

## Priority Conservation Areas in the Lake Pontchartrain Estuary Zone\*

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### Project Description

The primary purpose of this project is to identify priority conservation areas within the Lake Pontchartrain Estuary that are thought to significantly contribute to the ecological integrity of the region, and that are in addition to existing conservation areas within the estuary. This does not suggest that areas not identified are unimportant for conservation. However, it is meant to focus limited conservation resources to work in cooperative ways with landowners of areas that may be most important from an ecological standpoint.

Base map data was provided by USGS as part of the LOSCO GIS Data DVD.

\*This map serves as a guide only. We respect private property rights and wish to work only with willing landowners.





Location of the Lake Pontchartrain Basin (yellow) and Estuary Zone (green)



**Legend**

- Lake Pontchartrain Estuary Zone
- Lake Pontchartrain Basin (see insert)
- Urban Areas (LAGIC 2000)
- Pontchartrain Coastal Lines of Defense

**Existing Conservation Areas**

- Federal Wildlife Refuge
- State, Parish, Local and Private Conservation Areas
- Fisheries Protection Areas

**Recommendations For Future Conservation**

- Submersed Aquatic Vegetation Habitat (2000 Distribution)
- Rangia Clam Habitat
- Benthic Dead Zone (pre-Katrina)
- Land Bridges (portions not in existing conservation areas)
- Potentially Sustainable Cypress Forest
- Proposed Maurepas Diversion & Amite River Gapping Project (Future Sustainable Cypress)
- Large Blocks of Bottomland Forest and Forested Wetlands
- Additional Areas For Conservation Management



91°0'0"W      90°45'0"W      90°30'0"W      90°15'0"W      90°0'0"W      89°45'0"W

30°30'0"N

30°15'0"N

30°0'0"N

## LEGEND COMMENTS

### Lake Pontchartrain Estuary Zone:

The boundary of this project was based primarily on that developed for the Conservation Area Plan for the Lake Pontchartrain Estuary (The Nature Conservancy, 2004). The boundary was chosen to provide sufficient focus on immediate estuarine, palustrine, and aquatic habitats, and is linked to both tidally influenced habitats and habitats affected by less frequent wind driven tidal surges. The northern boundary was extended to Interstate-12 to match that of the LA Coastal Zone.

### Lake Pontchartrain Basin:

The entire Lake Pontchartrain Basin is shown in the inset. Within the Lake Pontchartrain Estuary Zone, areas colored in pale yellow are areas within the basin that are not considered priority conservation areas for this project.

## EXISTING CONSERVATION AREAS

### Federal Wildlife Refuges:

These include the Bayou Sauvage and Big Branch National Wildlife Refuges (NWR), managed by the U.S. Fish and Wildlife Service.

State, Parish, Local and Private Conservation Areas:

This category includes the LA Department of Wildlife and Fisheries, Joyce, Manchac, Maurepas and Pearl River Wildlife Management Areas; Fontainebleau, Tickfaw, and Fairview Alpha State Parks; St. Tammany Parish Camp Salmen and Pelican Park; City of Mandeville Wastewater Treatment Area; Northlake Nature Center; and The Nature Conservancy (TNC) White Kitchen Preserve.

### Fisheries Protection Areas:

Title 56 of the Louisiana Revised Statutes provides for fisheries protection in Lakes Pontchartrain and Maurepas to be administered by the LA Department of Wildlife and Fisheries as described below (Heather Finley, LA Dept. of Wildlife and Fisheries, pers. commun., 2006).

1) The Lake Catherine and Lake Pontchartrain Sanctuary was created to limit trawling in Lake Catherine, and its passes, the Rigolets, Unknown Pass, and Chef Menteur, and a portion of Lake Pontchartrain (L.R.S. 56:804; Lake Pontchartrain Basin Foundation (LPBF), 2006). In the Sanctuary, the taking of fish, shrimp and other seafood by trawls, seines, or traps or other netting is prohibited, except for listed exceptions including legal spearfishing and the use of legal catfish and crab traps. Another statute however allowing the use of butterfly nets and bottom nets to take shrimp was authorized in Lake Catherine and its passes (L.R.S. 56:499.2). Violations in the fish sanctuary are punishable by fines between \$250 and \$500, and any gear shall be forfeited.

