

**The Louisiana Coastal Protection and Restoration Plan
and
Jean Lafitte National Historical Park and Preserve
National Park Service**

Park Position Statement

Executive Summary

The National Park Service (NPS) has a substantial interest in the Louisiana Coastal Protection and Restoration (LACPR) Plan. Jean Lafitte National Historical Park and Preserve (Park) was established by Congress in 1978. Its purpose is to preserve natural and historical resources of the Mississippi River delta region, and to interpret them in such manner as to portray the development of the region's diverse culture. The park's responsibilities include the preservation of its Barataria Preserve and Chalmette Battlefield units, and to work with others for the preservation and interpretation of the natural and cultural resources of the entire Mississippi River delta region.

The NPS's vision for the Preserve focuses on providing or restoring its ecosystem and providing an opportunity for recreation in a natural setting free from resource impairment. In addition, the NPS vision encourages those actions that sustain the region's nationally significant culture which contributes to the nation's diversity. NPS works to preserve those historic resources entrusted to our care, such as the Chalmette Battlefield, and to work cooperatively with others in the preservation or appropriate treatment of these resources.

Given these responsibilities, and the federal statutes and mandates that govern the Park, the NPS sets forth the following recommendations and positions for the LACPR.

Potential LACPR effects on the Barataria Preserve

LACPR is examining two broad areas of structural modifications to the upper Barataria Estuary that might affect the Preserve.

- One set of structural alternatives would modify the height, width, footprint or design of the current Westbank Hurricane Protection Levee system, which now flanks much of the Preserve (Figure 1).
- The second set of structural alternatives being examined will look at construction of an outer ring levee or tidal surge barrier system gulf-ward of the Preserve, enclosing the Preserve in the protected upper basin in the event of a surge and system closure (Figure 1).

1. In general, NPS recommends that in implementing the structural components of the LACPR, the U.S Army Corps of Engineers (COE) seek alternative construction

techniques in order to minimize habitat destruction in the delta region. NPS recommends that any new outer ring levee system be constructed only if the optimal tidal exchange prism between the upper and middle estuaries can be maintained.

2. NPS recommends that COE examine the role of its navigation waterways in the system's hydrology and storm vulnerability and consider alteration of these waterways to help restore a more naturally functioning hydrology.

3. NPS recommends that in the event outer ring levees are built, that measures be taken to provide sediment delivery into the upper basin. NPS also recommends that ring levees not be constructed with the potential to impound storm waters should an overtopping event occur.

4. Finally, NPS recommends that COE and the state examine the potential of utilizing non-hardened surge buffers.

Potential LACPR effects on the Chalmette Battlefield and National Cemetery

LACPR will examine the possibility of raising the mainline Mississippi River levee that currently bisects the battlefield (Figure 2). Raising the Mississippi River levee would require either a wider footprint to accommodate the slope needed for higher fill, or raising the current concrete cap wall, now about three feet high.

1. NPS recommends that COE seek alternative solutions that would not require substantial modifications to the levee through the battlefield.

Potential LACPR effects on the Mississippi River Delta Region

It is no exaggeration to say that because of centuries of misguided manipulation of the delta's hydrological systems, the very existence of the delta region is at risk. Due to a host of factors, but most importantly the loss of sediment input from the Mississippi River, the entire delta is threatened with disappearance due to erosion, subsidence and sea level rise. As the delta disappears, one of the world's most productive ecosystems disappears, as does the culture of New Orleans and region which is so intimately tied to the delta's resources.

The LACPR ambitiously sets out to restore a functioning delta ecosystem, and to offer some level of storm surge protection to the city and as many delta communities as can be accommodated.

Unfortunately, these two goals are often at odds. Striking the right balance between a sustainable delta ecosystem and sustainable human infrastructure will be difficult.

1. NPS recommends that LACPR planners recognize and let their guiding principle be that the goal of restoration should be to allow the return of natural hydrological functioning to the delta region, consistent with the need to protect communities from

annual inundation, and in such a way as to minimize or mitigate for the disruption of cultural and socio-economic use patterns.

2. NPS strongly recommends that COE and the state proceed with the implementation of large scale diversions that capture all of the available freshwater and sediments in the lower reach of the Mississippi River.

The park anticipates that any alternatives adopted by the COE will be thoroughly examined through the NEPA process, and further acknowledges that many of the recommendations outlined herein will require Congressional authorization and concurrence by the State of Louisiana. With those understandings, the park affirms its commitment to working with COE and the state in any way we can to develop responsible solutions that will meet the mission goals of our respective agencies.

LACPR Effects on Park and Delta Region Resources

I. Introduction

Jean Lafitte National Historical Park and Preserve manages several sites in the delta region. The Barataria Preserve unit (Preserve) in Jefferson Parish was established to preserve and interpret representative examples of the delta's ecosystem and its cultural overlay. The Preserve provides habitat for the characteristic flora and fauna of the delta, stop-over habitat for migratory birds, and important nursery habitat for estuarine organisms, which are in turn part of our country's most productive fishery. It is an enclave for some of the complex terrestrial and aquatic plant and animal communities that characterize the northern Gulf Coast. Among these is the eastern anchor of the largest expanse of floating estuarine marsh on the continent, a habitat that is globally rare.

The Chalmette Battlefield unit (Battlefield) in St. Bernard Parish protects the site of the 1815 Battle of New Orleans, in addition to an ante-bellum house and the Chalmette National Cemetery, where over 15,000 veterans are interred. Interpretive centers in the French Quarter of New Orleans and Thibodaux in Lafourche Parish will also be affected by the LACPR.

Furthermore, because the Park's mission, as defined by Congress, transcends its borders to embrace the cultural and natural resources of the delta as a whole, the LACPR plan, which is vitally linked to the continued existence and sustenance of the entire region, will have a pivotal effect on that mission.

II. NPS's Vision for the Park and the Mississippi River Delta Region

The NPS's vision for management of the Mississippi River delta region includes the preservation of natural biological and geological conditions and processes, and the preservation of cultural resources.

The NPS's vision for the delta region reflects an appreciation for its geomorphic origin and history. Our management policies require NPS to refrain from interfering in natural processes and dynamics except under certain closely proscribed conditions. Studies indicate that hurricanes have historically been an important component in the evolution and function of the delta's highly dynamic ecosystem. Hurricanes, along with variations in sediment, freshwater and nutrient supply, subsidence, and sea level rise anticipated from global warming have and will continue to drive changes in the delta's configuration. Effective deltaic management requires adaptation to these dynamics.

