
71	Marsh Creation via Beneficial Use (Phase 1)	NA	Marsh Creation
	GIWW-O&M *	USACE	Dredging

ID #	Project Name	Agency	Project Type
51	Avoca Island Diversion and Land Building	USACE	Diversion
52	Castille Pass Channel Sediment Delivery	NMFS	Diversion
53	East Marsh Island Marsh Creation	EPA	Marsh Creation
54	Weeks Bay Marsh Creation and Shore Protection / Commercial Canal Freshwater Reintroduction/Dedicated	USACE	Marsh Creation
55	Dredging Program - Point au Fer Site	DNR	Dredging
56	Point au Fer Island Gulf Shoreline	DNR/USACE	Structures
57	Weeks Bay	NA	Marsh Creation
58	ABFS - Land Acquisition *	USACE	Hydrologic Restoration
59	Bayou Teche O7M	USACE	Dredging
60	CAP - 204 Shell Island Pass *	USACE	Habitat Restoration
61	Atchafalaya River, Bayous Chene, Boeuf, and Black, LA Maintenance *	USACE	Dredging
62	Convey Atchafalaya River to Northern Terrebonne Marshes	WRDA	Diversion
	GIWW-O&M *	USACE	Dredging

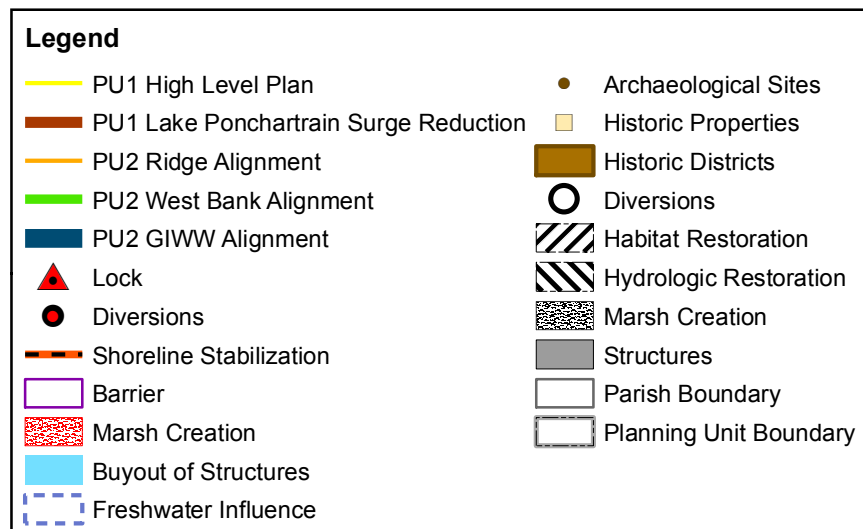
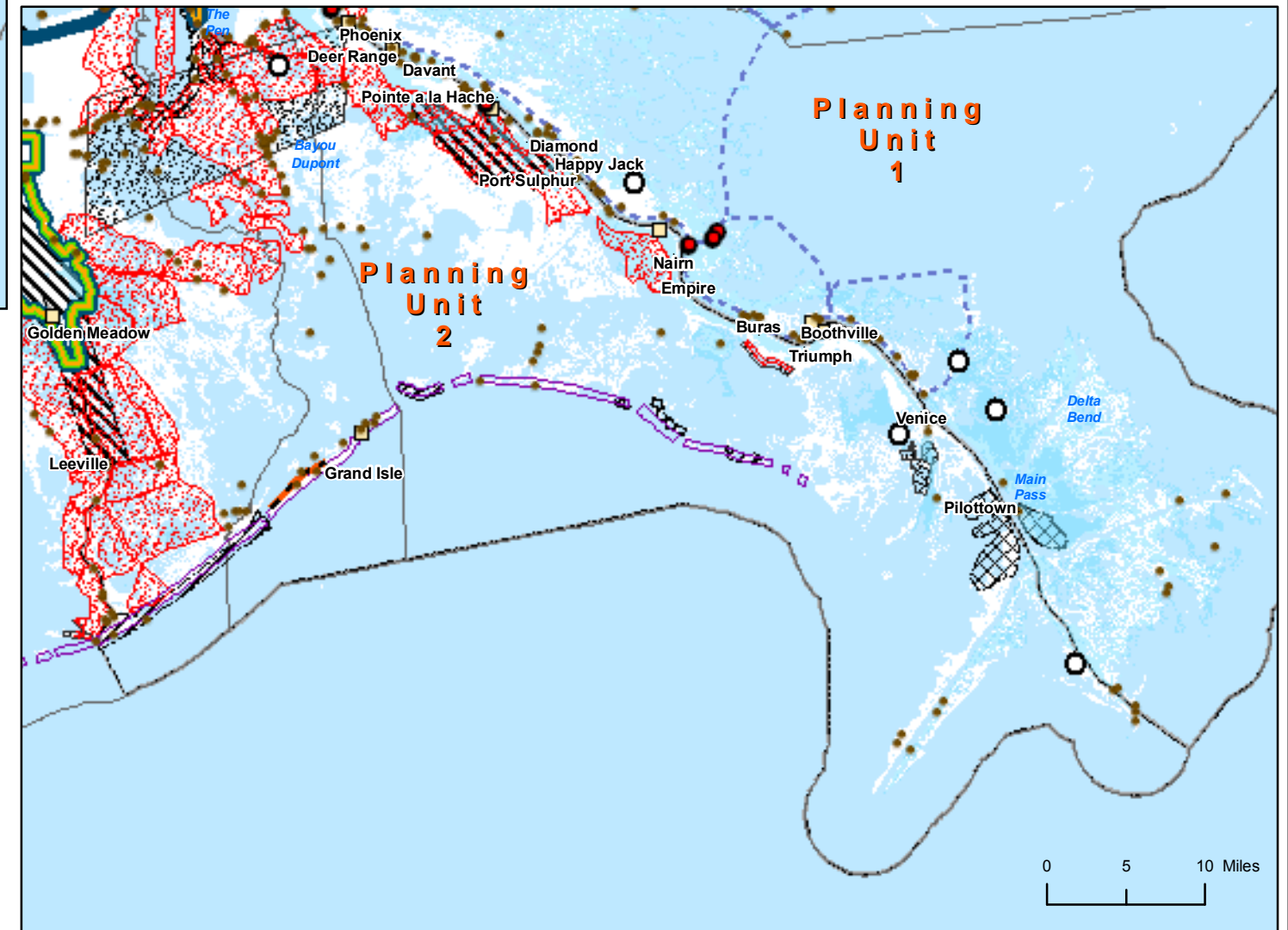
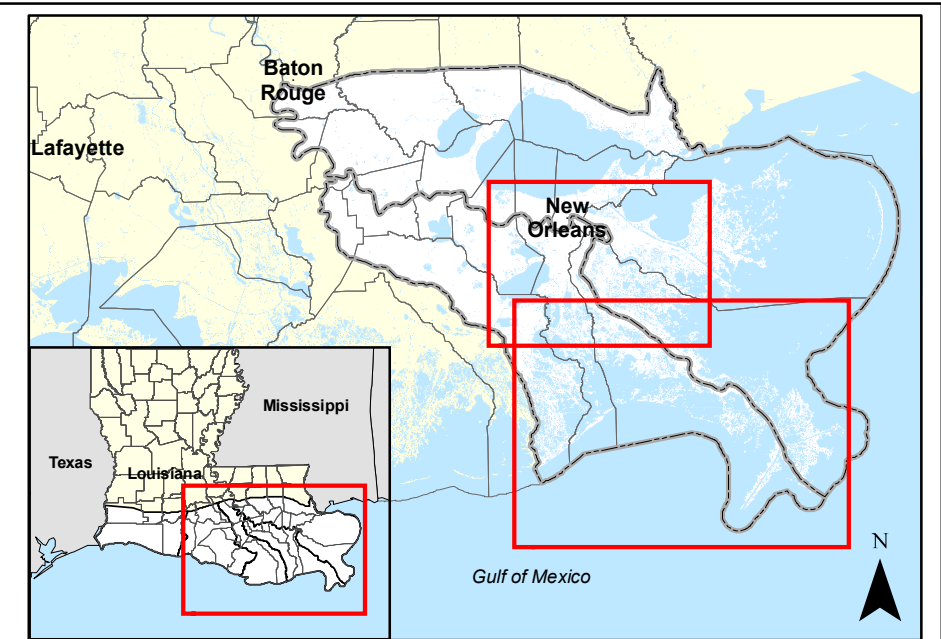
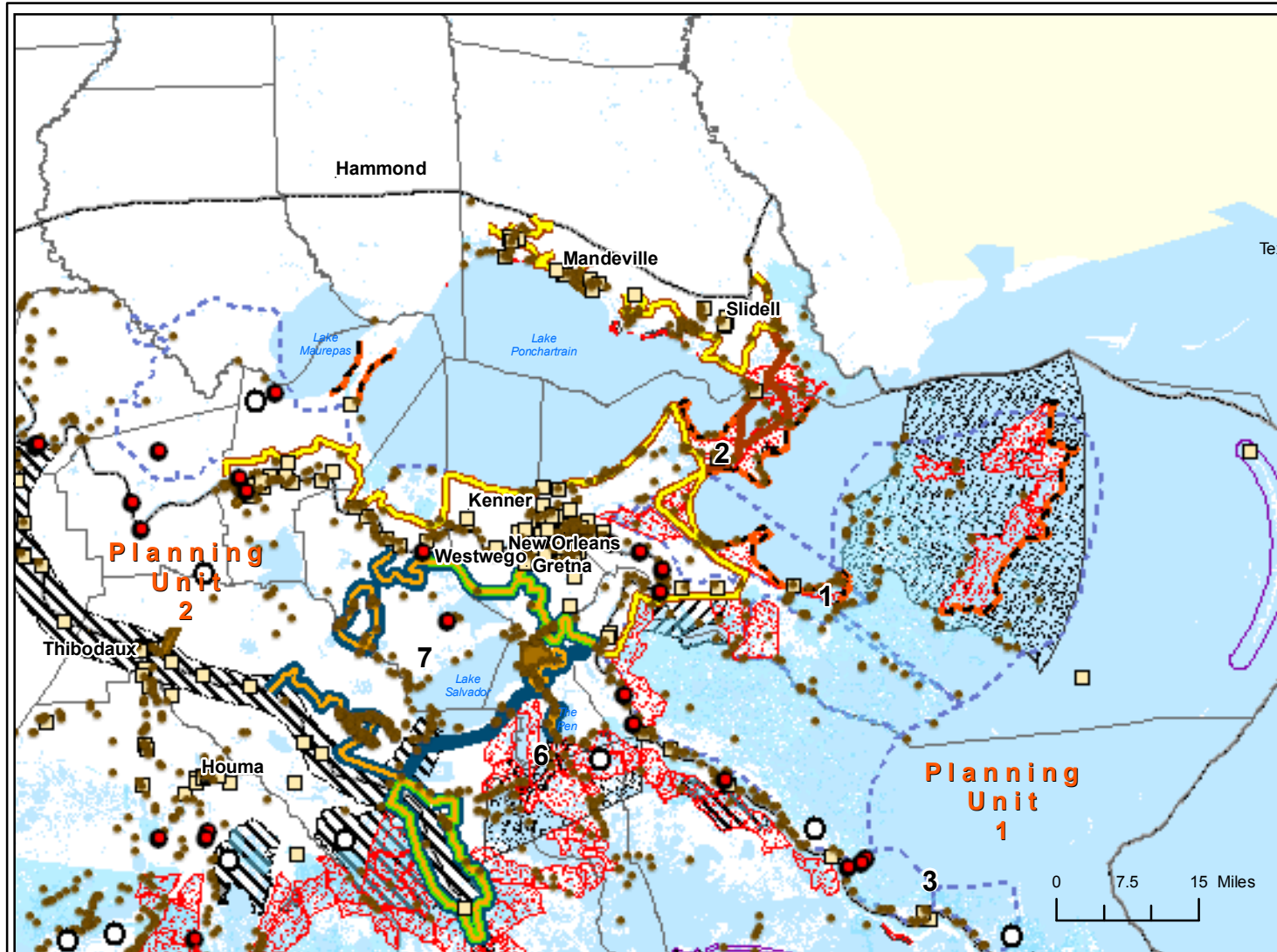
\* indicates mapping not available



Source: Archaeological Site Records; Louisiana Department of Culture, Recreation and Tourism, Division of Archaeology; Historic Districts and Listed Sites; Department of the Interior, National Park Service, National Register of Historic Places