2) In Lake Maurepas, trawling is prohibited, as well as the setting of any nets of any kind in the lake within one-half mile of the beacon lights marking the mouths of the

Tickfaw, Tangipahoa, Amite, and Blind Rivers and the Amite River Diversion Canal and Pass Manchac.

## RECOMMENDATIONS FOR FUTURE CONSERVATION

### Submersed Aquatic Vegetation (2000 Distribution):

Submersed aquatic vegetation (SAV) or sea grass beds occur in shallow shoreline waters of Lake Pontchartrain. They are considered the lake's most productive underwater habitat. Their value includes: providing spawning, feeding and shelter habitat for fish, shellfish and other aquatic vertebrates and invertebrates; preventing coastal erosion by absorbing wave energy; recycling nutrients which helps prevent algal blooms; absorbing pollutants from urban runoff; decreasing water turbidity by causing sediment to drop out of the water; and providing oxygen to the water (LPBF website [www.saveourlake.org](http://www.saveourlake.org), 2006; TNC 2004).

Early studies described SAV distribution on the Northshore as a continuous meadow that extended out to a depth of 2.0 m (6.6 ft). SAV was reportedly abundant on the Southshore as well. Prior to Hurricane Katrina, the abundance of SAV had declined over 50% since 1954 and was almost absent from the Southshore. Shoreline modification, increased water turbidity, and macroalgal overgrowth largely contributed to this decline (Cho and Poirrier 2001). Since Hurricane Katrina, the distribution of SAVs has plummeted even further for reasons not completely understood (Dr. Michael Poirrier, UNO, pers. commun., 2006).

Research by Dr. Poirrier and associates at the University of New Orleans, showed most SAV species making a significant comeback in recent years, and it is anticipated that recovery will occur over time after Katrina (Dr. Michael Poirrier, UNO, pers. commun., 2006). While the increase prior to Hurricane Katrina may have been due to several factors, including favorable salinity levels, it is believed the increase would not have occurred without improved water quality in Lake Pontchartrain.

For this project, SAV areas identified on the map are based on field data from 2000 (Cho and Poirrier, 2001). Although SAV extent in Lake Pontchartrain is dramatically less than that of historic times, 1999 and 2000 marked one of the largest documented expanse periods for SAV growth in Lake Pontchartrain in recent times (Cho and Poirrier 2005). It is important to conserve all areas that once supported SAVs because improvements in environmental conditions may allow them to re-establish in those areas in the future (Dr. Michael Poirrier, UNO, pers. commun., 2005).

### Rangia Clam Habitat:

The Rangia clam (*Rangia cuneata*) is considered a key species for the Lake Pontchartrain estuary. This abundant shellfish lives in bottom sediments in a majority of Lake Pontchartrain and portions of Lake Maurepas, and is an important filter feeder. Average size of individuals and population density are considered excellent indicators of water quality. Amazingly, the Rangia clam population at the level just prior to Hurricane Katrina was capable of filtering a volume of water equivalent to the volume of water in Lake Pontchartrain within an eight day period (Dr. Michael Poirrier, UNO, pers. commun., 2006, based on unpublished report to EPA Gulf of Mexico Program). Filtering

helps maintain and protect water quality by removing pollutants, toxins, and excess nutrients. Rangia clams provide food for ducks and fish, and play an important role in the algal biology in the estuary. Also, the shells help consolidate the lake bottom, which reduces turbidity and produces hard-bottom reefs that benefit fisheries (TNC, 2004).