Where peer-reviewed studies provide evidence that human activities have altered or interfered with the natural condition or processes of the Mississippi delta region, such as the natural sediment supply and transport rate and direction, NPS supports actions that would attempt to restore these natural processes. Restoration of natural processes would, in turn, help to reestablish a more natural biological and geological condition within park boundaries, which NPS is charged to promote. Adaptive management principles would govern restoration actions, facilitated by continuing analysis of monitoring data to assess project effectiveness.

Based on federal statutes such as the National Park Service Organic Act and the park's enabling legislation, NPS Management Policies, and the Park's management plans, the NPS is mandated to preserve natural conditions and processes, and to preserve cultural resources. Where peer-reviewed scientific studies indicate that human activities have altered or interfered with natural conditions or processes of the Mississippi delta region, such as the natural sediment, freshwater, and nutrient supply, transport rate and direction, the NPS would consider actions that would attempt to restore those natural processes as consistent with its mission responsibilities.

A. Barataria Preserve

The Preserve is of particular importance as a natural resource responsibility for NPS. The NPS vision and management focuses on providing or restoring for park visitors an undisturbed environment, an opportunity for recreation in a natural setting, and unimpaired resources. The NPS implements this vision by controlling nonconforming uses, preventing unnecessary or undue reduction of natural values, and seeking the restoration of impaired natural systems and landscapes.

Estuarine and deltaic ecosystems overlay dynamic coastal landforms, the interface between ocean and land, and are shaped by atmospheric, riverine and oceanic energy. Hurricanes, variations in sediment and freshwater supply, subsidence, and sea level rise anticipated from global warming will drive changes in the Preserve's shorelines and habitats. Effective management requires adaptation to these dynamics. Restoration of natural processes would help to re-establish more natural biological and hydrological conditions within Preserve boundaries.

The Preserve flanks the West Bank of the New Orleans metropolitan area, and separates the communities of Crown Point, Isle Bonne, Lafitte and Barataria from the metropolitan

area. The northern and eastern boundaries of the Preserve are the levees that comprise the current West Bank Hurricane Protection system.

Bills introduced in this session of Congress would add additional acreage to the Preserve in the Bayou Segnette, Bayou aux Carpes and Fleming Plantation areas. In each case, these areas abut existing or planned levee alignments. (Figure 1.)

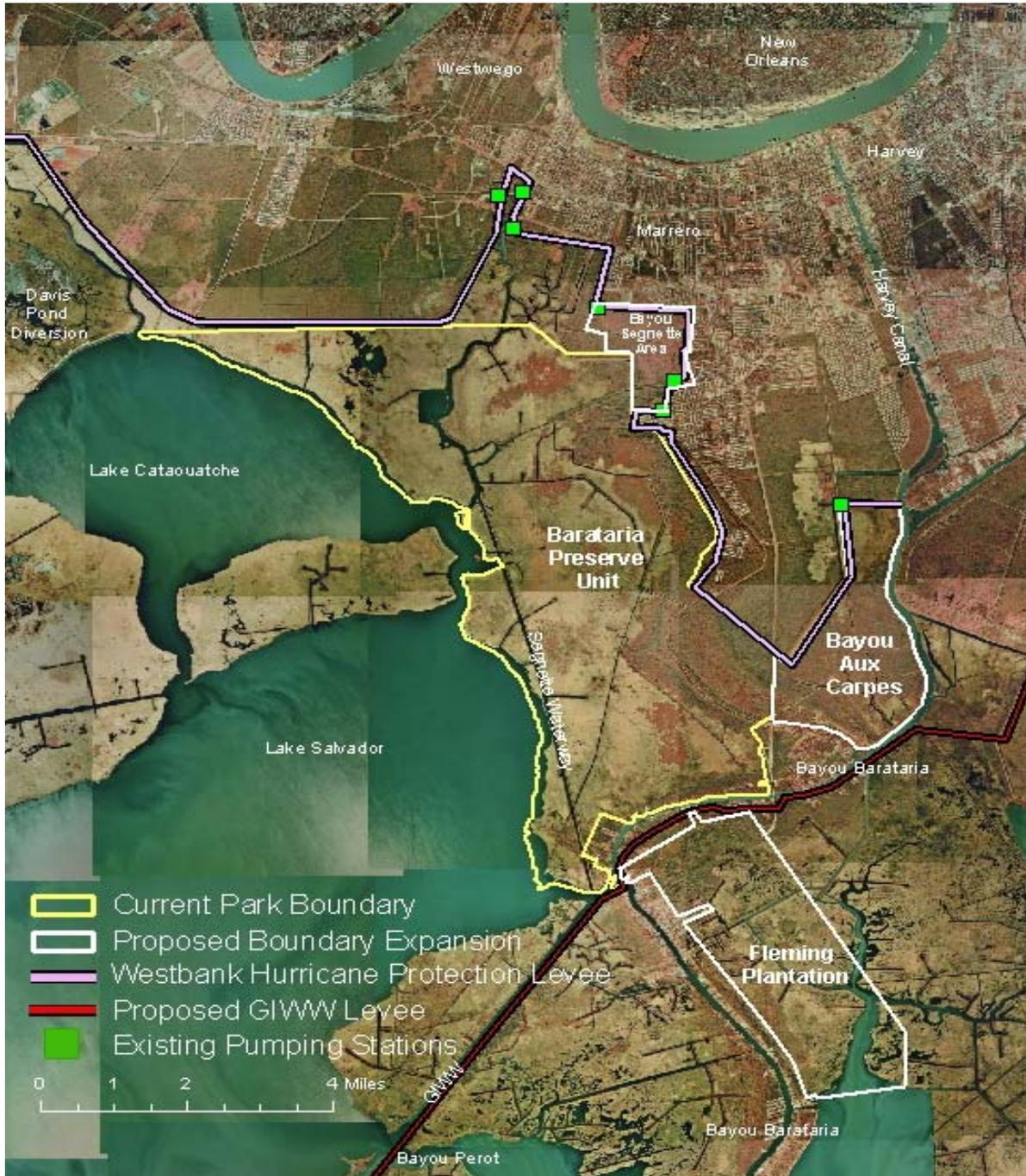


Figure 1. Location of the Barataria Preserve, proposed park boundary expansion, existing and proposed levees, and pumping stations.

B. Chalmette Battlefield and National Cemetery

The NPS vision also encourages those actions which sustain the region's nationally significant culture, a culture whose contribution to the nation's diversity Congress recognized in the creation of the Park. Critical components of any culture, in addition to its living communities, are its historical places, landscapes, buildings and artifacts. NPS works to preserve those historic resources entrusted to our care, such as the Battlefield, and to work cooperatively with others in their preservation or appropriate treatment.