**Cultural Resources and Non-LACPR Projects - PU3a, PU3b and PU4**  
**Figure 3.8-3**

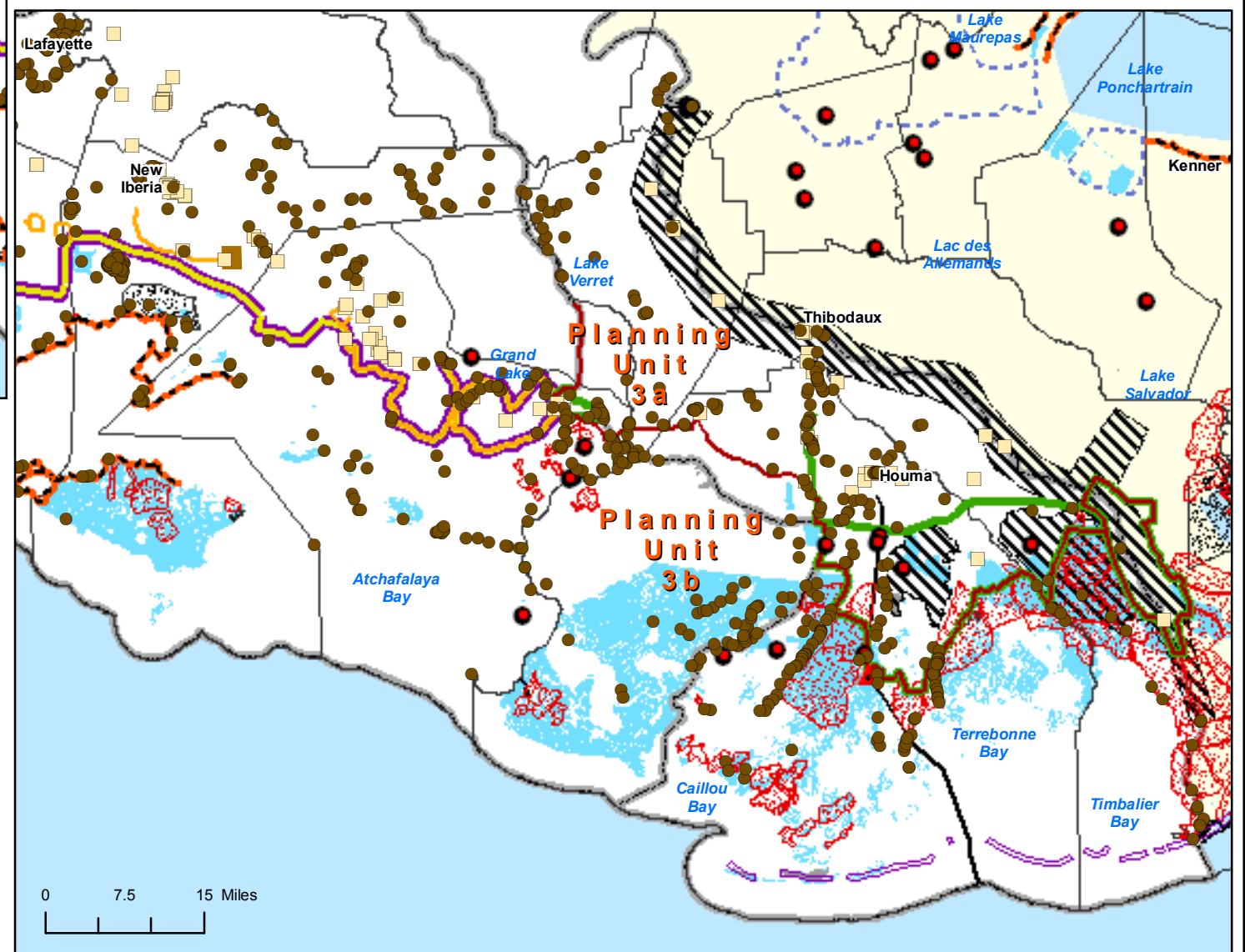
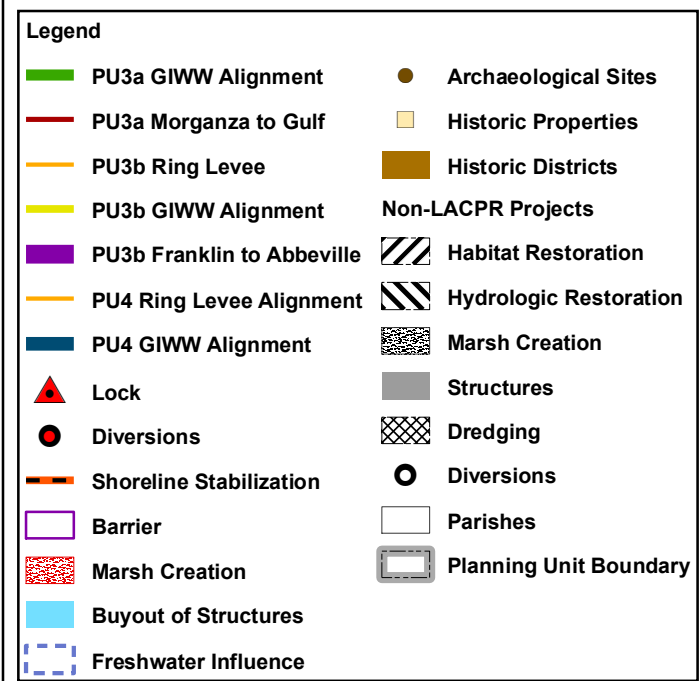
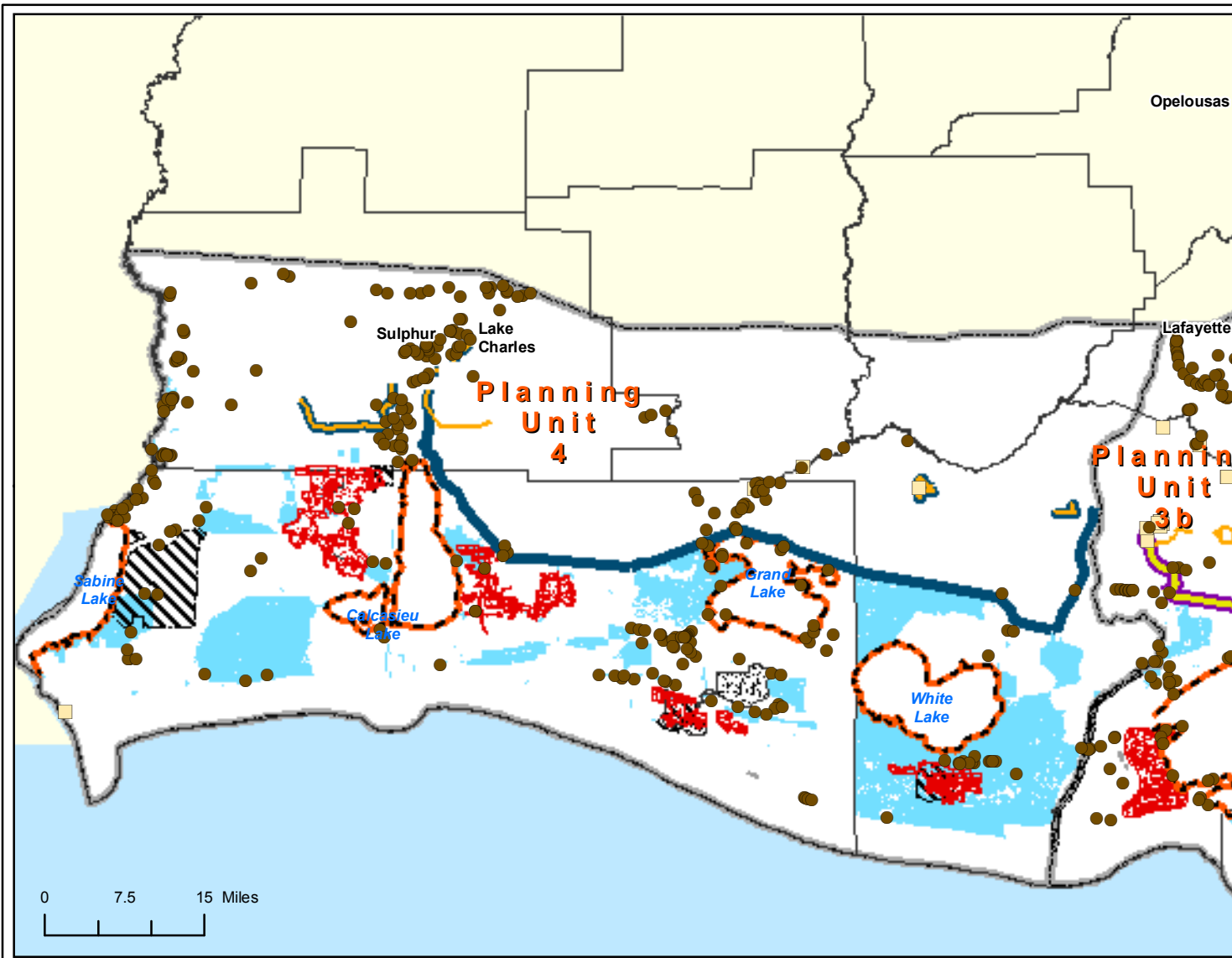




Source: Archaeological Site Records; Louisiana Department of Culture, Recreation and Tourism, Division of Archaeology; Historic Districts and Listed Sites; Department of the Interior, National Park Service, National Register of Historic Places

**Cultural Resources and Projects - PU1 and PU2**  
**Figure 3.8-4**

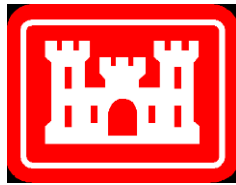




Source: Archaeological Site Records; Louisiana Department of Culture, Recreation and Tourism, Division of Archaeology; Historic Districts and Listed Sites; Department of the Interior, National Park Service, National Register of Historic Places

**Cultural Resources and Projects, PU3a, PU3b and PU4**  
**Figure 3.8-5**

# LACPR Recreational Resources Study



U.S. Army Corps of Engineers  
New Orleans District

Prepared By:

**URS**

Gaithersburg, MD

# LACPR Recreational Resources Study

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## **List of Acronyms**

CPRA	Louisiana Coastal Protection and Restoration Authority
GIS	Geographic Information System
LA	Louisiana
LACPR	Louisiana Coastal Protection and Restoration
LWCF	Land and Water Conservation Fund
NHPP	National Historic Park and Preserve
NWR	National Wildlife Refuge
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHS	State Historic Site
SP	State Park
SWR	State Wildlife Refuge
USACE	U.S. Army Corps of Engineers
WMA	Wildlife Management Area

Cover Photos (Credit: Mary Shaw) from left to right:

Row 1: Bayou Sauvage NWR, Chalmette Battlefield NHPP, Lake Fausse SP

Row 2: Pearl River WMA, Tickfaw SP, Sam Houston Jones SP

Row 3: Joyce WMA, Big Branch Marsh NWR, Fairview-Riverside SP



## ***Introduction***

In response to the destruction caused by Hurricanes Katrina and Rita in 2005 and to the historically deteriorating coastal wetlands in southern Louisiana, the United States Congress has directed Federal agencies to work cooperatively with State agencies to integrate hurricane risk reduction and coastal protection and restoration measures.

The Louisiana Coastal Protection and Restoration (LACPR) effort is a collaborative effort involving the United States Army Corps of Engineers (USACE), the Louisiana Coastal Protection and Restoration Authority (CPRA), other Federal, State, academic, and nongovernmental agencies, and stakeholders.

The LACPR study area encompasses southern Louisiana, generally south of Interstates 10 and 12. The LACPR area includes many different recreational areas, as well as state-owned land and water bottoms, scenic rivers, reefs, rookeries, and protected sensitive areas that contribute to recreational opportunities in the area.

The objectives of LACPR are to reduce risk and potential damages, promote a sustainable coastal ecosystem, restore and sustain diverse fish and wildlife habitats, protect historic sites, and support cultural traditions.

As recreational areas have historically been integral to sustaining diverse fish and wildlife habitats, protecting historic sites, and supporting cultural traditions such as hunting, fishing, and boating, they are of particular interest to LACPR. Recreational areas include local, state, and federal parks, state wildlife management areas, national wildlife refuges, and some other sport and recreation complexes. These areas are of great importance to the economy and culture of the State of Louisiana and the region.

In this report, first a summary of existing recreation areas and recreational opportunities in the LACPR area is provided. Second, the potential effects to recreational resources by non-LACPR project alternatives are discussed. Non-LACPR alternatives include freshwater diversion projects, borrow pits, dredging, and marsh creation projects that have been proposed or are under consideration by various Federal and State agencies. Third, the potential effects of LACPR alternatives are discussed. LACPR alternatives include coastal restoration, structural and nonstructural projects.

## **Scope of Analysis and Limitations**

This analysis is generally limited to those recreation resources provided by parks and wildlife management areas that are open to visitors and are managed by the National Park Service; the National Fish and Wildlife Agency; the Louisiana Department of Culture, Recreation, and Tourism; and the Louisiana Department of Wildlife and Fisheries.

To better identify the proximity of alternative projects to recreation areas, the analysis was expanded to include a small number of parks and refuges managed by municipal or

parish government or nonprofit entities such as The Nature Conservancy. The report does not examine the recreational resources provided for residents of and visitors to the LACPR area through lands that are owned or managed by municipal, parish, State, nonprofit, or private entities. However, the report does summarize the investment in public parks and recreation areas provided by the Land and Water Conservation Fund in the LACPR area.

## **Methodology**

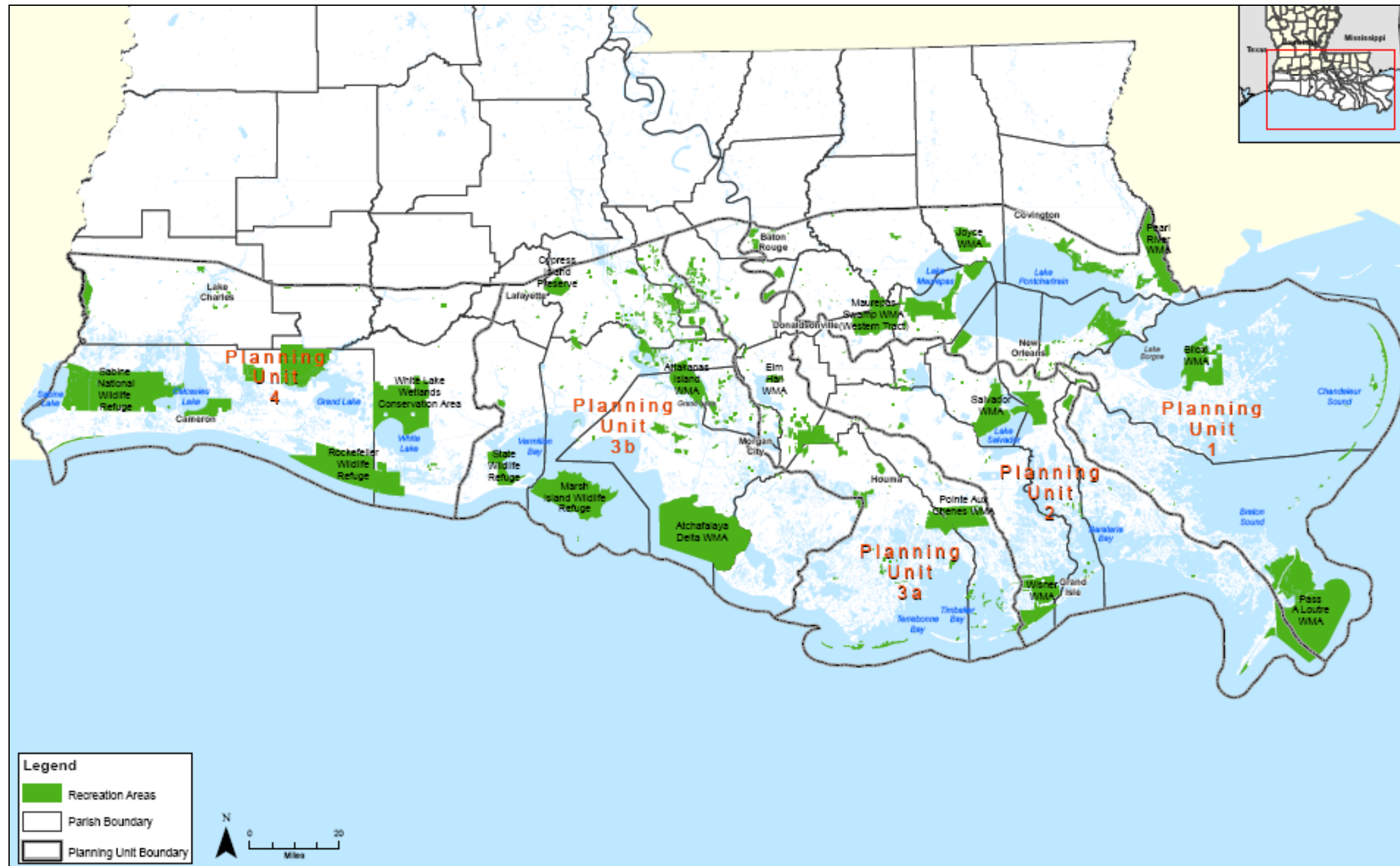
The analysis was conducted using three different approaches.

First, in December 2007, a preliminary study of current recreational opportunities was conducted using site visits and a review of readily available data, such as brochures and Web sites. The study identified boating, hunting, fishing, hiking, bird watching, swimming, and other opportunities provided by the various recreation areas. A total of 65 different recreation areas were the focus of this analysis. Since December, one new State Park, Palmetto Park near Abbeville, LA, has opened.

Consistent with the organization of other documents describing the work of the LACPR, the study considered recreation resources in five different areas or planning units. These are:

- Planning Unit 1, Lake Pontchartrain Basin or east of the Mississippi River to the Mississippi border
- Planning Unit 2, Barataria Basin or west of Mississippi River to Bayou Lafourche
- Planning Unit 3a, Eastern Terrebonne Basin or west of Bayou Lafourche to Bayou de West
- Planning Unit 3b, Atchafalaya Influence Area or west of Bayou de West to Freshwater Bayou
- Planning Unit 4, Chenier Plain or west of Freshwater Bayou to the Sabine River

Figure 1 shows the location of some of the larger recreation areas and shows the boundaries of the five planning units.



**Figure 1: Locations of Recreation Areas and Planning Unit Boundaries**

\*Sources: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007

Second, a Geographic Information System (GIS) was developed for the analysis to determine the location of alternative projects relative to identified recreation areas. Proximity was used as an indicator of a potential effect of an alternative project on a recreation area. Sources of information for the GIS included data about the location of recreation areas obtained from the U. S. Environmental Protection Agency, U. S. Department of Transportation, Louisiana Division of Administration, U. S. Fish and Wildlife Service, Louisiana Department of Wildlife and Fisheries, and Louisiana Department of Transportation and Development. Locations of potential LACPR or non-LACPR projects were provided by the USACE as part of the USACE LACPR Cumulative Effects Analysis project, which occurred simultaneously with the analysis of recreational resources.

Third, a qualitative research approach was used to examine the potential impacts of alternatives on recreation areas. Focus group interviews with managers, governmental organizations, NGOs, and users of various recreation resources were conducted to identify the potential effects of alternative projects on the recreational opportunities provided, and on usage of the recreation areas. Three focus group meetings were held with a total of 22 participants who identified both beneficial and detrimental effects of potential projects to recreation areas and to the recreational opportunities. Focus group meetings were held in May 2008 in Metairie, Abbeville, and Lake Charles, Louisiana. The distribution of focus group participants was two from Federal agencies, nine from State agencies, two from local government, eight from the nonprofit sector, one from the private sector. The 22 participants were those from among the 55 individuals directly associated with a park, wildlife management area, or recreation group who were contacted during the week prior to the focus group meetings and were willing and able to attend. In addition to the potential effects, focus group participants discussed the need for long-term monitoring of projects, the importance of privately-owned, parish and municipal, and other state-owned lands to recreation, and the contributions of other state and non-profit agencies to recreational opportunities. Notes from the focus group meetings are included in the appendix.

To identify the potential effects of alternative projects under consideration by various Federal and State agencies, other than the coastal restoration, structural and nonstructural projects that are under consideration as part of the LACPR effort, the alternatives were described during focus group meetings as very large freshwater



diversion projects; borrow of materials for other structural projects; dredging; marsh creation; and shoreline restoration.

To identify the potential effects of LACPR alternatives, these alternatives were broadly described during focus group meetings as very large, multi-faceted coastal restoration, structural, or non-structural projects. Coastal restoration alternatives considered were freshwater and sediment diversion and other marsh rebuilding measures. Structural alternatives considered were building additional levees or increasing the height and breadth of existing levees. Nonstructural alternatives considered were elevating structures or acquiring land vulnerable to damage by flooding and storm surge and demolishing the existing structures. Because the purpose of the focus group meetings was to identify potential effects rather than exact impacts of particular projects, no project locations or timeframes for implementation were specified.

## ***Existing Recreation Areas and Recreational Opportunities***

This section identifies existing recreation areas and summarizes the opportunities provided within the boundaries of the National and State parks, Federal and State wildlife management areas.

