RESTORE
THE MISSISSIPPI RIVER DELTA

Restoring the Mississippi River Delta for People and Wildlife:
Recommended Projects and Priorities

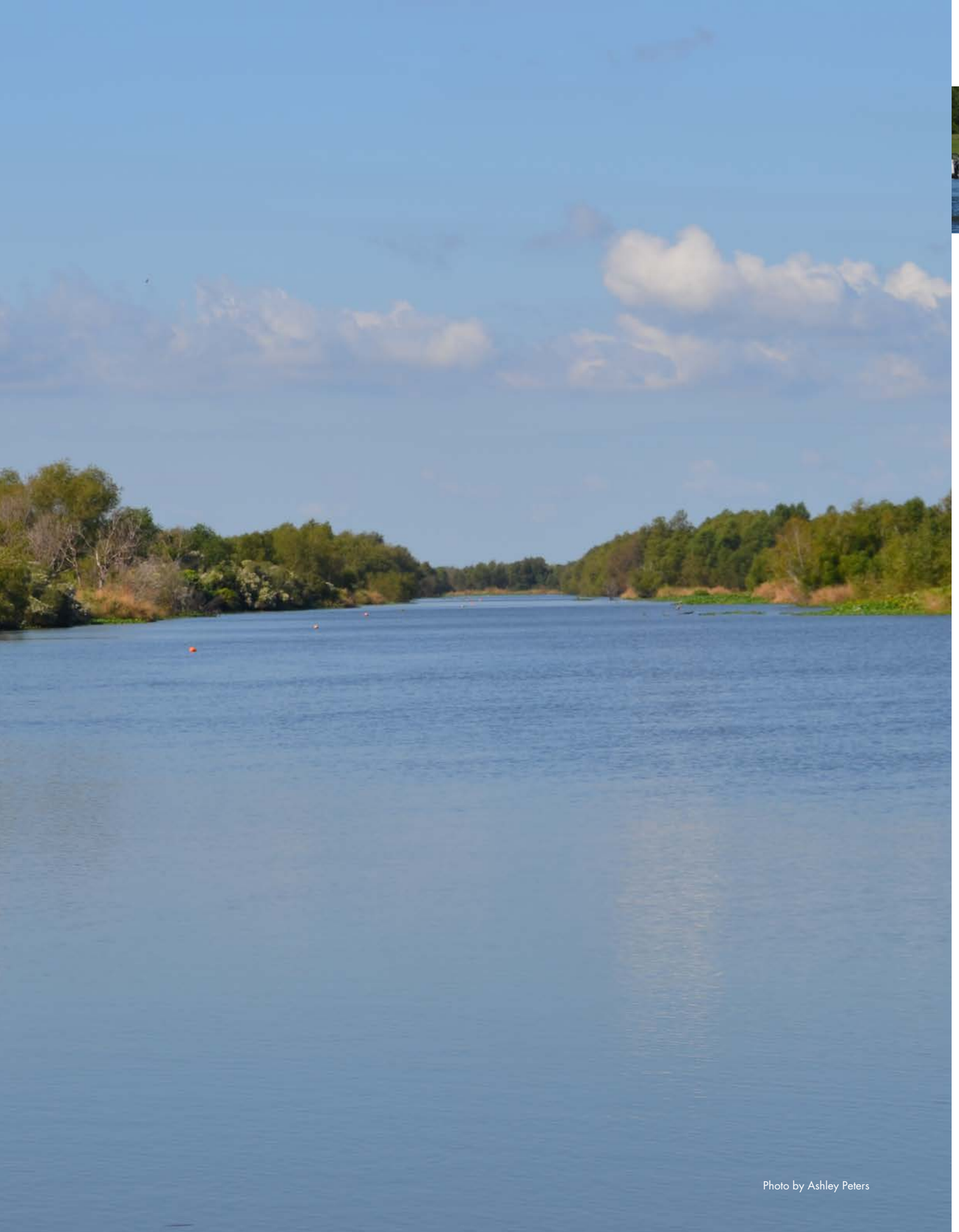

Photo by Ashley Peters

Photos by Ashley Peters

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A PROJECT PORTFOLIO FOR RESTORATION OF THE MISSISSIPPI RIVER DELTA AND COASTAL LOUISIANA

Photo by Ashley Peters

OUR VISION

To restore a healthy Gulf of Mexico ecosystem – starting with prompt restoration of the Mississippi River Delta – to ensure the ecological, cultural, social and economic benefits of the Gulf are experienced for generations.

The Gulf Coast ecosystem is a unique and varied landscape that offers an array of benefits to Gulf Coast states and the nation. The ongoing Gulf oil disaster is the latest act in a longer-running tragedy: the continuing loss of the Gulf's wetlands. The greatest losses have occurred in Louisiana around the Mississippi River Delta. Coincidentally, the largest oil impacts from the Gulf oil disaster were to the remaining marshes and beaches of the Mississippi River Delta, further damaging an already fragile ecosystem.