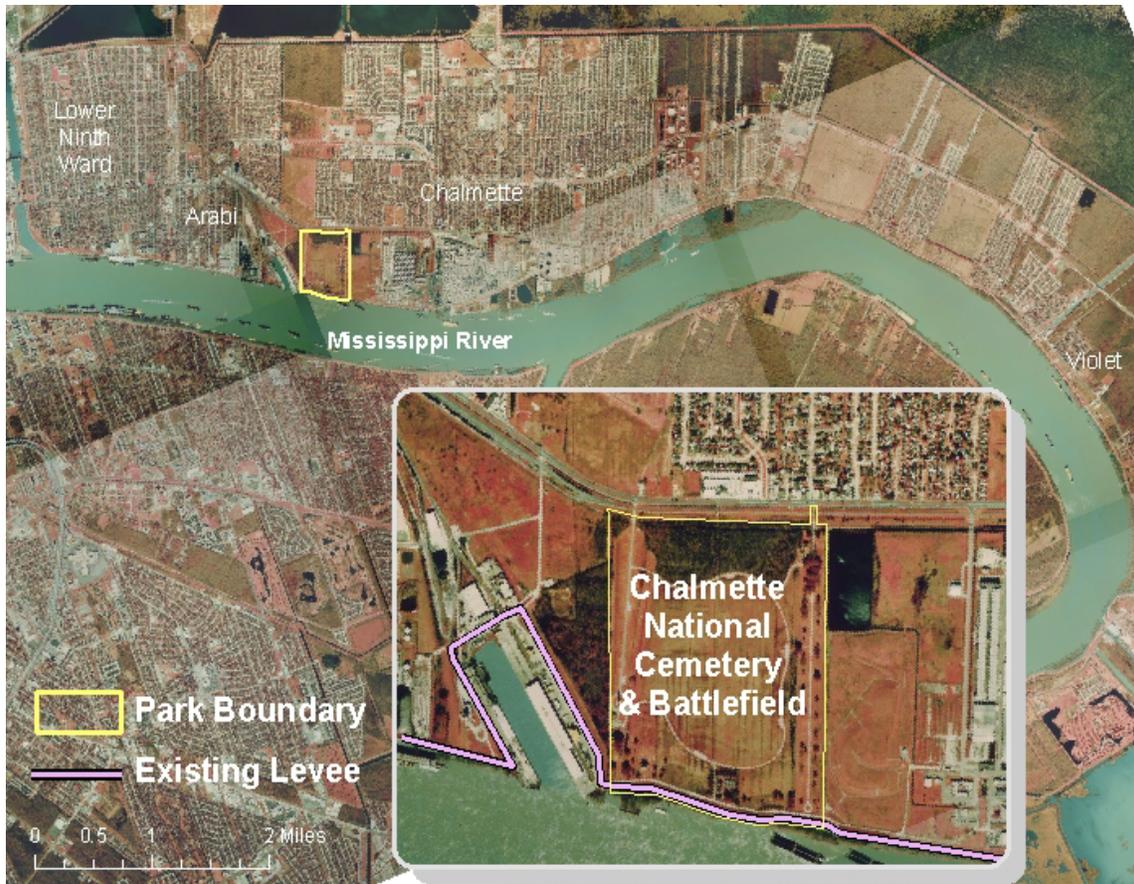


Figure 2. Location of the Chalmette National Cemetery and Battlefield and the existing Mississippi River levee, St. Bernard Parish, Louisiana.

III. LACPR Proposed Structural Modification and Recommendations

A. Raising Levees in Place

1. Barataria Preserve The possibility of raising or otherwise strengthening the existing levee system that flanks the Preserve's boundary raises several concerns. The National Park Service (NPS) has no statutory authority to cede land to the Corps of Engineers (COE) for levee construction in areas where Federal land abuts the outside toe of the levee, as on the east side of Highway 45. Therefore any expansion of the footprint will have to take place on the protected, interior side of the levee corridor on those reaches. In

many cases the interior side of the levee corridor is flanked by borrow and drainage canals, making expansion of the footprint costly and technically challenging (Figure 3). West of Highway 45, while the Preserve boundary abuts the outside toe, a corridor of non-federal land, owned by the West Jefferson Levee District, separates federal ownership from the levee. As is the case east of Highway 45, much of this levee is flanked by an interior canal, or, as at Oak Cove, by houses. While expansion of the footprint to the NPS side may be possible, much of that non-federal corridor has already been altered by the excavation of borrow pits, and more are slated as part of the emergency levee strengthening now underway. Again, these conditions make the possibility of levee footprint widening technically challenging and expensive. (Figure 3.)