### **Planning Unit 1**

Recreation areas in Planning Unit 1 that were examined include four National Wildlife Refuges (NWR), three Jean Lafitte National Historical Park and Preserve (NHPP) Units, seven Wildlife Management Areas (WMA) and State Wildlife Refuges (SWR), four State Parks (SP), one State Historic Site (SHS), as well as other significant recreation areas. These areas alone represent more than 355,000 acres that are visited annually more than four million times for recreational purposes. Recreation areas in Planning Unit 1 include more than 1,000 miles of trails for hiking and biking, 28 boat ramps, 500 feet of fishing pier, seven campgrounds that are rented more than 122,000 times per year, and four classrooms, eight visitor centers or museums, six picnic shelters, and five historic sites. These recreation areas provide opportunities for hunting, hiking, biking, boating, bird watching, fishing and crabbing, crawfishing, or shrimping, education, camping, picnicking, and playing.

Table 1 lists the State and Federal recreational facilities that are located in Planning Unit 1 and provides information about size and annual usage. For many sites, visitors are not counted because no parking or entrance fees are collected and there are many entrances to the areas.

**Table 1: State and Federal Recreation Areas in Planning Unit 1**

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Abita Creek Flatwoods Preserve	St. Tammany	The Nature Conservancy	834	Data not available	Abita Creek provides a boardwalk for viewing 24 different rare or endangered plant species.	Yes	No	No	No	Yes	No	No	No	
Audubon Nature Center / Joe W. Brown Memorial Park	Orleans	City of New Orleans, Audubon Institute	187	Data not available	The park has been temporarily closed since Hurricane Katrina.	Yes	No	No	No	Yes	Yes	Yes	No	
Audubon Park	Orleans	Audubon Institute	400	Data not available	The park includes a zoo and golf course.	Yes	No	No	No	Yes	Yes	Yes		Zoo, Aquarium, IMAX Theater, Tennis courts
Bayou Sauvage NWR	Orleans	U.S. Fish and Wildlife Service	23,000	Data not available	Park is entirely within the city limits of New Orleans and is the nation's largest urban wildlife refuge.	3-mile hiking trail; another 9-mile biking trail has been closed since 2005	1 boat ramp; motor boating and non-motor boating	No	Fishing from boat, bank; craw-fishing, crabbing	Yes; observation deck	Classroom space, educational programming, interpretive panels	Yes; 1 picnic shelter	No	
Big Branch Marsh NWR	St. Tammany	U.S. Fish and Wildlife Service	17,366	59,000	Big Branch Marsh NWR was formed in 1994. This diverse habitat is a wonderful example of the natural coastline of Lake Pontchartrain surrounded by fast developing communities.	5.3-mile hiking trail; 4.5-mile biking trail	2 boat ramps; motor boating and non-motor boating	Deer, small game, waterfowl, birds, alligator	Fishing from boat, bank; crabbing, gathering shrimp, shellfish	Yes; one observation deck	Visitor center, classrooms attended by 1,000 people annually, educational programming, 300 interpretive panels	No	No	
Biloxi WMA	St. Bernard	Louisiana Department of Wildlife and Fisheries	39,583	Data not available	Biloxi WMA is accessible only by boat via commercial launches at Hopedale and Shell Beach. The area is owned and leased to the Louisiana Department of Wildlife and Fisheries by the Biloxi Marsh Lands Corporation.	No	Motor boating	Small game, waterfowl, birds, alligator	Boat, bank fishing, crabbing, shrimping, shellfishing	Yes	No	No	No	
Bonnet Carré Spillway	St. Charles	USACE, St. Charles Parish Parks and Recreation	7,623	283,589	The Bonnet Carré Spillway was constructed by the USACE in 1936 to serve as a floodway connection between the Mississippi River and Lake Pontchartrain.	5 trails provide 10 miles for hiking; 4 trails provide 15 miles for horseback riding; 3 trails provide 8 miles for bicycling; 2 trails provide 40 miles for all-terrain vehicles	5 boat ramps; motor and non-motorized boating	Deer, small game, waterfowl, birds, alligator	200-foot fishing pier; boat, bank fishing; crawfishing, crabbing, shrimping, shellfishing	Yes	Visitor center, 3 historic sites, classroom, educational programming	2 play areas; areas for water skiing and wind surfing, 5 picnic tables, 1 picnic shelter	Unimproved and group camping areas used by 9,883 during 2007	Remote-controlled airplane field; retriever dog field trials and training

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Breton NWR	St. Bernard	U.S. Fish and Wildlife Service	Data not available	Data not available	Breton NWR is the second oldest refuge in the country and was 100 years old on October 4th, 2004. President Theodore Roosevelt heard about the destruction of birds and their eggs on Chandeleur and Breton Islands in 1904 and soon afterward created Breton NWR.	No	Motor boating	No	Fishing from boat, bank; crabbing	Yes	No	No	No	
Chalmette Battlefield NHPP	St. Bernard	National Park Service	200	60,775	Park is the site of the 1815 Battle of New Orleans and the location of a National Cemetery.	¼-mile walking trail	No	No	No	Yes	Visitor center, museum, historic building, educational programming, interpretive panels	10 picnic tables	No	
Delta NWR	Plaquemines	U.S. Fish and Wildlife Service	Data not available	Data not available	Delta NWR was established in 1935. Delta is the winter home for hundreds of thousands of geese and ducks.	No	Motor boating	Deer, small game, waterfowl, birds, alligator	Fishing from boat, bank; crabbing	Yes	No	No	No	
Fairview Riverside SP	St. Tammany	Louisiana Department of Culture, Recreation and Tourism	99	78,251	Fairview Riverside SP features moss-draped oaks and woodlands on the banks of the Tchefuncte River and is the location of the Otis House, a late 19th century Queen Anne style home of a lumber baron.	½-mile walking trail and boardwalk	1 boat ramp; motor boating and non-motor boating	No	Fishing from boat, bank; crawfishing	Yes	Museum, historic site, educational programming	1 play area, picnic tables	101 improved campsites (water and electricity available) used annually by about 56,053	
Fontainebleau SP	St. Tammany	Louisiana Department of Culture, Recreation and Tourism	2,809	79,189	Fontainebleau SP, which is on the shore of Lake Pontchartrain, was a sugar plantation until 1852.	2 walking trails (6.05 miles); 1 biking trail (23 miles)	No	No	300-foot fishing pier; fishing from bank, boat	Yes	Visitor center, historic site, educational programming, interpretive panels	Sandy beach for sunbathing; play area, pool, area for water skiing and wind surfing; 1 picnic shelter	133 improved campsites; 37 unimproved campsites and 2 group camping areas (capacity of each is 50); 1 lodge that sleeps 12	
Fort Pike SHS	St. Tammany	Louisiana Department of Culture, Recreation and Tourism	94	0 [This park was temporarily closed]	Fort Pike, a military installation, was completed in 1826. The park offers educational programs and demonstrations.	No	1 boat ramp	No	No	Yes	Museum, historic site, educational programming, interpretive panels	Picnic tables	No	



Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
French Quarter NHPP	Orleans	National Park Service	Data not available	54,300	Park is the headquarters of the Jean Lafitte National Park and Preserves and is the starting place for tours of the historic French Quarter of New Orleans.	No	No	No	Fishing from bank	Yes; observation deck	Historic site, educational programming	No	No	Art displays, cooking demonstrations, musical and theatrical performances
Honey Island Swamp	St. Tammany	Louisiana Department of Wildlife and Fisheries	70,000	Data not available	The swamp includes pristine swamp habitat.	No	Yes	No	Fishing from bank, boat	Yes	No	No	No	
Joyce WMA	Tangipahoa	Louisiana Department of Wildlife and Fisheries	16,394	5,791	Joyce WMA is a wetland consisting primarily of cypress-tupelo swamp; there are no roads into the swamp. Joyce is a historic site where cypress was logged in the early 1900's.	1000-foot boardwalk	3 boat ramps nearby; motor and non-motorized boating	Deer, small game, waterfowl, birds, alligator	Boat, bank fishing, crawfishing, crabbing	Yes	Historic site	No	No	
Manchac WMA	Livingston	Louisiana Department of Wildlife and Fisheries	8,328	Data not available	Manchac WMA is primarily an open freshwater marsh. Access to the interior is limited to canals.	No	Motor, non-motorized boating	Small game, waterfowl, birds, alligator	Boat, bank fishing	Yes	No	No	No	
Maurepas Swamp WMA	Livingston	Louisiana Department of Wildlife and Fisheries	62,500	10,885	Access into the interior of the property is extremely limited. There are no roads that lead into the wooded swamp.	½- mile trail	6 ramps in or near WMA; motor, non-motorized boating	Deer, small game, waterfowl, birds, alligator	Boat, bank fishing, crawfishing, crabbing	Yes	No	No	No	
New Orleans City Park	Orleans	Louisiana Department of Culture, Recreation and Tourism, City Park Improvement Association	1,300	4 million	The park includes the Botanical Gardens, a golf course, and tennis courts.	Yes	No	No	No	Yes	Yes	Yes	No	Botanical Gardens, Tennis courts
Pass A Loutre WMA	Plaquemines	Louisiana Department of Wildlife and Fisheries	66,000	Data not available	Pass A Loutre is located at the mouth of the Mississippi River and is accessible only by boat.	No	Motor boating	Deer, small game, waterfowl, birds, alligator	Boat fishing, crabbing	Yes	No	No	Unimproved camping	Pilings to allow houseboats to moor
Pearl River WMA	St. Tammany	Louisiana Department of Wildlife and Fisheries	35,031	48,066	Pearl River WMA includes Honey Island Swamp, one of the least altered river swamps in the country.	1-mile trail for hiking and all-terrain vehicles	7 boat ramps on or near WMA; motor, non-motorized boating	Deer, small game, waterfowl, birds, alligator	Boat, bank fishing, crawfishing, crabbing, shrimping, shell fishing	Yes	No	Area for water skiing, wind surfing	Unimproved camping	Shooting range

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
St. Bernard SP	St. Bernard	Louisiana Department of Culture, Recreation and Tourism	358	19,367	St. Bernard SP is located along the Mississippi River and provides opportunities for recreation among wetlands and woodlands.	Yes	No	No	No	Yes	No	1 play area; 2 swimming pools; 1 beach; area for water skiing, wind surfing, picnic tables, 1 picnic shelter	51 improved campsites (water, electricity available) used by 9,519 during 2007	
St. Tammany SWR	St. Tammany	Louisiana Department of Wildlife and Fisheries	1,309	Data not available	St. Tammany SWR is located on the north shore of Lake Pontchartrain adjacent to Fontainebleau State Park. It serves as a resting and feeding area for wintering waterfowl.	No	No	No	No	Yes	No	No	No	
Tickfaw SP	Livingston	Louisiana Department of Culture, Recreation and Tourism	1,183	79,136	Tickfaw SP, of which the Tickfaw River is the western boundary, includes a cypress and tupelo swamp, a bottomland hardwood forest, and a mixed pine and hardwood forest.	5 hiking trails (4.75 miles)	2 boat ramps, non-motorized boating; boat, canoe rental	No	Fishing from boat, bank	Yes	Visitor center, classrooms, educational programming, interpretive panels	1 play area, picnic tables, 2 picnic shelters	30 improved campsites; 20 unimproved campsites; 14 group camp sites; 1 lodge that sleeps 52; total number of camp sites rented during 2007 was 46,139	
White Kitchen Preserve	St. Tammany	The Nature Conservancy	586	Data not available	The preserve has a bald eagle nest and a boardwalk for wildlife viewing.	Yes	Yes	No	No	Yes	No	No	No	

The State- and Federally-managed facilities in Planning Unit 1 vary widely in terms of the recreational opportunities provided. This Table is based on data gathered through a review of publicly available brochures, contacts with park or refuge managers, and site visits. It provides details about the availability of different types of recreational opportunities at each of the facilities.

The 2003-2008 Louisiana Statewide Comprehensive Outdoor Recreation Plan<sup>1</sup> (SCORP) provides a statewide inventory of recreation resources and identifies recreational needs. While regions defined in the SCORP do not fit perfectly within the LACPR planning unit boundaries, SCORP Region 1 is roughly coincident with Planning Unit 1. The State- and Federally-managed areas described above represent just a portion of the more than 282,000 acres of recreational facilities inventoried for SCORP Region 1. Federal, State, parish, and municipal public recreational facilities provide more than 196,000 acres for hunting, 123 boat ramps, 1,833 picnic tables, ten beaches, and 320-acres for camping with 263 tent sites and 1,739 trailer sites. The SCORP-prioritized needs in this region include improving access to enable fishing and boating, funding to support consumptive and non-consumptive activities on all public recreation areas, more wilderness or primitive camping areas, identifying and acquiring large tracts of waterfront lands for large scale parks, and addressing the dwindling state of marine resources.

Other recreational features in Planning Unit 1 are provided by parishes and historic communities that attract visitors to a variety of heritage and cultural festivals, historical sites, parks offering opportunities for active and passive recreation that include tennis courts, soccer and softball fields, swimming pools, and golf courses. Tammany Trace, Louisiana's first and only "rails-to-trails" site, is located in Planning Unit 1. This scenic 31-mile recreational corridor on the north shore of Lake Pontchartrain runs through Fontainebleau State Park and provides opportunities for hikers, bicyclists, equestrians, rollerbladers, and joggers.

Funds from the Land and Water Conservation Fund (LWCF) have supported 164 different recreational projects in Planning Unit 1 since 1964. LWCF projects in each of the 5 planning units have provided numerous boat ramps and other facilities that enhance opportunities for recreation in the LACPR area. Actual LWCF expenditures not adjusted for inflation exceed \$18 million in Planning Unit 1. Table 2 summarizes the number and cost of projects implemented in parishes in Planning Unit 1. [Source: <http://waso-lwcf.nrc.nps.gov/public/index.cfm>]

**Table 2: LWCF Expenditures in Planning Unit 1 for Recreational Resources**

<b>Parish</b>	<b>Number of Projects</b>	<b>Actual<sup>2</sup> LWCF funds expended</b>
Ascension	21	\$1,412,037.53
East Baton Rouge	59	\$3,812,233.10
Livingston	16	\$1,540,166.79
Orleans	25	\$6,610,700.95
St. Bernard	3	\$1,214,738.78
St. Tammany	19	\$2,258,501.45
St. John the Baptist	1	\$128,026.56
Tangipahoa	20	\$1,244,276.32
<b>Totals for Planning Unit 1</b>	<b>164</b>	<b>\$18,220,681.48</b>

<sup>1</sup> Available online June 1, 2008 through <http://www.crt.state.la.us/parks/iSCORP.aspx>

<sup>2</sup> Dollar values expended in the years since 1964 are not adjusted for inflation.

## Planning Unit 2

Recreation areas in Planning Unit 2 that were examined include one Jean Lafitte National Historical Park and Preserve Unit, two Wildlife Management Areas, two State Parks, and two other large recreational areas. These areas represent more than 76,000 acres that are visited annually more than one million times. Recreation areas include more than 14 miles of trails for hiking and biking, four boat ramps, 400 feet of fishing pier, one classroom, one visitor center, seven picnic shelters, and two campgrounds that are rented more than 123,000 times annually. Recreation areas provide opportunities for hunting, hiking, biking, boating, bird watching, fishing and crabbing, crawfishing, shrimping, education, picnicking, and playing.

Table 3 lists the State and Federal recreational facilities that are located in Planning Unit 2 and provides information about size and annual usage. For many sites, visitors are not counted because no parking or entrance fees are collected and there are many entrances to the areas.

The 2003-2008 Louisiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) provides a statewide inventory of recreation resources and identifies recreational needs. While regions defined in the SCORP do not fit perfectly within the LACPR planning unit boundaries, SCORP Region 3 is roughly coincident with Planning Unit 2. The State- and Federally-managed areas represent just a portion of the more than 107,000 acres of recreational facilities inventoried for SCORP Region 3. The SCORP Region 3 identifies 105 boat ramps, 365 picnic tables, one beach, and 71 acres for camping. SCORP-prioritized needs in this region include maintaining cultural heritage while increasing opportunities for outdoor recreation and tourism, promoting and improving upon existing resources, increasing public access to marshes, protecting barrier islands, and providing aid to recreation-related businesses.

Historic communities in Planning Unit 2 provide other recreational features, including sandy beaches, fishing, crabbing, boating, swimming, surfing, and bird watching. Fishing opportunities abound on large lakes, including Catfish Lake, which covers more than 1,730 acres, and Lac Des Allemends, which covers approximately 16,800 acres.