However, with tragedy often comes hope and opportunity. By law, the parties responsible for the Gulf oil disaster must pay to replace, restore and/or compensate for damages to wetlands, beaches, fisheries, wildlife and habitats. The RESTORE Act, federal legislation passed in 2012, requires that Clean Water Act fines stemming from the Gulf oil disaster go to the Gulf Coast states to be used for restoration. Those funds and others present an opportunity to both rehabilitate specific locations affected by the oil spill, as well as improve the overall functioning of the Gulf of Mexico system and set one of America's greatest ecological treasures on a transformative path toward health.

Restoration of the Mississippi River Delta can jumpstart and provide far-reaching and long-term benefits to the entire Gulf system. One of the most important contributors to the ecological health of the Gulf of Mexico, the Mississippi River is the largest river in North America and provides more fresh water, sediment and nutrients to the Gulf of Mexico than all of the other U.S. rivers entering the Gulf combined. This blend of fresh water, sediment and nutrients mix with the salty Gulf waters creating expansive estuaries that are the biological engines for the abundance of life found in the northern Gulf.

The Restore the Mississippi River Delta Coalition (Coalition) has identified 19 priority projects in the Mississippi River Delta that, if underway in the next five years, will signal the beginning of an era of stewardship and set us on a path to healthy recovery for not just the delta, but for the entire Gulf Coast.

The 19 near-term, priority Louisiana projects will begin restoration of Louisiana's ecosystem and best meet goals outlined in the RESTORE Act, the Gulf Coast Ecosystem Restoration Council's Initial Comprehensive Plan, the National Fish and Wildlife Foundation's requirements and the goals of the Natural Resource Damage Assessment. We concentrate here on the Louisiana coast, while acknowledging the need and appropriateness of projects in other Gulf states that benefit the region as a whole.

The nation is enriched by the bounty of the Mississippi River Delta and will benefit from its revitalization. 97 percent of the entire Gulf region's commercial fish and shellfish population is dependent on coastal wetlands. Nicknamed "Sportsman's Paradise," Louisiana is home to world-class freshwater and saltwater fishing; up to 9 million wintering ducks and geese; vast nesting colonies of terns, herons, egrets and ibis; and 100 million birds which either reside year-round, spend the winter or migrate through the region. Wildlife-related tourism generates more than $19 billion annually across the Gulf Coast, with $2 billion of those revenues coming from Louisiana.

The Delta is an Economic Driver

$8 billion
annual economic impact of recreational saltwater fishing

$2.85 billion
annual economic impact of Louisiana's commercial fisheries

WHAT IS THE MISSISSIPPI RIVER DELTA?

On hearing the phrase "Mississippi River Delta" many people think of a small area of land at the mouth of the Mississippi River, also known as the "Bird's Foot Delta." In actuality, the land built by the Mississippi River in recent geological times is far more extensive. Herein, we include the entire coastal plain of Louisiana, from the border with the state of Mississippi west to (and including) the Atchafalaya Basin. West of the Atchafalaya is an area of coastal marsh extending to the Texas border, known as the Chenier Plain, also built indirectly with Mississippi River sediments, which is included as part of "coastal Louisiana."

The Heart of the Injury, the Heart of the Remedy

Louisiana, due to its close proximity to the Deepwater Horizon explosion and leaking well, accounted for ***61 percent*** *of the total oiled shoreline of the Gulf Coast states. Four years after the spill, Louisiana accounts for* ***52 percent*** *of shoreline still showing traces of oil, and* ***94 percent*** *of the oiled shoreline classified as more than "trace" oiling.*

Unfortunately, coastal Louisiana is home to another statistic: since the 1930s, 1.2 million acres of land have disappeared into open water, and more than 10,000 acres continue to vanish annually. Without swift, decisive action and bold, large-scale restoration efforts, this coastal land loss crisis will persist, and Louisiana could lose an additional 1,800 square miles in as little as 50 years. Along with threats to critical components of healthy estuarine habitat and a vibrant tourism economy, the loss poses a growing threat to some of the nation's most critical energy infrastructure, largest ports, busiest shipping corridors, leading commercial seafood producers and other important business sectors. But even in its current state of ongoing collapse, the Mississippi River Delta remains one of America's great landscapes.