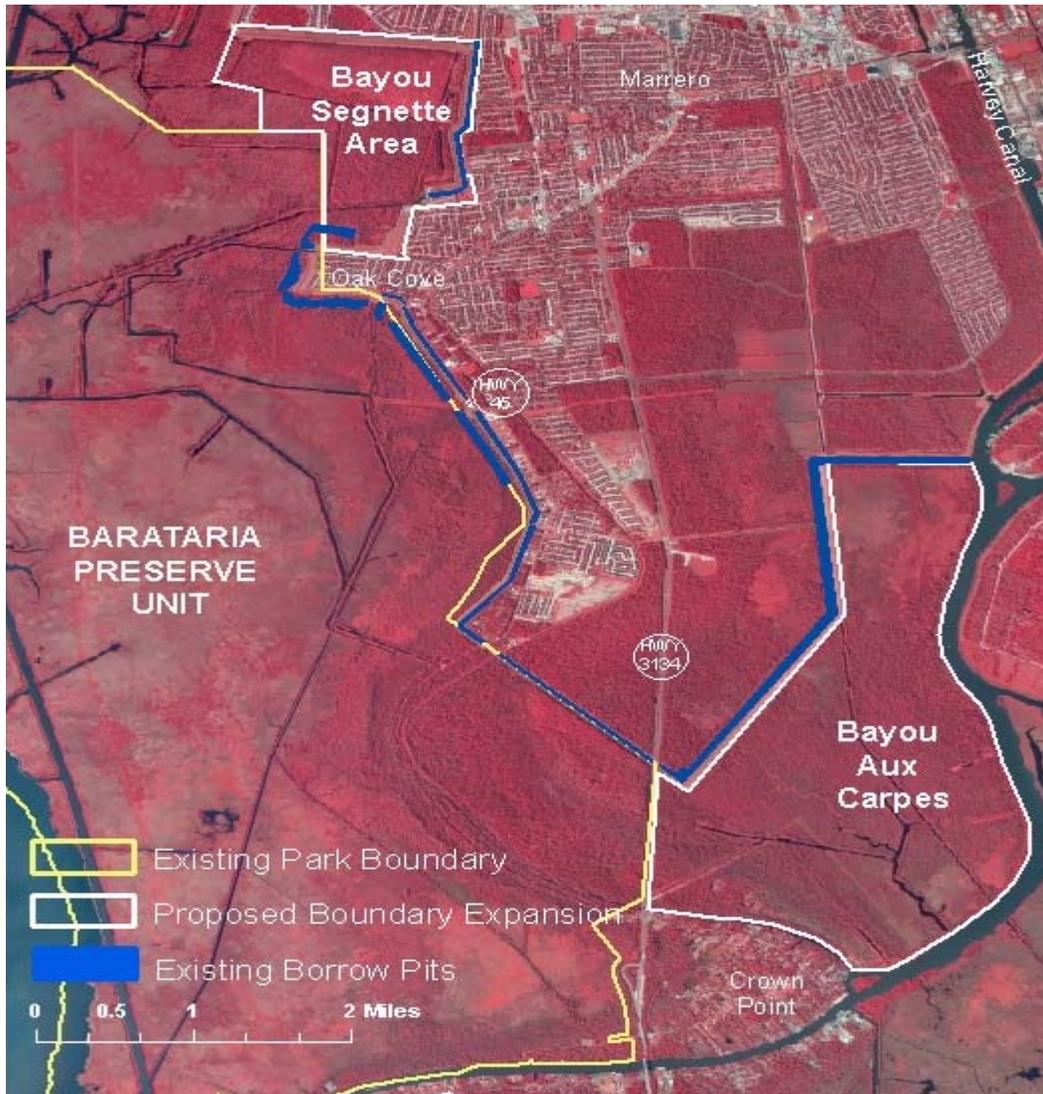


Figure 3. Location of borrow pits flanking the east side of the Barataria Preserve.

During COE’s National Environmental Policy Act (NEPA) review of the Westbank and Vicinity Hurricane Protection Project, NPS made clear its objection to borrow removal from inside the boundary. However, COE, proceeding on the basis of an approved Environmental Impact Statement and supplemental Environmental Assessments,

continues to assert it's authority to remove borrow, and about 100 acres are currently planned for destruction.

Additionally, projections for the amount of borrow that may be needed from outside the boundary for the authorized levee work already underway for the entire metropolitan region approach 10,000 acres. The obliteration of up to 10,000 acres of primarily bottomland hardwood forest in the delta region, if the borrow cannot be economically procured elsewhere, will have detrimental effects on delta-wide ecosystem function and habitat. These borrow requirements are independent of any future borrow needs that might result from the LACPR.

NPS is opposed to the use of borrow pits within it's boundaries and elsewhere in similar natural areas, and strongly recommends that the Corps seek alternative sources of clay, or alternative construction techniques, in order to obviate the necessity of massive habitat destruction in the delta region.

Non-earthen techniques for raising the height of levees and surge barriers also raise issues of some concern. A floodwall anchored within the existing levee will reduce the need for a widened footprint, but it will provide both a physical and visual barrier between the Preserve and areas inside the levee. The steel sheet pile I-wall already in the levee on the Hwy. 45 to Hwy 3134 reach renders that stretch impassable to terrestrial organisms such as white-tailed deer, which must pass the barrier at the highway openings. In addition, local residents use the levee as green space and a recreational corridor, experiencing the Preserve from the levee vantage. Indeed, on behalf of local governments Congress requested and NPS completed for the COE in 1998 a *Recreational Trail Corridor Concept and Design Recommendations for the Westwego to Harvey Canal Hurricane Protection Levee*. The recommendations in the report anticipated the eventual development of a 22 mile long recreational corridor with access points to the Preserve.

NPS recognizes that a recreational corridor is secondary to the levee's design and purpose, and it is recognized that the emergency post-Katrina reconstruction program underway will delay any such future use. Nevertheless,

NPS recommends that the Corps design any hard barrier atop the levees with openings or crossover points for terrestrial organisms. NPS further suggests that, to the maximum extent possible, future recreational use of the corridor not be precluded by the design of such barriers.

2. Chalmette Battlefield and National Cemetery The Chalmette unit of the park is located in western St. Bernard Parish. It is in the same drainage basin and protected by the same levees as the Lower Ninth Ward of New Orleans, and the communities of Arabi, Chalmette, Meraux and Violet. Despite being located on the natural levee of the Mississippi River on some of the region's highest ground, the unit suffered devastating flooding from Katrina's surge as it overtopped and eventually caused the failure of the ring levee and floodwall system.

Recent COE modeling suggests that improvements to the ring levee system may require them to be raised higher than the mainline Mississippi River levees, necessitating the need to raise those levees. The current mainline levee system runs through the Chalmette unit along its river edge.

A man-made levee was in place in Chalmette at the time of the battle. However, the river's meandering, and the steady raising of that levee over the last 192 years has shifted its location, footprint, height and visual impact. Key archeological sites along Andrew Jackson's defensive line or associated with the pre-battle plantations and landscape have already been disturbed or buried by levee construction. Sections of the post Civil War cemetery have been relocated.

Currently the levee occupies a wide earthen corridor which is topped by a low concrete floodwall. The floodwall was installed in the early 1980s so as to minimize the width and impact of the levee footprint on the historic landscape. This compromise achieved that goal, but added a non-historic visual element. A gate through the floodwall allows riverboat visitors, who comprised over 60% of the unit's visitation prior to Katrina, to gain access to the battlefield from a dock.

Any increase in levee height at the unit will require either a higher floodwall or a wider footprint, or some combination of both.

NPS strongly recommends that COE seek alternative solutions that would not require substantial modifications to the levee through the unit, such as extending the raised levees downriver rather than upriver from the point below Violet where the hurricane system ties to the river levees.

NPS requests timely, close and cooperative planning between COE and NPS if it becomes necessary to raise the levee in any manner within the Chalmette unit.

B. Building New Levees South of the Preserve

1. Leaky Levees--One concept proposed in the Louisiana Comprehensive Coastal Protection and Restoration Authority (CPRA) Master Plan is the construction of a ring levee that cuts across the middle portions of the estuary, gulf-ward of the Preserve. Similar "ring levee" systems are proposed in a broad arc across the delta, bisecting each of the estuaries. These ring levees are conceived of as barriers with openings to allow tidal interchange, except in the event of a storm. This so-called "leaky levee" concept would buffer the upper estuary and most development in and near metropolitan New Orleans from surge, but still be designed in such a way as to allow the continuation of hydrological function in the estuary.