**Table 3: State and Federal Recreational Resources in Planning Unit 2**

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Barataria Preserve of Jean Lafitte NHPP	Jefferson Parish	National Park Service	20,000	100,000	The preserve includes bayous, swamps, marshes, forests, alligators, nutrias, and more than 300 species of birds.	9 trails provide 7.45 miles for hiking and 3 boardwalks provide another 2.4 miles for hiking	3 boat ramps and non-motorized boating	Deer, small game, waterfowl, birds	Fishing from boat, bank; crawfishing	Yes; 5 decks for observation	Visitor center, museum, classroom, educational programming, interpretive panels	16 picnic tables	No	
Bayou Segnette SP	Jefferson Parish	Louisiana Department of Culture, Recreation and Tourism	580	186,096	Just 30 minutes from downtown New Orleans, this park provides a variety of opportunities, including salt and freshwater fishing, picnicking, camping, and swimming.	1 trail (1 mile) and 1 boardwalk (1/2 mile)	1 boat ramp, motor and non-motorized boating	No	Fishing from boat, bank	Yes	Educational programming	1 play area, 2 swimming pools, picnic tables, 7 picnic shelters	98 improved campsites, 20 cabins for rent, group camping area for 120 sites; total usage of camp sites for 2007 was 91,201	Conference center
Brechtel Park	Orleans	City of New Orleans	100	Data not Available	This city park provides opportunities for hiking, biking, picnicking, and golf.	Yes	Non-motorized boating	No	No	Yes	No	Yes	No	Golf course
Grand Isle SP	Jefferson Parish	Louisiana Department of Culture, Recreation and Tourism	120	787,262	Grand Isle is the most popular barrier island off the coast of Louisiana and the park provides opportunities for fishing, crabbing, swimming, and sunbathing.	1 trail (2.5 miles)	Motor, non-motorized boating	No	400-foot fishing pier, fishing from boat, bank; crawfishing, crabbing, shrimping, shell fishing	Yes; 1 observation deck	No	½-mile swimming beach, area for water skiing and wind surfing, picnic tables, picnic shelters	Improved camping, estimate usage as 22,271; unimproved camping, estimate usage as 10,000	
Lafitte Woods Preserve	Jefferson	The Nature Conservancy	43	Data not available	The preserve has a boardwalk that provides for wildlife viewing and bird watching.	Yes	No	No	No	Yes	No	No	No	
LaFreniere Park	Jefferson	Jefferson Parish Department of Parks and Recreation	155	Not available	This city park includes play areas, a jogging track, a water lagoon, and picnic areas.	Yes	No	No	No	Yes	Yes	Yes	No	Soccer fields
Salvador Timken WMA	St. Charles	Louisiana Department of Wildlife and Fisheries	34,520	Data not available	Access to the area is only by boat; access to the interior of the area is via many canals and bayous.	No	Motor and non-motorized boating	Deer, small game, waterfowl, birds	Fishing from boat, bank; crawfishing crabbing, shrimping	Yes	No	Yes	No	
Wisner WMA	Lafourche	Louisiana Department of Wildlife and Fisheries	21,621	Data not available	Wisner WMA was established in 1980 and is owned by the Wisner Donation Foundation.	No	Motor, non-motorized boating	Small game, waterfowl, birds	Fishing from boat, bank	Yes	No	No	No	

The State- and Federally-managed facilities in Planning Unit 2 vary widely in terms of the recreational opportunities provided. Table 3 is based on data gathered through a review of publicly available brochures, contacts with park and refuge managers, and site visits. It provides details about the availability of different types of recreational opportunities at each of the facilities.

Funds from the LWCF have supported 55 recreation projects implemented in Planning Unit 2 since 1964. Actual LWCF expenditures have exceeded \$18 million in Planning Unit 2. Table 4 summarizes the number and cost of projects implemented in parishes in Planning Unit 2. [Source: <http://waso-lwcf.nrc.nps.gov/public/index.cfm>]

**Table 4: LWCF Expenditures in Planning Unit 2 for Recreational Resources**

Parish	Number of Projects	Actual LWCF <sup>3</sup> funds expended
Jefferson	40	\$7,472,881.87
Lafourche	8	\$733,742.13
St. Charles	2	\$329,264.27
St. James	9	\$610,103.06
Total for Planning Unit 2	59	\$9,145,991.33

### Planning Unit 3a

Recreation areas in Planning Unit 3a that were examined include two National Wildlife Refuges, one Jean Lafitte National Historical Park and Preserve Unit, five Wildlife Management Areas or State Wildlife Refuges, one State Historic Site, and one other recreational area. These areas represent more than 223,000 acres that are visited annually more than 141,000 times. Recreation areas include more than one hiking trail, three boat ramps, 150 feet of fishing pier, one visitor center, two historic sites, four campgrounds that are rented more than 300 times each year, one classroom, one visitor center, and two historic sites. Recreation areas provide opportunities for hunting, hiking, boating, bird watching, fishing, crabbing, crawfishing, education, camping, and picnicking.

Table 5 lists the State and Federal recreational facilities that are located in Planning Unit 3a and provides information about size and annual usage. For many sites, visitors are not counted because no parking or entrance fees are collected and there are many entrances to the areas.

The State- and Federally-managed areas represent just a portion of the recreational facilities inventoried for the Louisiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) Region 4, which covers roughly the area identified as the LACPR Planning Units 3a and 3b. Federal, State, parish, and municipal public recreational facilities in SCORP Region 4 provide more than 523,000 acres for hunting, 138 boat ramps, 1,441 picnic tables, 16 beaches, and 443 acres for camping, 498 tent sites, and 2,391 trailer sites. The SCORP prioritized needs in this region include full funding for the State Parks Capital Improvement Plan, improving roads and signage to recreation areas, educating the public about conservation and ethical usage of land, increasing public awareness that recreation is part of tourism and can be an economic development tool, providing recreation to improve the quality of life, and promoting interaction among local, State, Federal, and private recreation programs to keep users in the area longer.

<sup>3</sup> Dollar values expended in the years since 1964 are not adjusted for inflation.

**Table 5: State and Federal Recreational Resources in Planning Unit 3a**

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Atchafalaya Delta WMA	St. Mary	Louisiana Department of Wildlife and Fisheries	141,000	Data not available	The area is at the mouth of the Atchafalaya River and consists of open water and about 27,000 vegetated acres.	No	Motor boating	Deer, small game, waterfowl, birds, alligator	Fishing from boat	Yes	No	No	Unimproved camping	Pilings to allow houseboats to moor and docking for other boats
Atchafalaya NWR <sup>4</sup>	St. Martin, Iberville	U.S. Fish and Wildlife Service, Louisiana Department of Wildlife and Fisheries	15,288	50,000	Atchafalaya National Wildlife Refuge was established in 1984 and is part of the largest bottomland hardwood swamp in the country.	3 trails provide 10 miles for hiking and biking and 7 miles for all-terrain vehicles	2 boat ramps, motor and non-motorized boating	Deer, small game, waterfowl, birds, alligator	150-foot fishing pier, fishing from boat, bank; crawfishing	Yes; 2 observation decks	Guided tours and interpretive panels	No	No	
Attakapas WMA	St. Mary, St. Martin, Iberia	Louisiana Department of Wildlife and Fisheries	27,930	17,000	Access to Attakapas WMA is by boat only. Attakapas WMA is generally flat swampland subject to periodic flooding.	32 miles of trails for hiking, biking, horseback riding, or all-terrain vehicles	1 boat ramp, motor and non-motorized boating	Deer, small game, waterfowl, bird, alligator	Fishing from boat, bank; crawfishing, crabbing	Yes	No	Picnic tables	3 unimproved camp sites used by about 200 parties during 2007	
Bayou des Ourses <sup>5</sup>	Iberville	USACE	[Bayou des Ourses is part of the Atchafalaya NWR]	[Bayou des Ourses is part of the Atchafalaya NWR]	See Atchafalaya NWR	See Atchafalaya NWR	See Atchafalaya NWR	See Atchafalaya NWR	See Atchafalaya NWR	See Atchafalaya NWR	See Atchafalaya NWR	See Atchafalaya NWR	See Atchafalaya NWR	
Elm Hall WMA	Assumption	Louisiana Department of Wildlife and Fisheries	2,839	4,000	Elm Hall WMA was established in 1998 and is accessible only by boat through bayous or oilfield canals.	No	Motor, non-motorized boating	Deer, small game, waterfowl, birds, alligator	Fishing from boat, bank	Yes	No	No	1 unimproved camping area is used by about 100 per year	
Mandalay NWR	Terrebonne	U.S. Fish and Wildlife Service	4,212	Data not available	Mandalay NWR was established in 1996 to provide marsh and swamp habitat for wintering waterfowl.	Yes (about 2.75 miles)	Motor, non-motorized boating	Deer, small game, waterfowl, birds	Fishing from boat, bank; crabbing	Yes	Interpretive panels	No	No	One vehicle
Plaquemine Lock SHS	Iberville	Louisiana Department of Culture, Recreation and Tourism	Less than 1	6,800	The lock was used from 1908 until 1962 to move vessels between Bayou Plaquemine and the Mississippi River.	No	No	No	No	No	Educational programming, classroom	No	No	

<sup>4</sup> The Atchafalaya NWR is part of the Sherburne WMA

<sup>5</sup> Bayou Des Ourses is part of the Sherburne WMA

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Pointe au Chien WMA	Terrebonne and Lafourche	Louisiana Department of Wildlife and Fisheries	31,902	Data not available	The area suffers from changing levels of salinity; levee and water diversion projects have been implemented to slow deterioration of the marsh habitat.	No	Motor and non-motorized boating	Deer, small game	Fishing from boat, bank; crabbing	Yes	No	No	Unimproved camping areas	
Terrebonne Barrier Islands SWR <sup>6</sup>	Terrebonne	Louisiana Department of Wildlife and Fisheries	630	Data not available	Terrebonne Barrier Islands SWR consists of three barrier islands, which are important water bird nesting areas.	No	Motor boating	No	Probably fishing from boat, bank	Yes	No	No	No	
Wetlands Acadian NHPP	Lafourche	National Park Service	3	70,000	From the national park, ranger-guided tours explore the natural and cultural history of Bayou Lafourche settlements.	Yes, 1/3- mile trail	Motor and non-motorized boating	No	Fishing from boat, bank; crawfishing, crabbing	No	Visitor center, museum, historic building site, educational programming, interpretive panels	No	No	Theater (200 seats)

The State- and Federally-managed facilities in Planning Unit 3a vary widely in terms of the recreational opportunities provided. Table 5 is based on data gathered through a review of publicly available brochures, contacts with park and refuge managers, and site visits. It provides details about the availability of different types of recreational opportunities at each of the facilities.

<sup>6</sup> The name of Terrebonne Barrier Island WMA has recently been changed to Isles Dernieres Barrier Island Refuge.



Other recreational features in Planning Unit 3a are provided by parishes and historic communities that attract visitors to a variety of heritage and cultural festivals, historical sites, and parks offering opportunities for active and passive recreation that include tennis courts, soccer and softball fields, swimming pools, and golf courses. In the Atchafalaya Basin, there are hundreds of square miles of swamps, lakes, rivers, bayous, and canals. Lake Veret provides approximately 14,500 acres and Lake Paladoure provides approximately 10,600 acres for fishing and recreational boating.

Funds from the LWCF have supported 24 different recreational projects in Planning Unit 3a since 1964. Actual LWCF expenditures not adjusted for inflation exceed \$1.5 million in Planning Unit 3a. Table 6 summarizes the number and cost of projects implemented in parishes in Planning Unit 3a. [Source: <http://waso-lwcf.ncrc.nps.gov/public/index.cfm>]

**Table 6: LWCF Expenditures in Planning Unit 3a for Recreational Resources**

<b>Parish</b>	<b>Number of Projects</b>	<b>Actual<sup>7</sup> LWCF funds expended</b>
Assumption	3	\$451,839.83
Iberville	10	\$664,135.30
Terrebonne	11	\$420,274.88
Total for Planning Unit 3a	24	\$1,536,250.01

### **Planning Unit 3b**

Recreation areas in Planning Unit 3b that were examined include two National Wildlife Refuges, one Jean Lafitte National Historic Park and Preserve Unit, two State Wildlife Refuges, two State Parks, one State Historic Site, and seven other recreational areas. These areas represent more than 127,000 acres that are visited annually more than 250,000 times. Recreation areas include almost 27 miles of hiking trails, two boat ramps, three visitor centers or museums, 22 picnic shelters, two classrooms, one historic site, and two campgrounds that are rented more than 55,000 times annually. Recreation areas provide opportunities for hunting, hiking, boating, bird watching, fishing and crabbing, crawfishing, shrimping, education, picnicking, camping, and playing.

Table 7 lists the State and Federal recreational facilities that are located in Planning Unit 3b and provides information about size and annual usage. For many sites, visitors are not counted because no parking or entrance fees are collected and there are many entrances to the areas.

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<sup>7</sup> Dollar values expended in the years since 1964 are not adjusted for inflation.

**Table 7: State and Federal Recreational Resources in Planning Unit 3b**

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Acadian Cultural Center NHPP	Might be Iberia	National Park Service	12	21,453	Exhibits and displays at the cultural center explain the origins, migration, settlement, and contemporary culture of the Acadians and others who live in the Lafayette area.	No	No	No	Bank fishing	Yes	Visitor center, museum, educational programming, interpretive panels	No	No	2 educational films, boat tour, day camps for children
Acadiana Park	Lafayette	Lafayette Parish	110	Data not available	The park provides opportunities for picnicking, nature trails, tennis, and camping.	3.5 miles of trails	No	No	No	Yes	Yes	Yes	Yes	Tennis courts
Bayou Teche NWR	St. Mary	U.S. Fish and Wildlife Service	9,028	Data not available	Bayou Teche NWR, established in 2001, is forested with bottomland hardwoods and cypress-gum forests and the endangered Louisiana black bear is relatively abundant throughout the refuge.	2 trails for hiking or all-terrain vehicles	Motor and non-motorized boating	Deer, small game, waterfowl, bird	Fishing from boat, bank	Yes	No	No	No	
Cypremort Point SP	St. Mary	Louisiana Department of Culture, Recreation and Tourism	185	47,128	Between Grand Isle and Cameron, Cypremort Point is the only beach on near the Gulf of Mexico that can be reached by car.	No	1 boat ramp, motor and non-motorized boating, 6 boat docks	No	100-foot fishing pier, fishing from boat, bank; crabbing, shrimping, shell fishing	Yes	No	1/2 mile (man-made) beach, area for water skiing and wind surfing, picnic tables, 16 picnic shelters	6 cabins for rent (usage in 2007 was 6,696)	
Cypress Island Preserve	St. Martin	The Nature Conservancy	9,500 acres	Data not available	The preserve has a 3.5 mile walking trail for wildlife viewing.	2.5 mile trail	No	No	No	Yes	No	No	No	
I.R. Bud Chalmers Park	Lafayette	Lafayette Parish	182	Data not available	The park includes a wetlands golf course.	No	No	No	No	Yes	No	No	No	Golf course
Indian Bayou	St. Landry, St. Martin	USACE	28,480	49,556	This area is primarily used for hunting.	7 trails (13 miles for hiking, biking, horseback riding), 4 trails (8 miles) for all-terrain vehicles	1 boat ramp, motor and non-motorized boating	Deer, small game, waterfowl, birds	Fishing from boat, bank; crawfishing	Yes	19 educational programs, interpretive panels	6 picnic tables		
J. Otto Broussard Memorial Park	Lafayette	Lafayette Parish	222	Data not available	The park includes a golf course and baseball fields.	No	No	No	No	Yes	No	No	No	Golf course, baseball complex
Jungle Gardens	Iberia	McIlhenny Family	250	Data not available	The gardens provide opportunities for viewing rare plants.	Yes	No	No	No	Yes	Yes	No	No	

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Lake Fausse Pointe SP	St. Martin	Louisiana Department of Culture, Recreation and Tourism	6,000	74,076	Lake Fausse Pointe SP, at the edge of a beautiful water wilderness was once part of the Atchafalaya Basin.	3 trails (5.65 miles)	1 boat ramp; motor and non-motorized boating; canoe rental	No	Fishing from boat, bank, pier	Yes	Visitor center, classroom, educational programming, interpretive panels	3 playgrounds, picnic tables, 5 picnic shelters	50 improved campsites; 5 unimproved camping areas; 18 rental cabins (annual usage 48,250)	Conference center; country store
Longfellow Evangeline SHS	St. Martin	Louisiana Department of Culture, Recreation and Tourism	157	14,495	The site was used during different periods to raise indigo, cotton, cattle, and sugarcane. The circa 1815 plantation house is the central feature of Longfellow-Evangeline SHS.	Yes	No	No	No	Yes	Yes	Picnic tables, 1 picnic shelter	Visitor center, museum, historic site, classroom, educational programming, interpretive panels	Amphitheater
Marsh Island SWR	Iberia	Louisiana Department of Wildlife and Fisheries	70,000	30,000	Marsh Island is virtually treeless and is very important as wintering grounds for blue and snow geese.	No	Motor, non-motorized boating	No	Fishing from boat, bank; crabbing, shrimping, shellfishing	Yes	No	No	No	
Moore Park	Lafayette	Lafayette Parish	130	Data not available	The park includes picnic areas and soccer fields.	Yes	No	No	Yes	Yes	No	Yes	No	Soccer fields
Rainey Audubon Wildlife Sanctuary	Vermilion	Audubon Society	26,000	Data not available	The park provides opportunities for viewing or hunting waterfowl.	No	No	No	No	Yes	Yes	No	No	
Shell Keys NWR	Iberia	U.S. Fish and Wildlife Service	Data not available	Data not available	Shell Keys was established in 1907 to protect part of the eroding coastline of Louisiana. Erosion has continued, but the islands still offer a resting area for shorebirds. Access to the refuge is only by boat.	No	Motor boating	No	Fishing from boat	Yes	No	No	No	
State Wildlife Refuge	Vermilion	Louisiana Department of Wildlife and Fisheries	13,000	Data not available	Established in 1911, State Wildlife Refuge borders Marsh Island SWR and the Paul J. Rainey (National Audubon Society) Sanctuary.	No	Motor, non-motorized boating	No	Fishing from boat, bank	Yes	No	No	No	

The State- and Federally-managed facilities in Planning Unit 3b vary widely in terms of the recreational opportunities provided. Table 7 is based on data gathered through a review of publicly available brochures, contacts with park and refuge managers, and site visits. It provides details about the availability of different types of recreational opportunities at each of the facilities.