Rangia clams were dredged from Lake Pontchartrain from 1933 until the activity was banned in 1990. Studies from the University of New Orleans prior to Hurricane Katrina showed the density of large clams had recovered to 1950's levels since shell dredging ceased. However, large clams are still absent from a large area in the lake referred to as the Benthic Dead Zone (see below). Their absence in this zone has been attributed to salinity stratification and periodic hypoxia (Carol Franze, UNO, pers. commun., 2005). Rangia clam is a hardy species and can tolerate salinities between 2 parts per thousand (ppt) and 15ppt (compared with seawater, around 30 ppt), but it is affected by hypoxia, specifically in the zone of saltwater intrusion near the entrance of the Inner Harbor Navigation Canal into the lake (Abadie and Poirrier, 2001). Rangia clams should recover in affected areas within a relatively short time frame if the hypoxia zone is eliminated or significantly reduced.

### **Benthic Dead Zone (pre-Hurricane Katrina):**

The Benthic Dead Zone, also referred to as the hypoxia dead zone, is an area covering about 100 square miles, or approximately 17%, of Lake Pontchartrain where high salinity water has entered through the Inner Harbor Navigation Canal (IHNC) via the Mississippi River Gulf Outlet (MRGO) (Poirrier 1978; Abadie and Poirrier 2001; LPBF 2006a).

This saltwater intrusion produces salinity stratification, with saltwater along the bottom, and periodic bottom water hypoxia, particularly during summer months. The absence of large clams from this extensive area pre-Hurricane Katrina indicates that episodic hypoxia is a serious environmental problem. Benthic dead zone areas have greatly increased since Hurricane Katrina. Potential reasons for this include prolonged high salinity levels, toxins, and physical wave action, or a combination thereof (Dr. Mike Poirrier, UNO, pers. commun., 2006).

The effect of hypoxia on the Rangia clam population was not readily evident until large clams became established throughout the rest of the lake following cessation of shell dredging in 1990, making the absence of mature clams in the benthic dead zone more noticeable. Closure of the MRGO or the placement of a sill near the mouth of the IHNC would reduce the movement of high salinity water, which causes hypoxia, and would restore a vast area of shellfish habitat. Benefits of this restoration would include increased water clarity, reduced concentration of fecal coliform bacteria, and improved fish habitat due to improved growth of sea grasses and production of hard bottom reefs (Abadie and Poirrier 2001).

### **Lines of Defense:** / **Land Bridges:**

The Pontchartrain Coastal Lines of Defense (LOD) are definable geographic areas in which certain natural or manmade features or activities are promoted or implemented, resulting in the reduction of impacts by tropical weather systems in the Louisiana coast. The LODs were defined and selected by the LPBF, Coastal Sustainability Program in

2006, with input from area experts following Hurricane Katrina. The Pontchartrain Coastal Lines of Defense consist of 10 priority projects that would strengthen the Louisiana coast by restoring habitats to a self-sustaining condition. These, plus improved levees, should provide the hurricane protection desperately needed for our communities to be sustainable. (LPBF, 2006; Pontchartrain Coastal Lines of Defense Program, <http://www.saveourlake.org/wetlands.htm> on April 2006; John Lopez, LPBF, 2006). Only those LODs completely located in the Lake Pontchartrain estuary are shown on this map. They include areas consisting mostly of the Orleans East Corridor Landbridge between Lake Borgne and Lake Pontchartrain; Maurepas Landbridge between Lake Pontchartrain and Lake Maurepas; and Jefferson Parish Lakefront Fringe Marsh Buffer. Land bridges and marshes reduce waves and help impede storm surge. They also help segregate waters of differing salinities.

Other tropical storm buffers that could arguably be included here are the extensive cypress-tupelo swamps west and north of Lake Maurepas, and in the northwest portion of Lake Pontchartrain and the lower Pearl River swamp (Dr. Gary Shaffer, SLU, pers. commun., 2006).