The LACPR is modeling several alignments of such a system. The idea that leaky levees might be constructed that would not result in acceptable alteration of hydrology and movement of estuarine organisms is untried and unproven. A number of coastal scientists

have expressed strong reservations about the viability of the leaky levee concept, though there is not uniform opposition to the idea among concerned research scientists.

2. Storm Surge Sediment Input--Recent research has demonstrated the role of storm surges in redistributing sediment from near-shore gulf and estuarine bay bottoms back up into the estuary. In portions of the estuary, these sediment pulses are a significant factor in building soil platforms high enough to support emergent vegetation and offset subsidence and sea level rise. There is little data that measures the influences of such storm carried sediments on the upper Barataria Estuary and in floating estuarine marshes, but if such sediments are shown to be important to the maintenance of the upper Barataria, the ring levee plan will prevent further inputs.

3. Impoundment—Reduction on any scale of the current tidal prism between the upper and middle estuaries could result in the impoundment of waters trapped for varying lengths of time inside the leaky levee system. Of course, such a reduction might also reduce the influx of saline marine waters into the upper estuary during periods of strong south winds or drought.

The preserve's plant communities are sensitive to changes in water elevation. As a result of both natural and man-made subsidence and sea level rise communities are shifting. Marsh is becoming open water, anchored marsh is becoming floating marsh, marsh is replacing swamp, swamp is replacing levee backslope bottomland hardwoods, and bottomland hardwoods are replacing levee crest vegetation. Tiny incremental changes in water level and flood duration change the surface ecology. The Davis Pond Freshwater Diversion has already raised daily average water levels. A ring levee system that constricts flow from the upper to the middle estuary could raise water levels even more.

One of the most destructive outcomes of Katrina resulted from the impoundment of saline or brackish water that became anaerobic behind overtopped levees. Such impounded waters resulted in massive die-off of salt intolerant vegetation, and massive die off of plants, ranging from grasses to trees, sensitive to prolonged impoundment, soil saturation, or anaerobic conditions. Terrestrial organisms drowned, starved or died of exposure, and aquatic organisms perished as a result of the low oxygen levels. A ring levee system south of the Preserve, should it ever be overtopped, raises the real possibility of massive mortality and wholesale ecosystem change by impounded water.

4. Historical Hydrology--Prior to canal building in the Barataria basin, the area of the Preserve in the upper basin was connected to the Gulf of Mexico through two natural waterways. The first was through Bayou Barataria and the second through Bayou Perot. In addition, uninterrupted sheet flow was possible over the marsh surface between the upper and lower basins.

The excavation of the Gulf Intracoastal Waterway (GIWW) in the 1930s, situated between the Preserve and the gulf, fundamentally changed the area's hydrology. First, it created an east-west conduit for water perpendicular to the line of flow. Second, the spoil excavated to create the channel was piled in an almost continuous fashion on both banks

through the swamps and marshes southwest of the Preserve, creating a barrier to sheet flow, and storm surge. Sections of the GIWW immediately adjacent to the Preserve and to the east were created by deepening and widening the existing bed of Bayou Barataria. Because the bayou adjacent to the Preserve was flanked by its own natural levees, little modification to sheet flow took place. To the east of the preserve, Bayou Barataria was a marsh drain, lacking substantial natural levees. In that reach little spoil was excavated, and some surface sheet flow still takes place.

Subsequent to the construction of the GIWW, oil and gas exploration led to the excavation of a series of oil and gas exploration canals, and petroleum product pipeline canals, which penetrated the GIWW's spoil banks, creating tidal connections of various volumetric prisms with water bodies to the south.

In addition, the narrow meandering Bayou Barataria was channelized, deepened and straightened, and a deepwater navigation channel (the Barataria Bay Waterway) was dredged that linked it directly to the Gulf of Mexico. To the north of the GIWW a second, smaller navigation canal, the Segnette Waterway, was dredged linking the GIWW to Bayou Segnette. The Segnette Waterway is within the Barataria Preserve and predates its creation.

As these alterations in the hydrology of the estuarine system were taking place, the riverine end of the system was undergoing profound change as well. After 1927 the Mississippi River levee system was federalized and improved. Though man-made levees had been in place since the early 1700s, the river had often topped and eroded a hole (*crevasse*) through these levees prior to 1927. The subsequent *crevasses* provided for periodic inputs of sediment, nutrients and freshwater into the estuary. Since 1927, no levee breaches have occurred into the Barataria basin. Before the 2000 provisional opening of the Davis Pond diversion, the only river water entering the upper estuary came in inadvertently through the locks on the GIWW and the Harvey Canal at the river, and from a trickle of river water that comes down Bayou Lafourche and enters the GIWW from the west.

Finally, the upper estuary has been deprived of natural sheet flow from the higher areas of natural levee along the river and its tributary courses. These areas have been deforested and developed, and ringed by drainage or hurricane protection levee systems. This has required the construction of pumping stations to lift rainwater over the levees and speed the discharge of pumped stormwater through outfall canals. Run-off that previously arrived in the Preserve through gradual down-slope sheet-flow now arrives at pumping station outfalls, highly concentrated point sources, dispensing water in high volume pulses of contaminated urban or agricultural runoff.

5. Davis Pond--In 2000 COE began provisional operation of the Davis Pond Freshwater Diversion structure, which is designed to allow controlled releases of river water into the upper estuary, mimicking annual over-bank flood conditions. David Pond discharges into the estuary just northwest of the Preserve. Not yet fully operational, it nevertheless delivers considerable quantities of freshwater and nutrients into the upper estuary.

However, it draws from the upper portion of the river's water column, and is not designed to divert significant quantities of sediment.

Discussion

The upper Barataria Basin's hydrology has already been profoundly altered. Davis Pond promises to restore some lost hydrological function. Any levee alignment gulf-ward of the Preserve will affect the system's hydrology. Sorting out the role of any one modification, given the complex history of interactions, is extremely difficult. However, it is clear that whatever alterations have been made in the past, the Preserve's flora and fauna have adapted to these hydrological conditions. Any changes to the area's hydrology should be calculated to minimize impacts, and to bring about change gradually.

Leaky levees potentially constitute massive, unprecedented and untried alterations to estuarine systems.

Any new levee system, if based on earthen fill, will exponentially increase the borrow requirements beyond the massive amounts already identified to reach the already authorized 100 year flood target.

NPS recommends that any ring levee system be constructed in such a way as to preserve the optimal tidal exchange prism between the upper and middle estuaries. Where practical, sheet flow should be maintained or restored. If Davis Pond or future diversions are seen to be creating unacceptable high mean water levels, the system must be flexible enough to allow increased discharge, preferably as sheet flow.