The 2003-2008 Louisiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) provides a statewide inventory of recreation resources and identifies recreational needs. While regions defined in the SCORP do not fit perfectly within the LACPR planning unit boundaries, SCORP Region 4 is roughly coincident with Planning Units 3a and 3b. The State- and Federally-managed areas represent just a portion of the SCORP Region 4 recreational facilities, which are summarized above in the discussion of Planning Unit 3a.

Other recreational features in Planning Unit 3b are provided by parishes and historic communities that maintain historic plantation homes and the Chitimacha Indian Museum in Charenton. Planning Unit 3b also contains the 800 acre Lake Boeuf Wildlife Management Area, which is accessible only by boat and provides additional opportunities for hunting and fishing, and the 71,000 acre White Lake Preserve, which is a conservation area in Vermilion Parish.

LWCF funds have supported 100 different recreational projects in Planning Unit 3b since 1964. Actual LWCF expenditures not adjusted for inflation exceed \$8.6 million in Planning Unit 3b. Table 8 summarizes the number and cost of projects implemented in parishes in Planning Unit 3b. [Source: <http://waso-lwcf.nrc.nps.gov/public/index.cfm>]

**Table 8: LWCF Expenditures in Planning Unit 3b for Recreational Resources**

Parish	Number of Projects	Actual <sup>8</sup> LWCF Funds Expended
Iberia	22	\$1,365,375.88
Lafayette	36	\$2,092,836.67
St. Martin	11	\$607,530.00
St. Mary	22	\$4,161,318.35
West Baton Rouge	9	\$464,343.38
Total for Planning Unit 3b	100	\$8,691,404.28

## Planning Unit 4

Recreation areas in Planning Unit 4 include three National Wildlife Refuges, one Wildlife Management Area, one State Wildlife Refuge, and one State Park. These areas represent more than 269,000 acres that are visited more than 460,000 times annually. Recreation areas include more than 9.5 miles of trails for hiking and biking, three boat ramps, three visitor centers, one picnic shelter, one classroom, and one campground that is rented more than 36,700 times annually. Recreation areas provide opportunities for hunting, hiking, biking, boating, bird watching, fishing, crabbing, crawfishing, education, picnicking, education, camping, and playing.

Table 9 lists the State and Federal recreational facilities that are located in Planning Unit 4 and provides information about size and annual usage. For many sites, visitors are not counted because no parking or entrance fees are collected and there are many entrances to the areas.

<sup>8</sup> Dollar values expended in the years since 1964 are not adjusted for inflation.



**Table 9: State and Federal Recreational Resources in Planning Unit 4**

Name	Parish location	Managed by	Size in acres	Estimated number of visitors during 2007	Brief description	Trails	Boating	Hunting or trapping	Fishing	Observe Birds, Wildlife	Educational programs	Play, picnic, swim	Camping	Other
Cameron Prairie NWR	Cameron	U.S. Fish and Wildlife Service	24,548	Data not available	Cameron Prairie was established as a wildlife refuge in 1998 on land that had been used for commercial rice production for many years.	Yes, including a boardwalk	Boat ramp, motor boating	Deer	Fishing from boat, bank; crabbing	Yes; observation deck	Visitor center	No	No	
Lacassine NWR	Vermilion	U.S. Fish and Wildlife Service	35,000	Data not available	Lacassine NWR was established in 1937 to provide wintering habitat for waterfowl.	Yes	No	Deer, small game, waterfowl, birds, alligators	Fishing from boat, bank	Yes	No	No	No	
Rockefeller SWR	Cameron and Vermilion	Louisiana Department of Wildlife and Fisheries	76,000	80,000	The deed to this property required that it be maintained as a wildlife refuge, boundaries be posted, the area be protected from trespassers and poachers, no public taking of fish or animals be allowed unless it is compatible with the management goals, refuge staff study and manage the property for wildlife, and mineral revenues be used to meet the mission of the refuge.	No	Motor, non-motorized boating	Small game	Fishing from boat or bank; crabbing, shrimping	Yes	Classroom	No	Lodging for staff and researchers	Laboratory facilities for research
Sabine Island WMA	Calcasieu	Louisiana Department of Wildlife and Fisheries	8,743	1,750	Sabine Island is accessible only by boat and the area floods frequently.	No	Motor and non-motorized boating	Deer, small game, waterfowl, birds	Fishing from boat, bank; crawfishing	Yes	No	Area for water skiing and wind surfing	No	
Sabine NWR	Cameron	U.S. Fish and Wildlife Service	124,511	280,000	Sabine NWR was established in 1937 to provide habitat for migratory waterfowl and other birds. There are more than 150 miles of canals, bayous, and waterways in the area.	Yes (1.5 miles)	Motor and non-motorized boating	Waterfowl, birds	Fishing from boat, bank, pier; crabbing	Yes; observation deck	Visitor center, educational programming, interpretive panels	No	No	Auditorium (films)
Sam Houston Jones SP	Calcasieu	Louisiana Department of Culture, Recreation and Tourism	1,087	97,627	Tree-filled lagoons and a mixed pine and hardwood forest combine to create a unique natural environment and bird watching is always excellent at the park.	5 trails provide 8 miles for hiking and mountain biking	2 boat ramps; motor and non-motorized boating; boat rental	No	Fishing from boat, bank	Yes	Visitor center, educational programming, interpretive panels	Playground, picnic tables, picnic shelters	61 improved campsites; 20 unimproved campsites; 12 rental cabins (total annual number of campers is about 36,718)	

The State- and Federally-managed facilities in Planning Unit 4 vary widely in terms of the recreational opportunities provided. Table 9 is based on data gathered through a review of publicly available brochures, contacts with park and refuge managers, and site visits. It provides details about the availability of different types of recreational opportunities at each facility.

The 2003-2008 Louisiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) provides a statewide inventory of recreation resources and identifies recreational needs. While regions defined in the SCORP do not fit perfectly within the LACPR planning unit boundaries, SCORP Region 5 is roughly coincident with Planning Unit 4. The State- and Federally-managed areas represent just a portion of the more than 383,000 acres of recreational facilities inventoried for SCORP Region 5. Federal, State, parish, and municipal public recreational facilities provide more than 134,000 acres for hunting, 89 boat ramps, 1,054 picnic tables, ten beaches, and 154 acres for camping with 282 tent sites and 825 trailer sites. The SCORP-prioritized needs in this region include promoting southwest Louisiana for birding, hunting, cycling; improving access to water-based recreation with additional roads, parking facilities, boat ramps, and fishing piers; providing additional public restrooms and picnic facilities.

Other recreational features in Planning Unit 4 are provided by parishes and historic communities that attract visitors to a variety of heritage and cultural festivals, historical sites, and parks offering opportunities for active and passive recreation that includes tennis courts, soccer and softball fields, swimming pools, and golf courses. Large bodies of water available for recreation include the 59,700-acre Sabine Pass Lake and the 52,700 acre Calcasieu Lake. The Baton Rouge Audubon Society owns and manages the 40-acre Peveto Woods Sanctuary, and privately operated Niblett’s Bluff Park provides opportunities for camping, picnicking, fishing, and boating on the Sabine River.

LWCF funds have supported 69 different recreational projects in Planning Unit 4 since 1964. Actual LWCF expenditures not adjusted for inflation exceed \$5.6 million in Planning Unit 4. Table 10 summarizes the number and cost of projects implemented in parishes in Planning Unit 4. [Source: <http://waso-lwcf.ncrc.nps.gov/public/index.cfm>]

**Table 10: LWCF Expenditures in Planning Unit 4 for Recreational Resources**

<b>Parish</b>	<b>Number of Projects</b>	<b>Actual<sup>9</sup> LWCF Funds Expended</b>
Calcasieu	28	\$2,392,393.51
Cameron	4	\$174,783.06
Jefferson Davis	15	\$1,500,892.45
Vermilion	22	\$1,619,823.56
Total for Planning Unit 4	69	\$5,687,892.58

### ***Potential Effects of Non-LACPR Alternatives***

This section identifies the potential effects of the various alternative projects that have been proposed or are under consideration, exclusive of the LACPR alternatives. Potential effects were identified through an analysis of focus group interview data and show that future projects may have beneficial as well as detrimental effects upon recreation areas and upon the recreation opportunities available to residents and visitors to the area.

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<sup>9</sup> Dollar values expended in the years since 1964 are not adjusted for inflation.

Generally, projects that improve access to recreation areas or increase the diversity of species in an area will be beneficial to recreation. Projects that impede access to open waters or limit birding, hunting or fishing areas will be detrimental to recreation.

Figures 2 through 6 show the names and locations of State and Federal parks and wildlife management areas in each of the 5 Planning Units.

Figure 7 shows the locations of non-LACPR projects that are scheduled or under consideration for implementation by 2025 in Planning Units 1 and 2. Figure 8 shows the locations of non-LACPR projects that are scheduled or under consideration for implementation by 2025 in Planning Units 3a, 3b, and 4. The determination of which recreation areas are most likely to be affected by different types of projects is based on proximity to project locations. The following paragraphs discuss the potential effects of freshwater diversion, borrow pits, dredging, marsh creation, shoreline restoration, and hydrologic restoration projects.

Freshwater diversion projects will benefit freshwater fishing by increasing the area in which freshwater fish live, but will be detrimental to saltwater fishing because to reach saltwater, people will have to travel further towards the Gulf. Diversion projects must be diligently monitored to detect any accumulation of heavy metals and nutrient loads, which can negatively affect fish quality. Diversion projects must also be monitored because non-native plant species can flourish when salinity levels are reduced, and removing non-native plants can be very expensive for recreation areas. Due to proximity, diversion projects will most likely affect the Maurepas Swamp Wildlife Management Area, Delta National Wildlife Refuge, Mandalay National Wildlife Refuge, and Atchafalaya Delta Wildlife Management Area.

The borrow pits that will be created to supply material for structural projects may benefit recreational fishing by providing additional public access to fishing, additional ponds for freshwater fishing or for fish hatcheries, and additional habitat for waterfowl. If the borrow pits are large and in areas where there never was a recreational area, the borrow pits may provide entirely new recreation opportunities.

Using dredged materials to increase marshes will benefit recreation by increasing the nesting areas for birds. However, dredging projects can hurt fishing resources by decreasing water clarity, disturbing long-buried contaminants, and contributing to salt water intrusion, and must be timed so that they will not interfere with migration patterns of fish. Dredging project must be monitored closely to identify any unanticipated changes in salinity. Dredging may provide a benefit for recreational boating by opening up waterways, but may also be detrimental to recreation areas if the use of motorized boats leads to acceleration in rates of erosion. Due to proximity, dredging projects will most likely affect the Delta National Wildlife Refuge, Sabine NWR, Cameron Prairie NWR and Pass A Loutre Wildlife Management Area.



Figure 2: Locations of State and Federal Recreational Resources in Planning Unit 1

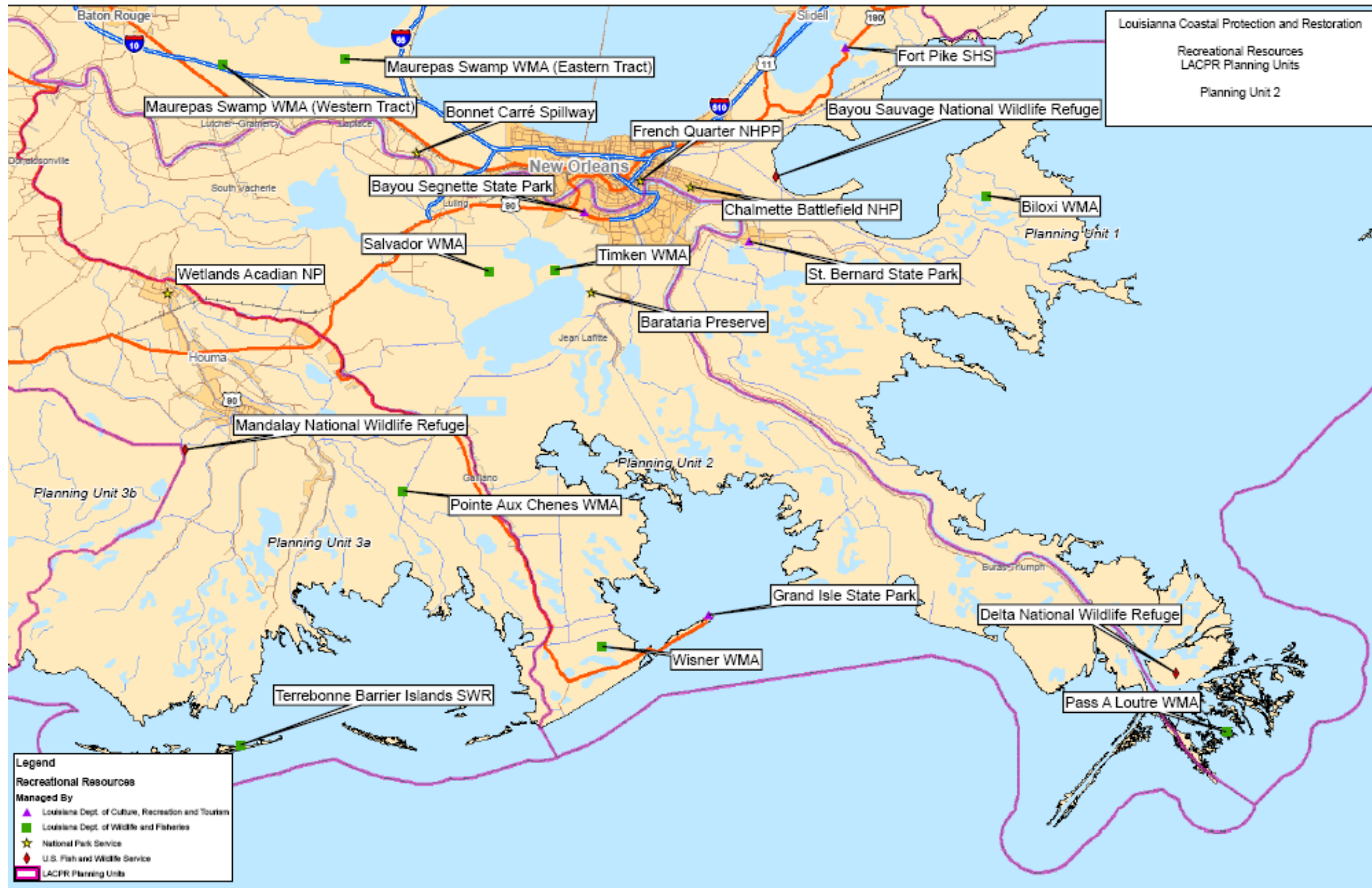


Figure 3: Locations of State and Federal Recreational Resources in Planning Unit 2