### **Potentially Sustainable Cypress Forest:**



In recent years, the cypress forests near Lake Maurepas have been referred to as a "dying or relic swamp" because once the existing cypress trees die, there is virtually no regeneration of young cypress to replace them. In many areas, the loss of forest overstory (now degraded swamp) has already occurred following logging conducted mostly in the early Twentieth century (LPBF 2006). In 2004, Governor Blanco commissioned the "Coastal Wetland Forest Conservation and Use Science Working Group" (SWG) to identify what is necessary to sustain the long-term health of Louisiana's cypress swamps. The SWG's final report can be viewed at [www.coastalforestswg.lsu.edu](http://www.coastalforestswg.lsu.edu). The report concludes that in many areas, regeneration of cypress forests after logging is not occurring.

The decline of cypress swamp in this region is due to several factors (see Maurepas Diversion below). Dr. Gary Shaffer (SLU) and Jason Zoller (currently at LSU) developed a method to identify relatively healthy swamp from non-sustainable or "relic" swamp in the western half of the Lake Pontchartrain Estuary Zone, primarily near Lake Maurepas. Their methodology involved analyzing Landsat imagery data and extensive field reconnaissance for verification of signature profiles (Dr. Gary Shaffer, SLU and Jason Zoller, LSU, pers. commun., 2006). Data generated depicts potentially sustainable forested wetlands (including some bottomland hardwood forests), degraded swamp, and relic swamp. Only that classified as sustainable cypress swamp is shown on this map.

The largest concentrations of healthy or potentially sustainable cypress swamp pixels identified by Shaffer and Zoller (that are not in existing conservation areas) have been combined in solid blocks on this map to emphasize their conservation importance. Large concentrations of sustainable forested wetlands are more ecologically important than small areas, and are more capable of supporting regeneration of young cypress. These blocks also include some healthy bottomland forest identified by Shaffer and Zoller. It is important to note that all concentrations of sustainable cypress forest in the Lake Pontchartrain Estuary Zone identified by Shaffer and Zoller are not visible on this

map. Some occur in existing conservation sites or other priority conservation areas, and are hidden because they are covered by those layers.

**Proposed Maurepas Diversion and Amite River Diversion Canal Gapping Projects (future Sustainable Cypress):** 

The Maurepas Diversion is a river diversion project with goals to restore and protect the health and productivity of swamps south of Lake Maurepas by reintroducing sediment- and nutrient-laden water from the Mississippi River. The diversion will occur through an outflow channel to the Hope Canal north of Interstate-10.

Since construction of levees along the Mississippi River, the Maurepas swamp has been deprived of nutrient- and sediment-rich freshwater input. This sediment accretion deficit, when combined with natural subsidence, has produced a net lowering of ground surface elevation, causing persistent flooding and encouraging salt water intrusion. Without restoration, the factors and processes that are contributing to stress and deterioration of the Maurepas swamp will continue. The result would be loss of the forest community, eventually followed by succession to open water (Dr. Gary Shaffer, SLU, pers. commun., 2006; Shaffer et al. 2003), causing a tremendous loss of wildlife habitat and the storm protection afforded by swamps.

The Maurepas Diversion is on the Coastal Wetland Planning Protection and Restoration Act (CWPPRA) Priority Project List 11, and is a first-tier Near-term Critical Restoration Feature in the LA Coastal Area (LCA) Final Study Report. The project is expected to enhance over 35,000 acres of cypress swamp (LA Coast website, <http://www.lacoast.gov>, 2006).

The Amite River Diversion Canal Gapping Project has been proposed as a candidate for CWPPRA and is currently a second-tier Near-term Critical Restoration Feature in the LCA plan (Louisiana Coastal Area Website, <http://www.lca.gov>, 2006). This project is supported by EPA Region 6 and Livingston Parish Government and has been proposed for CIAP (Coastal Impacts Assessment Program) funding (Cormier and Grimmer, 2006). Swamps near the Amite River Diversion Canal are highly stressed by a lack of Mississippi River inflow and the impounding effects of the spoil bank along the canal. Spoil banks prohibit input of sediment- and nutrient-rich water from the canal into the swamps during high water, and they prohibit drainage of the swamps during low water periods. The project would involve constructing cuts in the spoil banks on each side of the Diversion Canal to facilitate water exchange.