NPS recommends that if leaky ring levees are found to be necessary, that some alternative to massive earthen levees be found, and that the footprint be kept as small as possible. We further recommend that the levees be sited in such a way as to minimize habitat destruction, especially of forested higher ground, as along the GIWW spoil banks. Because of development on high ground, ridge habitats are the most imperiled habitats in the basin, making even artificial ridges such as the GIWW spoilbanks critical as stopover habitat for migratory birds, and as surge barriers in their own right.

NPS recommends that COE examine the role of its navigation waterways in the system's hydrology and storm vulnerability, specifically the GIWW, the Barataria Bay Waterway, and the Segnette Waterway, and consider alteration of these waterways to help restore a more naturally functioning hydrology, and improve ecosystem function and storm readiness for communities in the upper basin. Specifically, we oppose the continued dredging of the Segnette Waterway and strongly recommend the de-authorization of this little-used canal, and the development of an alternative navigation route through natural water bodies. Further, we recommend that measures be taken to restore the landscape scarred by the canal or mitigate its ecological effects.

NPS recommends that COE examine the possibility of adding some mechanism for sediment delivery into the upper basin to offset the loss of riverine sediments and of sediments that might otherwise be carried into the upper basin by storm surge.

NPS recommends that if ring levees are constructed with the potential to impound wetlands a fool proof system be devised to open the system after a storm surge has overtopped the levees, to allow the release of impounded waters rapidly enough to prevent them from doing serious harm. Such a system to release waters has to be designed to work even under catastrophic post-storm conditions.

NPS recommends that COE and the state examine the potential of utilizing non-hardened surge buffers. These might include restoring subsiding natural ridges or perhaps building entirely new ridges, in areas calculated to have maximum effectiveness for reducing the surge that reaches levees and floodgates. These ridges should be forested and gapped appropriately so as not to impede tidal interchange. Their purpose would not be to create impermeable barriers, which after all simply force storm surge to go elsewhere, but rather as baffles or “speed bumps” meant to slow down and reduce the force and the height of surge reaching interior levees, acting in concert with existing and restored marshes, barrier islands, headlands, cheniers and natural levee ridges.

IV. Proposed Delta Region Restoration and Recommendations

Since the adoption of the concepts outlined in the Coast 2050 Plan in 1998 and the development of the Louisiana Coastal Area (LCA) plan in 2004, the joint Federal and State goal for coastal management in Louisiana has been to reach equilibrium between land loss and land building by the year 2050. Such equilibrium is to be achieved by a variety of measures, including large scale diversion to build new sub-delta lobes; barrier island restoration by mining of offshore sands; increased freshwater diversion into upper estuarine areas; beneficial use of dredge spoil as a by-product of ongoing navigation maintenance; and using dedicated dredges and pipelines to mine and transport bed sediments from the Mississippi River to targeted restoration locations, thereby building wetland platforms, nourishing marshes and swamps, and restoring natural ridges.

The National Park Service participated in the development of the Barataria-Terrebonne National Estuary Program’s (BTNEP) *Comprehensive Conservation and Management Plan* (CCMP) in 1996. The CCMP proposed actions that foreshadowed and are consistent with the goals of LCA, with the added advantage of providing a framework and ongoing basis for community involvement.

Hurricane Katrina validated the warnings contained in the BTNEP CCMP and the subsequent Coast 2050 plan about the potentially costly effects of coastal land loss to the viability of delta communities. The urgency of restoration action is now in the forefront of all federal, state and local hurricane protection planning, and is reflected in the dual goal of protection and restoration contained in the Congressional mandate to develop the

LACPR. However, the goal of equilibrium by 2050 becomes ever more elusive with each year of delay. Storms like Katrina, which swept away large areas of emergent marsh but also redistributed vast quantities of sediment, skew the restoration calculation.

NPS supports the goals of these plans, but not solely because of their importance for the sustainability of the Barataria Preserve. Even more importantly, given the Park's broader delta-wide mandate, we recognize that restoration is critical to the survival of the fragile natural and historical resources of the region, and the culture they sustain. Structural modification of the delta, such as building levees and other forms of surge barriers and gates, are doomed to failure if restoration is not pursued quickly and aggressively.

NPS recommends to COE and the state that the goal of restoration should be to allow the return of natural hydrological functioning to the delta region, consistent with the need to protect communities from annual inundation.

A) Navigation Channel

Construction of the jetties below Head of Passes in the 1870s ingeniously used the river's own force to maintain a navigation channel through the bar, with disastrous consequences for the natural system (Figure 4). As a result of the success of the jetties, most of the river's freshwater, its sediments, and its nutrients are lost over the edge of continental shelf. The resulting influx of water, suspended sediments and dissolved nutrients causes huge algal blooms, eutrophication, and the growth of a vast annual dead zone in the Gulf of Mexico, disrupting one of the world's most productive fisheries. It also means those resources are lost to the delta as a whole. Only by returning all of the freshwater, sediments and nutrients to the delta can equilibrium be achieved.

The navigation channels are vital to the local, national, and indeed international community. Decoupling the navigation channels from the distributary channels will require expensive and well-planned structural and engineering solutions. Failure to do so, however, will mean there are not enough natural resources available to save the delta and the port infrastructure it now protects.

NPS recommends that COE recognize that the most serious impediment to large scale restoration is the present navigation system at the mouth. The river's navigation function must be decoupled from its hydrological function.

B) Freshwater Diversions

The two largest diversions already constructed, Caernarvon and Davis Pond, were conceived and planned long ago, when their purpose was to affect salinities in their respective lower basins in order to improve oyster production (Figure 4). As a result, they are inappropriately sited and sized for their current restoration mission. Both discharge into mid-basin marsh areas at very high volumes.



Figure 4. *Freshwater diversion structures, waterways, and federal lands within the Mississippi River delta region and the Bird's Foot Delta.*

To have the maximum benefit to the delta, freshwater diversion should take place in the upper estuary and on the flanks of the lower estuary, mimicking the spring flood by flowing at appropriate volumes into the backslope bottomland forests, swamps and fresh marshes that fringed the natural levees. These freshwater systems are under stress, dying or dead throughout the delta (and within the Preserve), because of subsidence, nutrient and sediment deprivation, and saltwater intrusion. Swamps in the upper Terrebonne, Barataria and Pontchartrain basins should be nourished by series of small scale diversions that allow sheet flow to percolate slowly from the upper to the lower estuary. Small diversions should be used along the lower reaches of the river to revive and restore the fringing wetland forests that flank the natural levees near Labranche, the Lake Borgne basin, and upper Bayou Barataria. Where possible, former distributaries, both small (River aux Chenes, Grand Bayou) and medium (Bayou Lafourche) should be used as conduits.