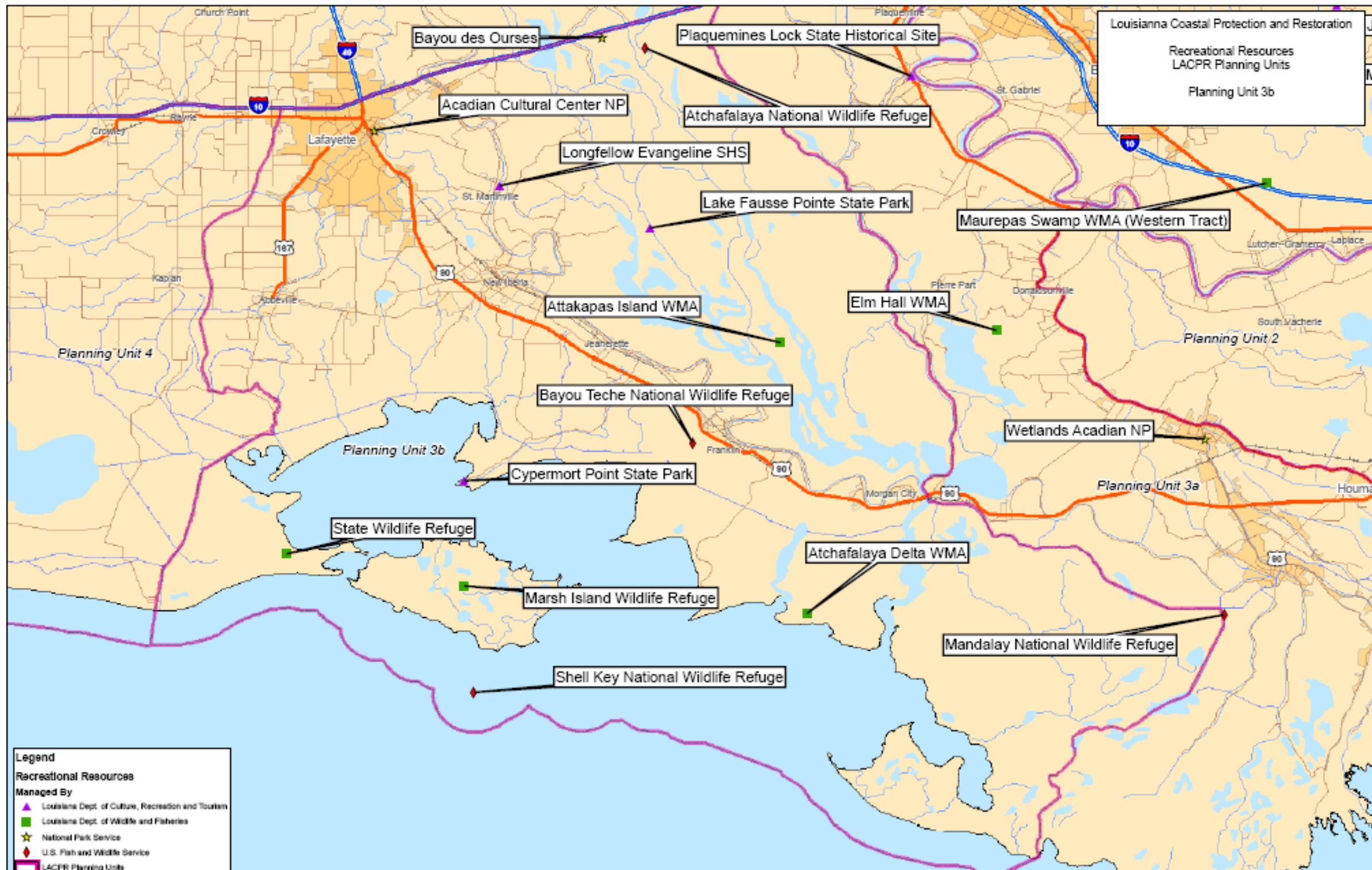


Figure 5: Locations of State and Federal Recreational Resources in Planning Unit 3b



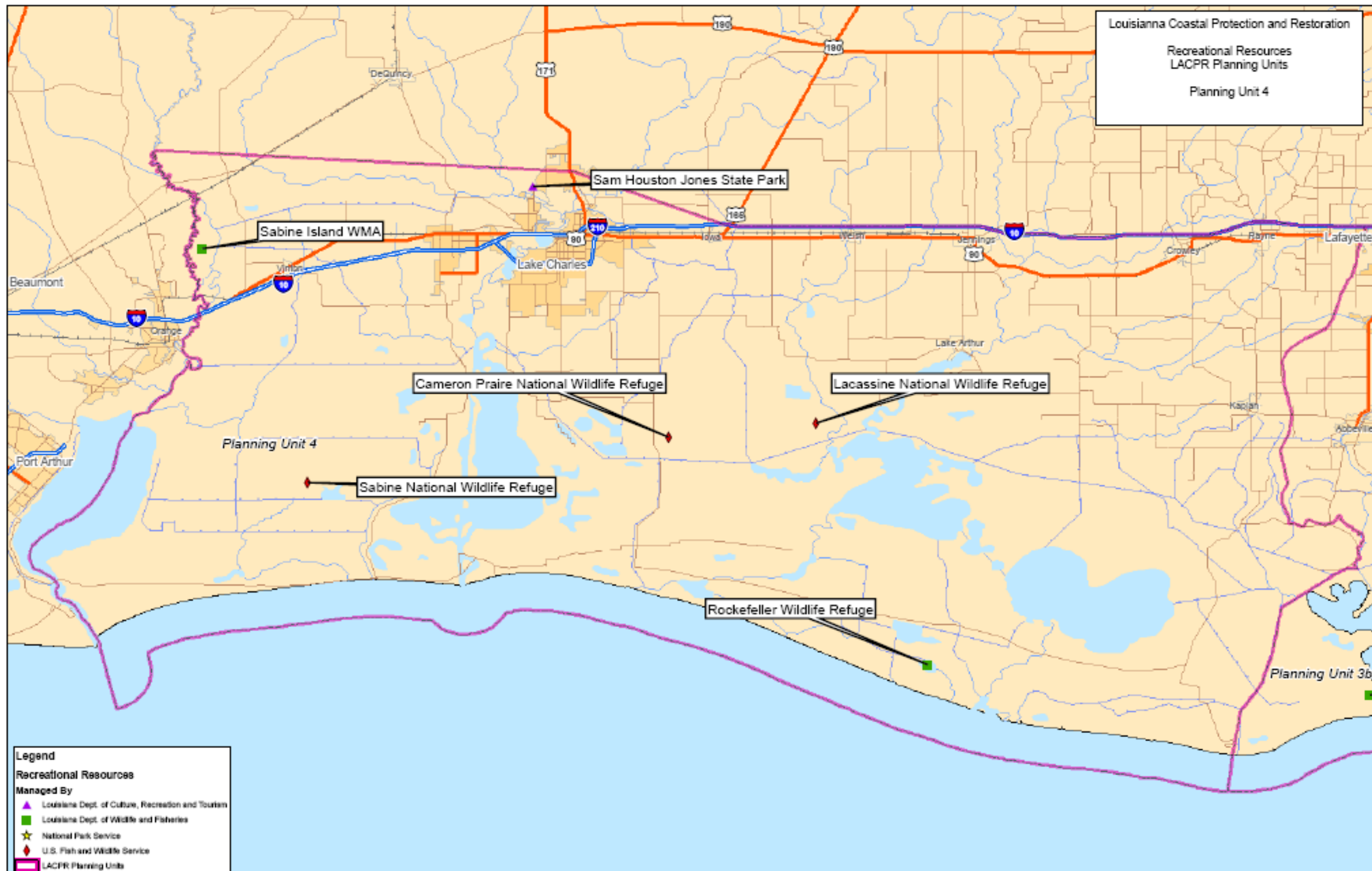


Figure 6: Locations of State and Federal Recreational Resources in Planning Unit 4

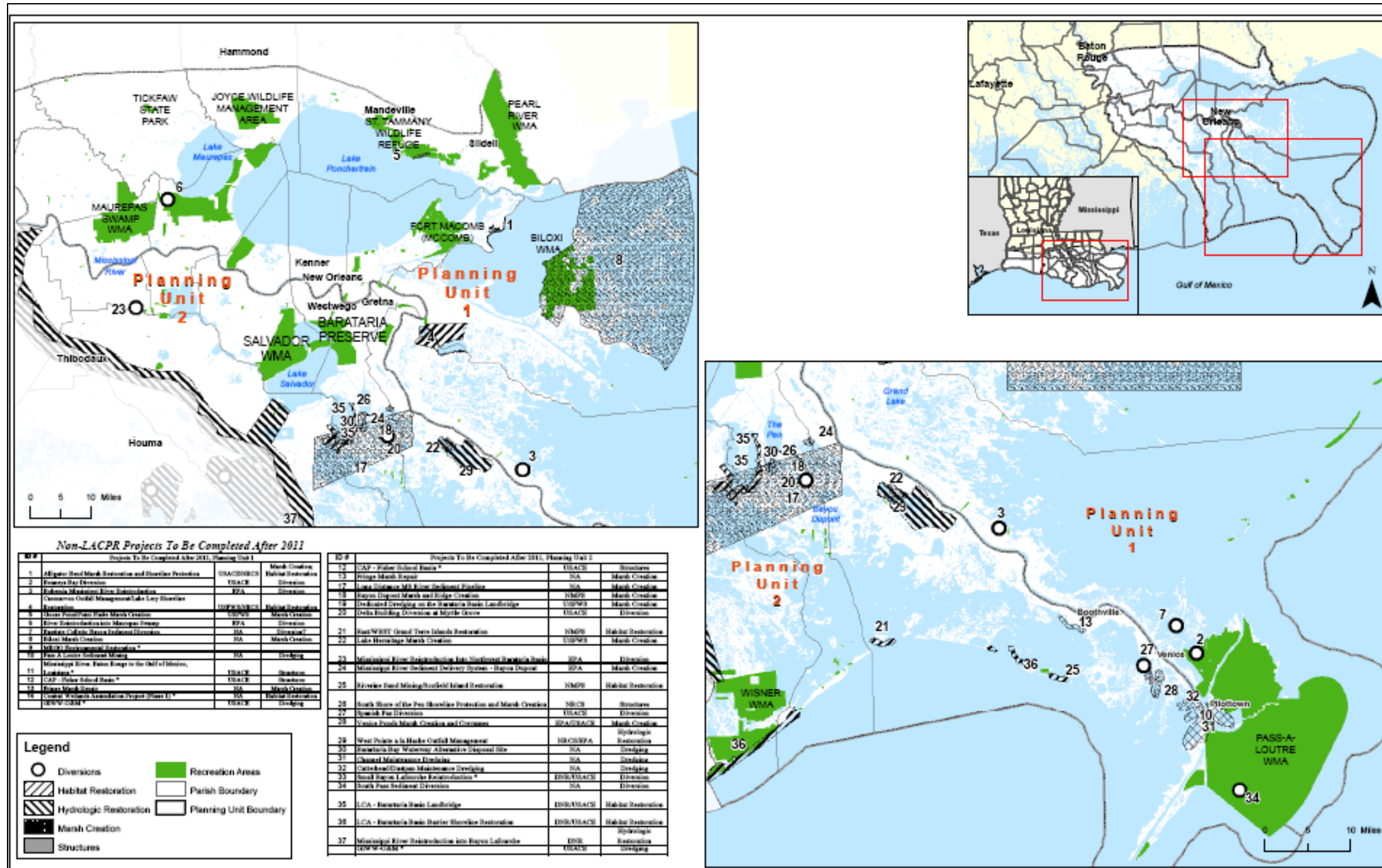


Figure 7: Locations of Recreation Areas and Planned Non-LACPR Projects in Planning Units 1 and 2

\*Sources: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007



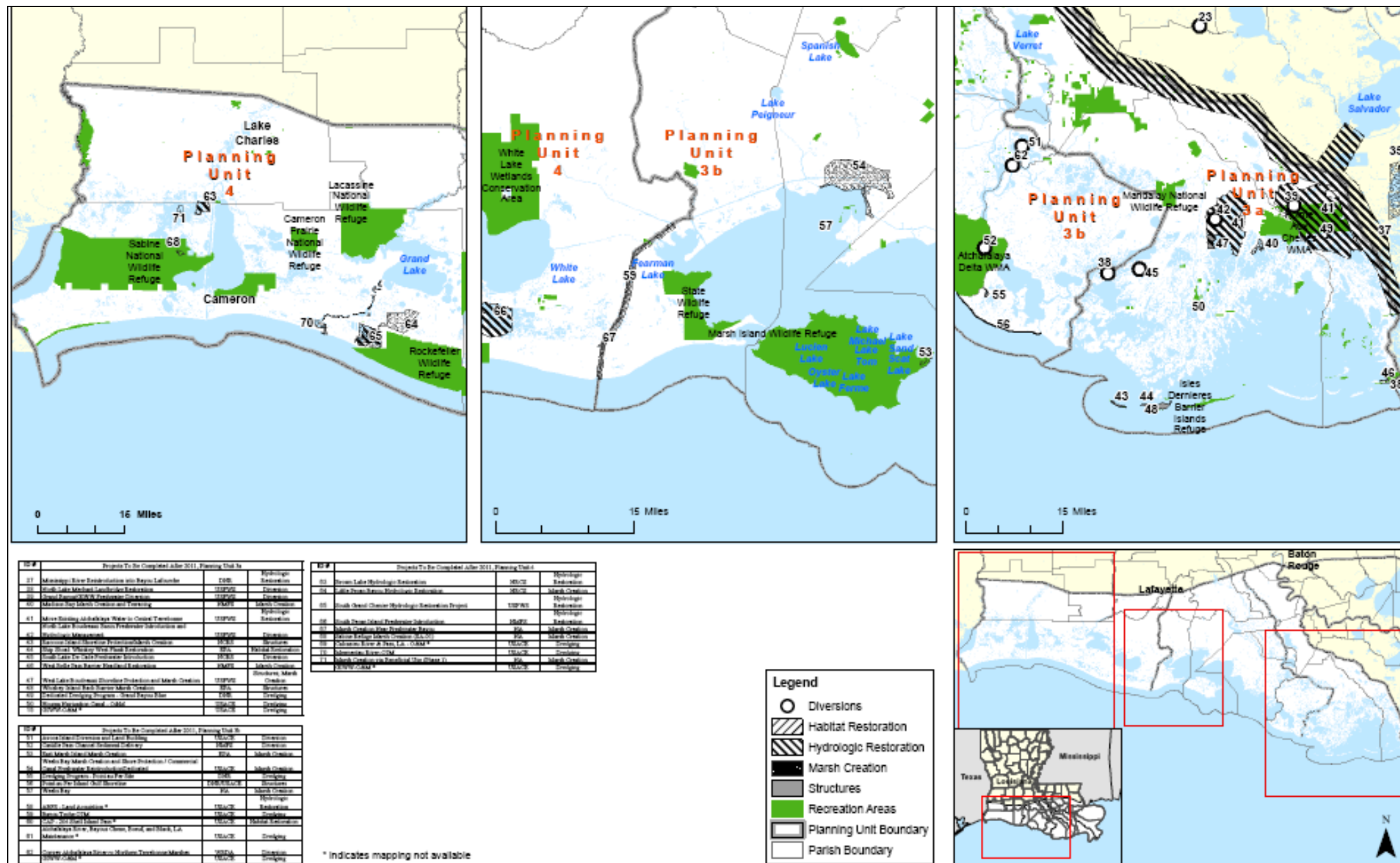


Figure 8: Locations of Recreation Areas and Planned Non-LACPR Projects in Planning Units 3a, 3b, and 4

\*Sources: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007



Marsh creation projects will benefit recreation by providing additional land for birding and hunting but may be detrimental for recreational boating as open waters are removed. Due to proximity, marsh creation projects will particularly benefit the Biloxi Wildlife Management Area.

Barrier shoreline restoration projects will provide for recreational areas and will generally benefit recreation by providing increased areas for bird nesting. Shoreline projects cause silt and sediment to accumulate along shorelines, which facilitates access to the water, providing a benefit to recreational fishing. In Planning Unit 4, reforestation of the Cheniers would be a key component of shoreline restoration projects, and would provide additional nesting areas for birds. Restored barrier islands may also make it possible to expand recreation opportunities by allowing, for example, camping in the Rockefeller Wildlife Refuge.

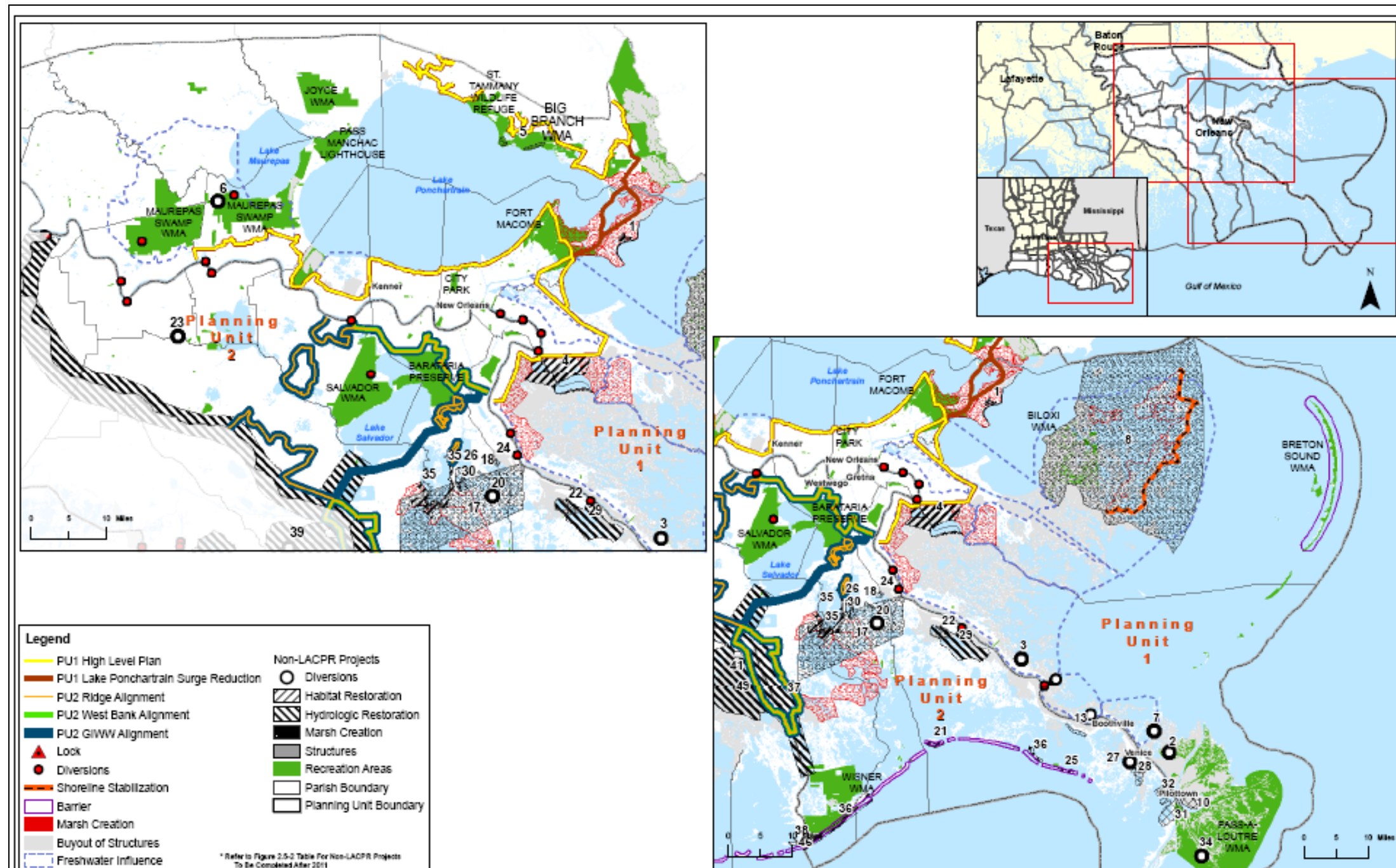
Hydrologic restoration projects will restore natural flows of water and, due to proximity, will particularly benefit the Wisner Wildlife Management Area, Sabine National Wildlife Refuge, Rockefeller Wildlife Refuge, State Wildlife Refuge, and Pointe Aux Chenes Wildlife Management Area. The benefits of hydrologic restoration projects will be increased opportunities for fishing, birding, and increased diversity of species due to the improved nourishment of native plant and animal life. However, projects that alter water flow can be dangerous for recreational boating if, for example, they create new currents with which boaters are unfamiliar.