For the Maurepas Diversion and Amite River Diversion Canal Gapping projects, the area mapped is the zone where diversion waters and sediment are predicted to help restore. Although portions of this area are not currently considered sustainable cypress swamp, the diversion projects should allow those areas to become sustainable, and thus are considered priority areas.

**Large blocks of bottomland forest and other forested wetlands:** 

Large blocks of forested wetlands are considered important conservation areas from a hydrological, species diversity and habitat conservation perspective. These areas were digitized by Malcolm Swan, TNC, based on 1998 low-altitude infrared aerial photographs. Digitizing focused on large areas (greater than 40 acres) that were

dominated by wetland forests, the majority of which were bottomland forests, however, some cypress swamps are included.

### **Additional Areas for Conservation Management:**



These areas were primarily identified and digitized by TNC using 1998 low-altitude infrared aerial photographs. Areas were selected based on the following criteria developed by TNC and LPBF:

1 Buffers for existing conservation areas - Buffer widths varied mostly between ¼ to ½ mile based on habitat type, land form, and susceptibility to development or alterations. The purpose of buffer areas is to prevent degradation of critically important conservation sites. On certain streams, the Louisiana Natural and Scenic Rivers System provide some conservation. State-designated scenic streams in the estuary zone include all or portions of the following rivers: Blind, Tickfaw, Tangipahoa, Tchefuncte including tributaries, Bayou Lacombe, and West Pearl.

- Inholdings and areas that connect existing conservation areas - Inholdings within existing conservation areas as well as tracts that connect existing conservation areas were mapped under this category. Large, unfragmented conservation areas better conserve biological diversity and natural processes and serve as corridors for wildlife movement.
- Sites for species of concern - The LA Dept. of Wildlife and Fisheries - Natural Heritage Program provided locations of rare, threatened and endangered species for the project area. Upon close examination, the vast majority of the locations of globally-rare species occurred in areas already identified as Additional Areas for Conservation Management in this section, and thus did not need to be mapped separately. Due to the sensitivity of this information, rare species are not identified on this map. Also not shown is USFWS designated Critical Habitat for the threatened Gulf Sturgeon, that includes the Pearl and Bogue Chitto Rivers, Lake Pontchartrain (east of Causeway), Lakes Catherine and Borgne, Little Lake, and The Rigolets.
- Old growth or mature forests - Some mature pine flatwood forests were identified near Big Branch National Wildlife Refuge, Pearl River Wildlife Management Area, and Tickfaw State Park. These forests are rare and may support species that depend upon older forests. Their current status following Hurricane Katrina is unknown. Several mature forests are included within the sustainable cypress or large blocks of bottomland forest designations.
- Key habitat types for conservation targets - Conservation targets were identified in a conservation plan for the region (TNC, 2004). Many of these have been mapped separately, such as SAVs. Some identified here include all remaining relatively unfragmented fresh and intermediate marsh on the Northshore and southwest Hancock County. Tidal marshes are critical to biological integrity and productivity of open water estuarine and marsh systems.

- Natural areas with significant habitat loss - Included in this category are LaBranche Wetlands, which represents the largest cypress swamp area on the Southshore, and Guste Island, an important restoration area on the Northshore.
- Important hydrologic areas - Includes such sites as lower riverine systems, e.g., Tangipahoa, Amite, Pearl Rivers, areas along Pass Manchac and the Rigolets; wetlands hydrologically connected to existing conservation areas; and primary floodplains and buffers along Northshore streams. Many of these areas are important to fisheries and other wildlife.

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