Capturing freshwater, nutrients, and micro-sediments in upper estuarine and flanking forests more efficiently will mean less disruption of salinity and marsh regimes in the lower estuaries, and reduced dead zone development in the open gulf.

NPS recommends that future freshwater diversions, designed to mimic the spring flood, should be built at appropriate scale and in appropriate locations, allowing pulses of freshwater, micro-sediments, and dissolved nutrients to nourish forested wetlands and fresh marshes in the upper basins and on the flanks of distributary natural levees. Obviously, an increased volume of freshwater entering the upper estuaries will require flexibility in the design and management of ring levee systems that bisect estuaries if optimal hydrological balance is to be maintained.

C) Barrier Islands and Barrier Headlands

Barrier islands and headlands in most areas of the delta have been starved of coarse sediment inputs from the river, cut up by canal dredging, deforested by human action, cut off from sediment transport by navigation channels and jetties, subjected to subsidence by sub-surface mineral extraction, and slowly inundated by sea level rise induced by global warming.

To be most effective, sand and sediment sources for barrier island restoration must be from far enough offshore that changes to bathymetry don't ultimately negate the effects of the restoration project. Where appropriate, all elements of a barrier island must be restored, including beaches, dunes, maritime forests, and bayside salt marshes.

Restoration of barrier islands, especially where it involves closing or narrowing of tidal passes, cannot be accomplished without restoring significant acreages of interior marsh platforms. The total size of the passes, and therefore the islands and headlands, will ultimately be controlled by the volume of tidal water seeking equilibrium between the estuary and the gulf.

NPS recommends that barrier island and headland restoration should be undertaken, but only where anthropogenic forces have reduced the natural input of sediments below the threshold needed for island or headland sustainability.

D) Dedicated Dredging

Currently COE expends large annual sums dredging bars and channel accumulations to keep the river open for navigation. This material is often pumped into the strongest current and simply transported farther downstream, only to be picked up by dredge again and the cycle repeated, until it is captured at the passes and jettied offshore, lost to the delta. Re-direction of this stream of sediments would be a relatively low cost, low impact way to create new marsh and ridge habitat in carefully targeted locations. Advantages of such a plan would be: it could be accomplished quickly; it would not require the longer term massive re-engineering of the river needed for diversion and decoupling from the navigation channel; and, it would not result in wholesale changes to salinity regimes and

plant communities in targeted areas, because dewatered sediments could be used. Salt marsh could be built in saline areas, brackish marsh in brackish areas, etc.

NPS recommends that COE require that all sediment from maintenance dredging projects in the delta, whether government sponsored or controlled by COE permitting, should henceforth be beneficially used for wetland creation or nourishment. Piling dredge material in upland areas or on existing spoil banks is unsustainable and wastes resources important for delta restoration.

NPS recommends that material dredged to maintain the navigation channel in the Mississippi River, now re-directed back into the current for eventual transport through the jetties into the deep gulf, should be captured as de-watered slurry and transported by pipeline to build new marsh platform.

E) Large Scale Diversion for Sub-Delta Building

Since the end of the Pleistocene and the relative stabilization of sea level that followed the melting of the ice caps, the Mississippi River has built and abandoned a series of deltas. Delta decay through erosion and subsidence are part of the natural process. Indeed, deltaic decay is a vital driver in the bioenergetics of the delta's estuaries, and plays a key role in diversifying habitats and the floras and faunas dependent upon them. However, in the natural system, new deltas were built as the old decayed. For most of the last 5,000 years, the delta has seen a net annual gain of land. No more. Restoration of that equation cannot be accomplished without unleashing the delta-building power of the river again.

A number of uncontrollable factors will affect the size of the new deltaic lobes that the river can now build. These include the total volume of available sediment, now diminished by dams on the Missouri, upper Mississippi, Tennessee, and other tributary streams. Another is eustatic sea level rise, which will affect the total area of emergent wetland that can be built by deltaic deposition. Nevertheless, because delta building is inherently dynamic, the system will respond to both its input and output limitations, and build appropriately scaled delta platforms, no matter the changing conditions. Indeed, it is the ability of a naturally-forming delta to reshape itself under any conditions that make major diversions the most effective tool in the long term plan to reach equilibrium between wetland loss and wetland gain.

Major diversions will have considerable societal and economic costs. Depending on the number of such diversions, their location on the main stem, and the target area, human infrastructure and human livelihoods will be disrupted and will need to be relocated or redesigned. These costs have to be factored into design and planning. The needs of communities dependent upon the harvest of fish, shrimp, crabs and oysters disrupted by a major diversion must be at the forefront of planning for large scale diversion. Local government, landowners, the oil and gas industry and its local employees, the recreational and commercial seafood industry, hunters and trappers, and the navigation interests affected by large scale diversion must all be brought into the process.

Wholesale diversion into shallow water areas above Head of Passes would also mean the present Bird's Foot Delta will be starved of sediment and freshwater. A prograding delta will begin the natural cycle of degradation and evolution toward higher salinity marshes, lower productivity, reduced landmass, and the formation of a receding barrier headland. Because the Bird's Foot is, as a result of channelization, perched precariously in unsustainably deep water, the process of conversion and retreat will be quite rapid. Abandonment of the Bird's Foot will mean that some of our continent's most productive marshes, including those contained in the Delta National Wildlife Refuge and the Pass a Loutre Wildlife Management Area, will be transformed, and, perhaps eventually lost. This will be ameliorated by the simultaneous creation of new delta which will exceed in size the areas lost, because built in shallower water with more available sediment.

Despite these obstacles, there is no alternative. Those affected negatively by large scale diversion can either constructively and proactively adapt to it now, or watch as the delta disappears and their concerns become moot. Freshwater capture upstream by diversion into upper estuarine areas combined with dedicated sediment dredging and pipeline delivery should be used to increase the ratio of sediment to freshwater for building large scale sub-delta lobes. This will reduce the impact on those natural and cultural systems that depend upon the current salinity balance.

NPS strongly recommends that COE and the state proceed immediately with the implementation of large scale diversions that capture all of the available freshwater and sediments in the lower reach of the Mississippi River. These diversions should be targeted into areas that achieve the maximum benefit for the combined goals of land building and surge protection for interior communities.

NPS recommends that the public lands that will be transformed or lost due to the abandonment of the Bird's Foot Delta be replaced in kind in the newly forming delta lobes. The U. S. Fish and Wildlife Service for the Federal government and the Louisiana Department of Wildlife and Fisheries for the state have trust responsibilities for our nation's wildlife and manage large areas in the Bird's Foot delta. The newly forming delta will be critically important habitat for hundreds of thousands of wintering waterfowl, migrating shorebirds, and nesting wading birds.