### ***Potential Effects of LACPR Alternatives***

With LACPR, additional coastal restoration, structural and nonstructural projects will be implemented, and these may be beneficial or detrimental to recreation areas and to the provision of recreational opportunities. Figures 9 and 10 show the locations of both non-LACPR and LACPR projects, as well as the locations of designated recreation areas. The figures depict the location of only the potential LACPR projects that the February 2008 Draft Louisiana Coastal Protection and Restoration Technical Report<sup>10</sup> identifies as the projects that are anticipated to have the greatest impact on the area. The recreation areas that are identified in this section as most likely to be affected by a particular type of project appear to be in close proximity to the projects that are anticipated to have the greatest impact.

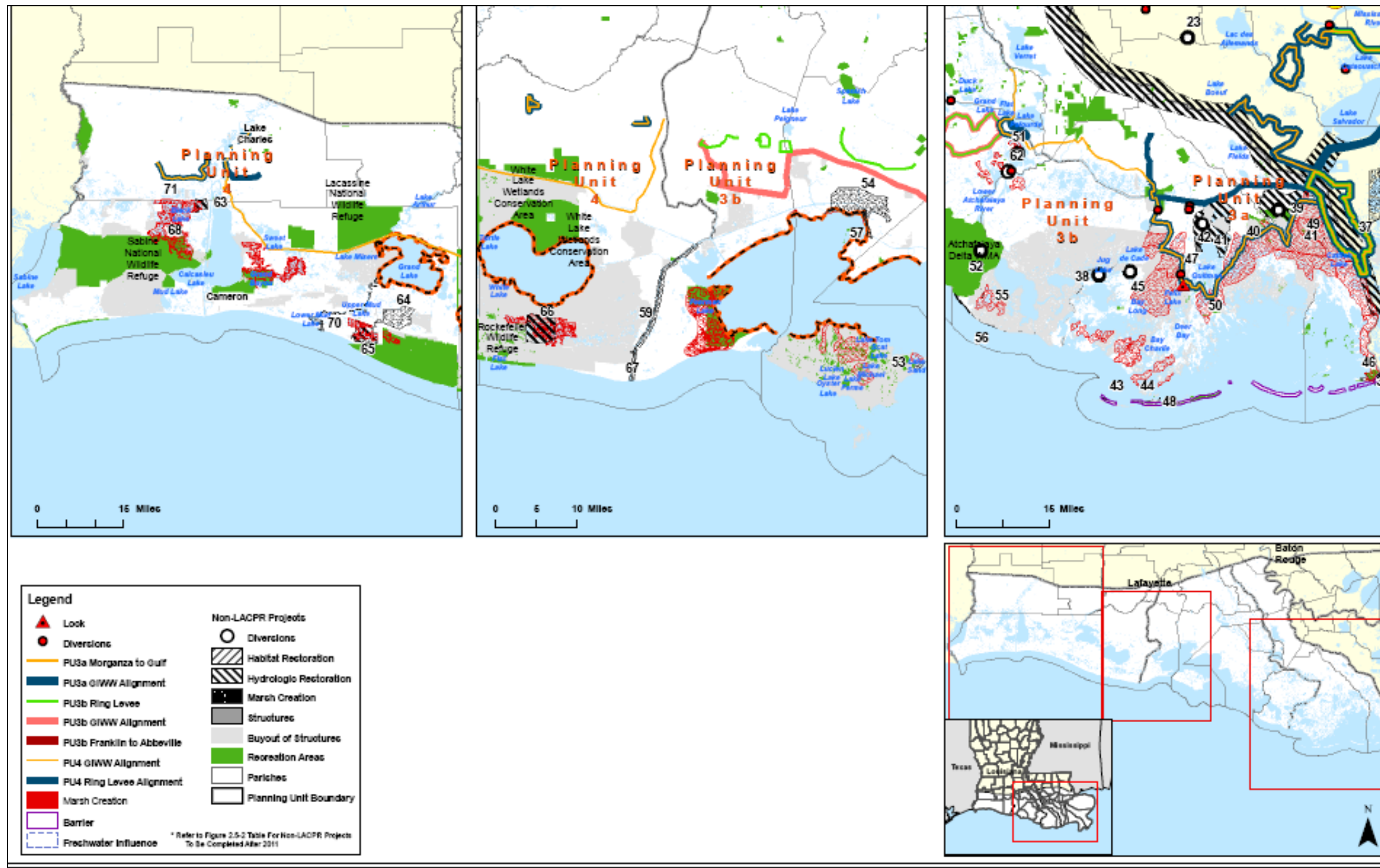
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<sup>10</sup> USACE, 2008. Draft Louisiana Coastal Protection and Restoration Technical Report. Available online June 1, 2008 at: [http://lacpr.usace.army.mil/default.aspx?p=LACPR\\_Draft\\_Technical\\_Report](http://lacpr.usace.army.mil/default.aspx?p=LACPR_Draft_Technical_Report)



**Figure 9: Locations of Recreation Areas and LACPR Alternatives in Planning Units 1 and 2**

\*Sources: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007



**Figure 10: Locations of Recreation Areas and LACPR Alternatives in Planning Units 3a, 3b, and 4**

\*Sources: Recreation Areas, EPA 2002; USDOT Bureau of Transportation Statistics 2006; Louisiana Division of Administration, State Lands Office 2007; USFWS 2006; Louisiana Department of Wildlife and Fisheries 2001; Louisiana Department of Transportation and Development 2007

Coastal restoration measures may include freshwater diversion projects to bring sediment into coastal areas or to restore natural salinity levels to encourage native vegetation. Such measures may change the diversity of fish in specific areas and may be either beneficial or detrimental to recreation areas. Freshwater diversion may benefit recreational fishing as more desirable species are brought into an area or as more areas become accessible or available for bank fishing, but may be detrimental as desirable species move further away.

Freshwater diversion measures can be beneficial by creating new opportunities for recreation. For example, near St. Bernard State Park, the Caernarvon freshwater diversion project has resulted in an increase in the population of bass. Residents are presently evaluating the possibility of creating a bass fishing tournament. While such an event may benefit the area by bringing in additional revenue, it may also be costly to the area if there is overwhelming demand for space on roads and in hotels.

Freshwater diversion measures may be detrimental to recreational saltwater fishing as fish habitat is altered. In Planning Unit 4, for example, 14,000 people participate in a saltwater fishing tournament each year. This tournament is an important component of tourism in the area, and if saltwater estuaries are changed, the tournament and the economic benefit it produces annually may be in jeopardy.

Another example of changes in the places where particular species live concerns the Bonnet Carré spillway between the Mississippi River and Lake Pontchartrain. There are usually manatees in the brackish waters on the north shore of Lake Pontchartrain near Fontainebleau State Park in the summer, and seeing them is a benefit for visitors to the park. However, with freshwater diversion through the Bonnet Carré spillway due to high water in the spring of 2008, the water on the north shore has become less brackish, so the manatees remain further east, nearer to the Gulf, denying park visitors the opportunity to view manatees.

Due to proximity, freshwater diversion projects are most likely to affect fishing in the Salvador-Timken and Maurepas Swamp Wildlife Management Areas.

One potential structural coastal restoration measure, designed to reduce erosion, is the placement of rocks or other barriers parallel to a shoreline. Due to proximity, shoreline stabilization measures may particularly benefit recreational opportunities in Sabine, Cameron Prairie, and Lacassine National Wildlife Refuges by creating additional areas for bank fishing. However, there is a potential for the creation of rip tides near swimming areas which would be a negative effect of this type of shoreline restoration. For example, rocks placed parallel to the shoreline of Grand Isle State Park to protect it have caused unanticipated rip currents.

Structural measures under consideration through LACPR are the creation of additional levees or increasing the height of existing levees. An expanded and improved levee system will have both beneficial and detrimental effects to recreation areas and to recreational opportunities.



Increased levees will benefit recreation areas by providing additional protection to the structures and utility systems at recreational areas, which will decrease the amount of time that the areas cannot be used following severe storms. Following Hurricane Katrina, many recreational areas were used for several months for temporary housing.

Additional levees will also be beneficial to recreation by providing new recreational opportunities such as the development of bike trails along the levees that may connect with existing trails.

Increased levees will be detrimental to recreation if they necessitate the destruction of cabins that are currently available for vacation rentals along waterways in State Parks. At Bayou Segnette State Park, a larger levee, depending upon the design, might also necessitate the destruction of a swimming pool because it is located near the base of the current levee. Due to their proximity to potential projects to increase the size of levees, the following parks and refuges are most likely to be affected: Bayou Sauvage, Big Branch Marsh, Bayou Teche and Lacassine National Wildlife Refuges, St. Tammany Wildlife Refuge, the Bonnet Carre Spillway, Fairview-Riverside and Fontainebleau State Parks, and the Maurepas Swamp, Pearl River, Salvador-Timken, and Point Aux Chenes Wildlife Management Areas.

Increased levees along Highway 82, which is along a natural levee or Chenier in Planning Unit 4, will also be detrimental to recreation if the projects necessitate the destruction of homes along the roadway. This will negatively affect recreation in the area because these are the homes of many guides and people who work to support recreation in the area.

Increased levees will be detrimental or more costly to recreation areas by requiring longer access roads so that the grade over the higher levees will be manageable for mobile homes and a boat trailers.

Nonstructural measures under consideration through the LACPR efforts include elevation or acquisition of structures. Elevation projects will result in flood waters and storm surge passing safely below a structure, and acquisition projects will result in the removal of structures that are likely to be damaged by flooding or storm surge. Additionally, the acquired property will be used as open space in perpetuity.

Elevation projects will be beneficial to recreation areas as elevated structures will create less debris that must be removed following a flood. The Louisiana State Parks are considering building floating cabins rather than elevated cabins to protect them from flood and storm surge damage.

However, elevation requirements may affect recreation areas negatively because elevated fishing piers will change the fishing experience by elevating people well above the water surface. Elevation requirements will also affect recreation areas negatively by adding costs. For example, it will be more costly to elevate bath houses and cabins, and



handicapped access ramps will either have to be very long to provide for a reasonable grade or will have to be replaced by more costly marine grade elevators.

Elevation requirements may lead to there being fewer hunting clubs in southern Louisiana because elevated structures will be more costly to erect. This will negatively affect recreation opportunities because people will have to travel further to access locations for activities such as hunting, fishing, boating, and birding.

Elevation requirements may be detrimental to recreation because many recreation workers who live and work in the area may not be able to afford to meet elevation requirements for their own homes and will choose to move away from the area. These workers provide the skills necessary to guide recreational visitors safely through the wetlands, marshes, and open waters and are available to respond to emergencies. Without having guides and recreation workers living near recreation areas, there will not be skilled personnel nearby to respond quickly to emergency situations that occur when people are lost or injured in the area.

Acquisition projects may have a similar detrimental effect on recreation by causing low-income people who support recreation areas to leave the area, which will, in turn, cause businesses that support both the local population and others who come to enjoy recreational areas to leave the area. Participants in the focus group meetings explained that while acquisition projects are designed to remove residents from the risk of loss due to flooding or storm surge, residents of the area often choose to live there and accept the risk because they value highly the opportunity to live where there are opportunities to hunt and fish and enjoy the natural environment. Due to proximity, acquisition projects are most likely to affect Pearl River and Point Aux Chenes Wildlife Management Areas, the State and Rockefeller Wildlife Refuges, and the Lacassine, Cameron Prairies, and Sabine National Wildlife Refuges.

## ***Conclusion***

The effects of the wide variety of proposed or potential projects to be implemented through various Federal and State agencies are likely to be both beneficial and detrimental to recreation areas and to the recreational opportunities provided. Generally, projects that result in an increase in the variety of native plant and animal species, restore natural environmental conditions to the area, provide greater to residents and tourism and expand recreational opportunities will be beneficial to recreation in the LACPR area. Projects that will reduce access to recreational areas, allow non-native species to thrive, disturb long-buried contaminants, create dangerous situations, reduce the availability of workers and volunteers that are necessary to support recreation areas, or increase the costs of maintaining recreation areas will be detrimental to recreation in the LACPR area. As many potential projects will result in both beneficial and detrimental effects, it will be necessary to carefully evaluate the effects of any potential project on recreational resources as well as to other assets before determining that it is the most appropriate

project for the area and for meeting economic development, hurricane protection, and resource conservation objectives.

## ***Appendix***

## Focus Group Meeting Notes – Planning Units 1 and 2

**Date** Tuesday May 13, 2008  
**Time** 10:00 AM – 12:00 Noon  
**Location** URS Corporation  
10<sup>th</sup> Floor Conference Room,  
3500 North Causeway Blvd.  
Metairie, LA 70002

### Attendees

Name	Affiliation	Type of Agency Represented
Steven Pelronnin	Coalition to Restore Coastal LA	Nonprofit
Matt Rota	Gulf Restoration Network	Nonprofit
John Lopez	Lake Pontchartrain Basin Foundation	Nonprofit
Barry Kohl	National Audubon Society	Nonprofit
Charlie Gauthier	State Parks	State
Denise McKinney	State Parks	State
Andrew Perez	USACE	Federal
Christi Wilson	URS Corporation	Not applicable
Mary Shaw	URS Corporation	Not applicable

### Summary of Comments Regarding Freshwater Diversion Projects

- Salinity will change.
- Habitat will change for both plants and animals.
- Pre-project and post-project monitoring is needed. Davis Pond is an example of a project for which additional monitoring is in order.
- Nutrient loads will need to be monitored; these will result in algae blooms, which will affect fish negatively.
- There is the possibility of accumulation of heavy metals, which will affect fish quality and result in consequences to recreational fishing.
- Positive effects may be more and better access to recreational areas.
- Diversions may change access to areas that are currently accessed through bayous and canals.
- This will change water and land habitat, which will mean a change in the types of birds, wildlife, and fish.
- Positive effects could be greater access, more abundant fish, wildlife, and birds.
- This may make recreational resources more sustainable.
- With changes in the species, recreational fisherpersons will have to go further to catch salt water fish; may also mean bigger bass area and that people will be able to catch freshwater fish near boat launches.

### Summary of Comments Regarding Dredging Projects

- Diminished water quality or clarity is a temporary effect.
- Disturbance of water has a negative effect on fish; this is mainly a lack of oxygen.
- Dredging can interfere with migration of the threatened Gulf Sturgeon, so timing of dredging is an important consideration.



- Erosion caused by larger draft boats if possible if dredged channels are used for navigation.
- Salt water intrusion is possible due to dredging.
- Contaminated dredge materials are susceptible to disturbance by storm surge and may leach into marshes.
- Dredging may lead to people using bigger, faster boats, which will cause more erosion.
- Placement of dredge materials can establish more marshes; this is a benefit.
- Dredging may mean movement of contaminants that have long been buried, which will be harmful to fish.
- This will alter a recreational area if more land or marsh is built and there is less open water.
- Dredging will potentially change the salinity.
- Dredging can be better for boating if waterways are more passable.