V. Statutory, Policy, and Administrative Foundation of the NPS Vision

A) Statutory Basis for NPS Management in the Mississippi River Delta Region

In the **National Park Service Organic Act of 1916** (16 U.S.C. § 1), Congress stated that "There is hereby created in the Department of the Interior a service to be called the National Park Service, which shall be under the charge of a director....The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified, except such as are under the jurisdiction of the Secretary of the Army, as provided by law, by such means and

measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

Subsequently, in the **National Park System General Authorities Act of 1970**, Congress clarified that national park areas are to be “preserved and managed for the benefit and inspiration of all of the people of the United States, in light of the high public value and integrity of the National Park System” (16 U.S.C. § 1a-1). In the **National Parks Omnibus Management Act of 1998**, Congress instructed the NPS to integrate the results of scientific research into its management decisions (16 U.S.C. § 5936).

In the **enabling legislation which established Jean Lafitte National Historical Park and Preserve**, Congress established the park in order to preserve for the education, inspiration, and benefit of present and future generations significant examples of natural and historical resources of the Mississippi Delta region and to provide for their interpretation in such manner as to portray the development of cultural diversity in the region (16 U.S.C. § 230).

The park also contains a number of sites of historic/archaeological value, including the Barataria National Register District, the Chalmette National Historical Landmark, the Percy-Lobdell Building in Thibodaux, which is a listed classified structure on the National Register of Historic Places, and the 419 Decatur Building in the French Quarter of New Orleans, a contributing element for the Vieux Carre National Historic Landmark District. The NPS preserves these cultural resources and landscapes as required by the **National Historic Preservation Act** (16 U.S.C. § 470 et seq.).

B) Policy Basis for NPS Management in the Mississippi River Delta Region

The NPS’s management vision for the Mississippi delta region is additionally derived from the Service-wide NPS Management Policies. Updated in 2006 after extensive review and comment from the general public, the scientific community, and agency employees, the NPS Management Policies are mandatory for all NPS employees unless specifically waived or modified in writing by the Secretary of the Interior, the Assistant Secretary of the Interior, or the Director of the National Park Service.

The sections of the NPS Management Policies most relevant to NPS management of the Mississippi delta region are quoted here. The policies are available in their entirety at www.nps.gov/policy/mp/policies.html or www.nps.gov/policy/MP2006.pdf.

1) Section 4.4.2.4: Management of Natural Landscapes

“Natural landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes, and fires, will be allowed to recover naturally unless manipulation is necessary to (1) mitigate for excessive disturbance caused by past human effects, (2) reserve cultural and historic resources as appropriate based on park planning documents, or (3) protect park developments or the safety of people. Landscape and

vegetation conditions altered by human activity may be manipulated where the park management plan provides for restoring the lands to a natural condition.”

2) Section 4.8.1.1: Shorelines and Barrier Islands

“Natural shoreline processes (such as erosion, deposition, dune formation, overwash, inlet formation, and shoreline migration) will be allowed to continue without interference. Where human activities or structures have altered the nature or rate of natural shoreline processes, the Service will, in consultation with appropriate state and federal agencies, investigate alternatives for mitigating the effects of such activities or structures and for restoring natural conditions...Any shoreline manipulation measures proposed to protect cultural resources may be approved only after an analysis of the degree to which such measures would impact natural resources and processes, so that an informed decision can be made through an assessment of alternatives. Where erosion control is required by law, or where present developments must be protected in the short run to achieve park management objectives, including high-density visitor use, the Service will use the most effective method feasible to achieve the natural resource management objectives while minimizing impacts outside the target area.”

3) Section 4.1.5: Restoration of Natural Systems

“The Service will reestablish natural functions and processes in parks unless otherwise directed by Congress. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes, and fires, will be allowed to recover naturally unless manipulation is necessary to protect other park resources, developments, or employee and public safety. Impacts on natural systems resulting from human disturbances include the introduction of exotic species; the contamination of air, water, and soil; changes to hydrologic patterns and sediment transport; the acceleration of erosion and sedimentation; and the disruption of natural processes. The Service will seek to return such disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function.”

4) Section 4.4.1: General Principles for Managing Biological Resources

“The National Park Service will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems....by

- preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur; and
- minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them.”

5) Section 4.6.4: Floodplains

“In managing floodplains on park lands, the National Park Service will (1) manage for the preservation of floodplain values; (2) minimize potentially hazardous conditions associated with flooding; and (3) comply with the NPS Organic Act and all other federal laws and executive orders related to the management of activities in flood-prone areas, including Executive Order 11988 (Floodplain Management), the National Environmental Policy Act, applicable provisions of the Clean Water Act, and the Rivers and Harbors Appropriation Act of 1899.”

6) Section 4.6.5: Wetlands

“The Service will manage wetlands in compliance with NPS mandates and the requirements of Executive Order 11990 (Protection of Wetlands), the Clean Water Act, the Rivers and Harbors Appropriation Act of 1899, and the procedures described in Director’s Order 77-1 (Wetland Protection). The Service will (1) provide leadership and take action to prevent the destruction, loss, or degradation of wetlands; (2) preserve and enhance the natural and beneficial values of wetlands; and (3) avoid direct and indirect support of new construction in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm to wetlands.”

7) Sections 5.3.5, 5.3.5.1, 5.3.5.1.1-4: Cultural Resources

Recognizing that the NPS is the steward of many of America’s most important cultural resources, including archeological sites, as well as historic and prehistoric structures, the NPS Management Policies specify that park cultural resource management involves: (1) research to identify, evaluate, document, register, and establish basic information about cultural resources and traditionally associated peoples; (2) planning to ensure that management processes for making decisions and setting priorities integrate information about cultural resources and provide for consultation and collaboration with outside entities; and, (3) stewardship to ensure that cultural resources are preserved and protected, receive appropriate treatments to achieve desired conditions, and are made available for public understanding and enjoyment.

C) Administrative Planning Basis for NPS Management in the Mississippi River Delta Region

In 1995, Jean Lafitte National Historical Park and Preserver produced an amended General Management Plan (GMP) which provides long-term direction for administering the Park. Congress requires each park unit to have a GMP to guide park decisions about resource preservation, visitor use, and park management. GMPs are developed and adopted with much public review and input.

As directed by the 1995 GMP, the NPS must manage the Barataria Preserve in the following ways:

- as part of the larger Barataria Basin ecosystem;
- for the restoration of natural hydrology; and
- to reestablish the natural flow of freshwater and sediment.

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