#### **Summary of Comments Regarding Barrier Island Restoration**

- Restoring the bird nesting sites will be beneficial.
- Borrow sites may be too close to the islands themselves; this can change wave/tidal forces and actually can increase erosion.
- Grand Isle historically used borrow sand from Chenier Islands, which caused deterioration of the Cheniers.
- More and better barrier islands will protect recreational resources as well as the rest of the coastline.
- Seems generally to be beneficial for recreation because there will be more habitat, increased bird nesting areas.
- With restored barrier islands, there will be the possibility of allowing camping on islands.

#### **Summary of Comments Regarding Restoration of Natural Flow of Water**

- Redirection of water could cause land loss.
- Changing the flow of water may lead to sedimentation.
- This may cause changes in migration/wandering habits of land animals.
- Generally, effects will be the same as the freshwater diversion effects.
- This could also create new dangerous currents.
- This could lead to new erosion problems.
- This could be very unsafe for boating as water behaves (flows) differently than boaters have come to expect.

#### **Summary of Comments Regarding Shoreline Protection**

- May reduce fishing access.
- Fish dips need to be created for movement of fish.
- May reduce duck habitat with marsh creation.
- Likely to lead to more erosion and land loss.
- Likely to hurt fringe marshes.
- Likely to hurt fishing.
- Likely to remove some access.

### **Summary of Comments Regarding Increasing the Height of Existing Levees**

- Borrow locations could be a negative impact of increasing levee heights.
- Borrow locations may add ponds, thus more areas for duck hunting and for boating.
- But if raising levees where the levees are crossed for boat access (roadways up and over the levees to get to the water) must preserve this access.

### **Summary of Comments Regarding the Construction of New Levees**

- Radical alteration of landscape both outside and inside the levees is a likely consequence.
- May reduce opportunity for restoration on the flood side of the levee.
- Will affect habitat / estuaries, may change salinity, may be more water outside of the levee than in the past.
- Basically detrimental to recreation.
- This too can affect access to water for boating, fishing.

### **Summary of Comments Regarding Elevation of Structures**

- No effect if elevation is on piers, but if elevation is on fill (dirt) effects will be negative.
- Can be a good mitigation measure if areas are subsiding.
- Can be beneficial if won't have to rebuild park facilities.
- Beneficial because won't have all that debris from structures that are damaged by flooding that has to be removed from recreational areas and that fills in the channels.

### **Summary of Comments Regarding Property Acquisition or Buy-Out Projects**

- Detrimental because recreation is dependent upon access to water.
- Landowners would be further away from water making access more difficult.
- Sewerage from camps along waterways currently goes almost directly into water; elimination of camps would thus improve water quality.
- Open space is a help to recreation.
- Might move people further away from recreation areas.

### **Summary of Comments Regarding the Relocation of Structures**

- People will have to travel further to recreational areas possibly.
- There will be less raw sewage discharged into waterways; this is a benefit for recreational fishing, boating.

### **Additional recreational sites suggested for future study**

- Lake Pontchartrain Sanctuary is an open waterway for fishing, bird sanctuary on southeast shore of Lake Pontchartrain. The area is managed by LA Wildlife and Fisheries.
- Recreational areas include regulated fishery areas, artificial (oyster) reefs; oyster reefs are reestablished by piling old oyster shells offshore; the artificial reefs are created with limestone.

- Scenic Rivers are also recreational resource; this is a national system with buffers on either side of the rivers; they are for recreation as well as wildlife habitat.
- There is an additional recreation area called Bohemian Spillway or Pointe a la Hache Wildlife Sanctuary.
- Fort Lacombe in Planning Unit 1 and Fort Livingston in Planning Unit 2 are additional recreational areas.
- Blind River may be an additional area of land managed by LADNR near Joyce/Manchac/Maurepas WMA.
- The Atchafalaya Heritage Area is managed by National Park Service.
- State Owned Water bottoms are regulated public areas used for recreational fishing; the State Land Office has information about such areas.
- Wax Lake is a recreation area near Atchafalaya.
- White Lake Preserve may be managed by Audubon Society or by Wildlife and Fisheries; hunting is allowed in this area.

## Focus Group Meeting Notes – Planning Units 3a and 3b

**Date** Wednesday May 14, 2008  
**Time** 1:30 PM – 3:30 PM  
**Location** Vermilion Parish Library  
Meeting Room  
405 East Saint Victor Street  
Abbeville, LA 70510

### Attendees

Name	Affiliation	Type of Agency Represented
Joseph Vallee	LA Birdwatchers Anonymous	Nonprofit
Judith O’Neale	LA Ornithological Society	Nonprofit
Clifford Melius	LA State Parks	State
Cassidy Lejeune	LA Wildlife and Fisheries	State
Mike Carloss	LA Wildlife and Fisheries	State
Tony Vidrine	LA Wildlife and Fisheries	State
Travis Dufour	LA Wildlife and Fisheries	State
Sarah Clardy	US Fish and Wildlife	Federal
Mary Shaw	URS Corporation	Not applicable

### Summary of Comments Regarding Freshwater Diversion Projects

- Diversions will change types of fish species, new species will move in.
- If species change, people who come to the area for recreation will change because people go to catch certain types of fish.
- There are usually manatees, who like brackish water, in the summer in Lake Pontchartrain near Fontainebleau State Park; but due to Bonnet Carré spillway opening the water is now more fresh so the manatees are further east, nearer to the Gulf.
- Change in salinity will change the vegetation.
- There is the problem of exotic plants; with fresher water they flourish, which is bad because they choke off native species; it costs lots of money to remove them.
- Hurricane Rita changed water salinity by making it more salty, which changed the vegetation, which in turn changed the bird habitat.
- Caernarvon diversion has affected St. Bernard State Park. People want there to be a bass tournament, which could be an economic boon to the area bringing in people/visitors but which will also cause difficulties such as extra traffic, and additional demands for housing, water, and so forth.

### Summary of Comments Regarding Dredging Projects

- Can use materials beneficially and create upland habitat.
- This has happened in the past and now there is deer hunting season where there used to be open bay (water), so it can increase recreational opportunities.
- With more land there will be more areas for birding, hunting of large and small game.

- But filling in open water will hurt access; it means we can't go where used to go to hunt or fish.
- More freshwater areas mean greater duck hunting area.
- Grand Isle State Park benefits from dredging because they can move sand back to the beaches (beach re-nourishment); this has been done and now there is tent camping on the beach where there didn't used to be a beach. They are dredging a sandbar that is in the ship channel.

#### **Summary of Comments Regarding Barrier Island Restoration**

- Big nesting sites have been built up by developing breakwaters and doing dredging to replenish barrier islands.
- Now only Raccoon Island, part of Isles Dernieres WMA is a good place in that area to fish, but there is no camping allowed; it is not clear if barrier restoration can change this because of the rough seas.

#### **Summary of Comments Regarding Restoration of Natural Flow of Water**

- Consequences of this will be the same as beneficial use of dredge materials.
- This will increase fishing and hunting possibilities and may provide better access to some areas.

#### **Summary of Comments Regarding Shoreline Protection**

- Effects will be similar to barrier island restoration.
- It will affect fish habitat.
- It may increase fishing opportunities or at least opportunities for surf fishing.
- There will be more beach area for public use.
- There will be more recreational boating.
- Negative consequence may be rip tides; this has happened at Grand Isle where rocks were placed offshore and parallel to the shoreline to protect the shoreline. It has caused unanticipated rip currents and a negative, dangerous effect for swimmers.
- Protection might mean that they will have to replace the sand less often.
- Protecting the shoreline will protect the marsh area behind the shoreline.

#### **Summary of Comments Regarding Increasing the Height of Existing Levees**

- State parks will lose 20 cabins because the large base of the levee will be where the cabins currently are; Bayou Segnette will also lose a swimming pool.
- It will be harder to drag the RV/mobile homes up and over the higher levees to get to campgrounds.
- We will have to build roads from way back to get a workable grade; so the effect is longer, more costly roadways in parks for camping opportunities.
- The large levees will take marsh land out of the system.
- The borrow pits may take marsh land and turn it into open water.
- The higher levees may reduce flood damages at parks, which may increase the amount of time that the parks are usable.



- A levee can protect a park and then people can use the parks as temporary housing sites; this happened post-Katrina.
- The borrow pits may provide more fishing and better access because people will be more easily able to drive to them if they are near developed/populated areas.
- If the borrow pits are large and in areas where there never was a recreational area, the borrow pits may become new park areas.
- But if boating is allowed in borrow pits, then the sides (banks) may experience erosion and they will get even larger.

#### **Summary of Comments Regarding the Construction of New Levees**

- This will affect sheet flow of water, which would lead to wetland loss.
- Levees do protect bird habitat by providing some higher ground.
- New levees will change hydrology and will generally cause more trouble and damage than they will prevent.
- There is a possibility of new bike trails such as along levees between St. Bernard Parish and Baton Rouge on the Mississippi River.

#### **Summary of Comments Regarding Elevation of Structures**

- Elevating cabins at State Parks does protect them from damage.
- State Park system will go to floating cabins to deal with the possibility of storm surge rather than elevating.
- New fishing piers must be elevated, too. This changes things for recreational fishing both visually (the appearance) and the experience itself is somewhat different from a high fishing pier.
- Parks must also elevate bath houses, restrooms to be in compliance; this too adds cost.
- Elevation of structure will mean very long ramps for handicapped access to meet regulations about grade. So State Parks has thought of this and will install marine grade elevators where needed for access.

#### **Summary of Comments Regarding Property Acquisition or Buy-Out Projects**

- There may be more land for parks and recreational agencies to manage as land is acquired and turned into open space.
- Acquisition may change the population base, but a lot of non-local people use the recreation areas; WMA users generally come from less than 60 miles from the recreational areas, so if homes are acquired and people more, they might still be within 60 miles of the recreational areas.

#### **Summary of Comments Regarding the Relocation of Structures**

- This type of project seems odd, because where in southern LA would they relocate structures to? There is very little high ground nearby to ground that is prone to flooding.

#### **Additional recreational sites suggested for future study**

- Rookeries and sensitive areas have endangered plant and animal species such as eagles.
- Palmetto Park is a new State Park south of Abbeville.
- Lake Boeuf is a WMA that is accessible only by boat and is in the LACPR area.
- Lake Martin, in Lafayette Parish, is managed by The Nature Conservancy.
- The name of Terrebonne Barrier Island WMA has recently been changed to Isles Dernieres Barrier Island Refuge.

## Focus Group Meeting Notes – Planning Unit 4

**Date** Thursday May 15, 2008  
**Time** 10:00 AM – 12:00 Noon  
**Location** Carnegie Memorial Library  
Carnegie Meeting Room  
411 Pujo Street  
Lake Charles, LA 70601

### Attendees

Name	Affiliation	Type of Agency Represented
Carolyn Woosley	Audubon Society	Nonprofit
Claude Smart	Calcasieu Parish	Local
Pam Mattingly	Calcasieu Parish	Local
Rusty Vincent	Coastal Conservation Association	Nonprofit
Tom Hess	LA Wildlife and Fisheries	State
Kevin Savoie	Louisiana State University	State
David Richard	Stream Company	Private sector
Mary Shaw	URS Corporation	Not applicable

### General statements about potential impacts of projects

- The smaller the footprint of any project, the better it is for recreation.
- Planning Unit 4 is a very rural area, but industry is growing. We will have to consider the impacts of projects to both recreation and the natural environment and to industrial uses.

### Summary of Comments Regarding Freshwater Diversion Projects

- Freshwater diversions have generally been positive, but are not a big factor in Planning Unit 4 because in Planning Unit 4 the problem is generally too much water accumulation from rain rather than salt water intrusion from the Gulf.
- One problem in Planning Unit 4 is diversion of the Sabine River for more drinking water in Texas.
- Moving freshwater into areas that have more salt water will increase wetland diversity; it will increase the number of fish and wildlife species and more diversity may mean increased usage.
- Freshwater diversion may hurt the recreational saltwater fishing, which is huge in Planning Unit 4; for example, 14,000 people participate in fishing tournament each year; if saltwater estuaries are changes, this may be a problem; saltwater fishing brings in a lot of tourism dollars.
- In Planning Unit 4, there is a flaw in the LACPR approach because it does not appear to include upstream drainage into the Mermentau basin; this basin extends northward to just south of Alexandria.

### Summary of Comments Regarding Dredging Projects

- Need dredge material to be used beneficially to help with hunting.

- Funding for beneficial dredging is being unfairly directed to the eastern part of the state.
- Need dredge material to rebuild marsh.
- Do not want dredging to increase salinity; in Calcasieu Lake there is dredging of a channel into the Gulf for navigation; so if there is dredging there needs also to be hydrologic control.
- Beneficial use of dredge materials can increase waterfowl nesting areas, which is beneficial to recreation; but if dredging causes deterioration in marshes, this will have a negative effect on recreation.

#### **Summary of Comments Regarding Barrier Island Restoration**

- This type of project would more correctly be called barrier shoreline restoration.
- If don't do projects, we will lose the land where recreation happens.
- If don't do project, we will lose diversity of species and productivity of species.
- The Cheniers are different from other parts of LA; the most important shoreline restoration for the Cheniers would be reforestation.
- Beach nourishment in Holly Beach and elsewhere in western LA has worked very well; the rebuilt dunes were very effective in protecting the natural and the built environment in Hurricane Rita.

#### **Summary of Comments Regarding Restoration of Natural Flow of Water**

- Hydrologic restoration can restore diversity, but restoring natural channels may hurt navigation.
- Structures to keep out saltwater will help trees; salt water has killed cypress trees.
- Restoration will increase diversity of species.

#### **Summary of Comments Regarding Shoreline Protection**

- We need this because of increased ship traffic; we need to protect shorelines (of channels) from erosion.
- There are 35 miles of shoreline protection for non-erosion in Planning Unit 4
- During wave action, the shoreline protection, such as rocks along channels, causes sediment/silt to build up behind the rocks and now there is grass growing where these projects have been in place; so this increases recreational opportunities for fishing.
- Weirs can be useful in starting an estuary.
- Generally, this is a positive thing because creates more waterfowl habitat.

#### **Summary of Comments Regarding Increasing the Height of Existing Levees**

- Highway 82 is along the coast and on a Chenier, which is naturally elevated land; thus Hwy 82 is on a natural levee, so any change to the roadway would affect the Cheniers; if this levee were made larger, people who live along it would have to move because a taller levee would mean that the base would spread out into where their homes are currently located.
- What the Cheniers need is reforestation so that they continue to provide protection.

- Biggest danger in Planning Unit 4 is to flooding due to rain, not storm surge; the perimeter levee around Calcasieu Lake manages water but not storm surge and this is what works in Planning Unit 4.
- We need 40 miles of levee in Rockefeller refuge. These should be wetland management levees; if these are constructed, it will be helpful for recreation by saving the land.

#### **Summary of Comments Regarding the Construction of New Levees**

- New levees to reduce storm surge are not appropriate in Planning Unit 4 because of the Cheniers.

#### **Summary of Comments Regarding Elevation of Structures**

- LA Wildlife and Fisheries wanted a new building in a V zone; when the building was designed, it was to be elevated 7' above sea level; but the new FEMA maps indicate that it will have to be elevated 15'; so elevation drives up the cost of structures.
- Elevation requirements will hurt hunting clubs, which have buildings throughout the coastal areas; if they have to elevate and build more expensive structures, this will decrease usage of the area for recreation.
- Elevation requirements are hurting the recreation in the area because having to build elevated homes means that many of the people (guides, etc.) who support recreation and who are generally of low-income will not be able to afford to rebuild and will leave the area; only people with high end jobs can afford to elevate.

#### **Summary of Comments Regarding Property Acquisition or Buy-Out Projects**

- Acquisition destroys recreation; just as elevation drives away the low-income people who support recreation, acquisition means that they will leave the community; and if residents leave, businesses, which are necessary to those who visit the area for recreation, will also leave and the communities that support recreation will die.

#### **Summary of Comments Regarding the Relocation of Structures**

- If we relocate structures, the communities that support recreation still need workers; and there is no high ground on which to relocate people along the coast.
- Relocation will also hurt industry because the off-shore outer-continental shelf industries need employees who live close by.
- For example, people (who visit the area for recreation) get lost in the marsh, and staff needs to be nearby to go and rescue them in a timely manner; this has happened; if staff lived far away, it would be much more dangerous for tourists.

#### **Additional recreational sites suggested for future study**

- Calcasieu River Channel goes into the Gulf and is a recreation area.
- Cameron Creole area nature trail is a recreation resource.
- Creole Nature Trail is called an American Byway and is a recreational resource.
- The Inter-coastal Park on the GIWW is a recreational resource with 2 boat ramps.



- Niblets Bluff Park is a recreation area near Sabine.
- Prien Lake is on the GIWW and is a recreation area in Lake Charles, LA.
- Rabbit Island, in Calcasieu Lake is 640 acres; this area is protected as the western nest for the brown pelican; thus it supports recreation.
- State Owned Water bottoms are regulated public areas used for recreational fishing; the State Land Office has information about such areas.
- The DOT provides recreational resources with its visitor centers.
- The majority of the land along the coast is privately owned yet provides a huge benefit to recreation; this is private land with public availability.