A Healthy Mississippi River Delta, A Healthy Gulf

The anticipated funding from the fallout of the Gulf oil disaster is substantial, but it will not be enough to finance all the projects necessary to restore the Gulf Coast. For this reason, we must focus our attention on the projects with the greatest potential to provide the greatest benefits. Since restoration of the Mississippi River Delta has the greatest potential for large-scale and expansive benefits to the entire northern Gulf of Mexico, our Coalition reviewed and evaluated projects based on the following questions:

1. Is the project included in Louisiana's 2012 Comprehensive Master Plan for a Sustainable Coast?
2. Is the scale of the project's benefits sufficient to advance Gulf-wide restoration?
3. Does the project restore a naturally functioning and sustainable delta and Gulf ecosystem?

Louisiana's 2012 Coastal Master Plan

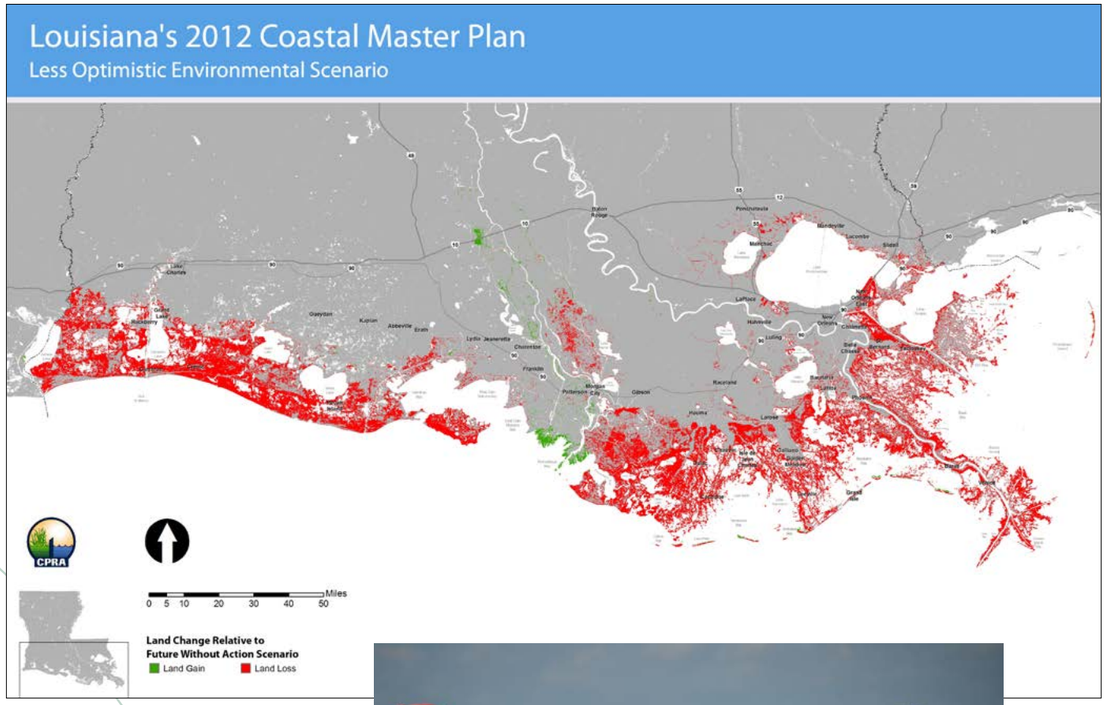
The state of Louisiana has developed a blueprint of projects to restore and sustain the estuaries of the Mississippi River Delta. The 2012 Comprehensive Master Plan for a Sustainable Coast (Coastal Master Plan) used a thorough and transparent science-based process, with extensive public outreach, to recommend 109 restoration and protection projects to be implemented over the next 50 years that maximize land building and reduce flood risk. Our team has reviewed all of the restoration projects proposed in the Coastal Master Plan slated for the first implementation period, years 0-20.

We chose restoration projects that were part of the Coastal Master Plan because of its adherence to a strong science-based project selection method and because of its robust and diverse public and stakeholder participation process. With a long list of needs and limited funding, it is critical that every available dollar be leveraged by selecting projects that maximize overall benefits to the Gulf. Given limited funds and many restoration needs, we chose projects that address multiple priorities and goals.

A Scale That Will Advance Gulf-Wide Restoration

We emphasize comprehensive restoration actions that tackle large-scale issues and have the potential to provide multiple long-term benefits and services over the long term. We recognize that "large-scale" is a relative term that requires a baseline against which progress can be measured and compared. A river delta is not a static landscape – it includes very different regions. In areas dominated by the influence of the Mississippi River, land builds; in areas dominated by the influence by the sea, land erodes. The future without large-scale restoration in Louisiana is victory by the sea and the near complete loss of its ecologically and economically vital coastal wetlands.

We evaluated projects against this bleak baseline to determine the relative scale of their contribution to improving conditions compared to that possible watery future, as well as their effective interaction with other projects to maximize overall benefits. We placed an emphasis on river reintroduction where river resources of fresh water, sediment and nutrients are available because of the potential to both build new land and maintain existing wetlands, as well as the benefits to the long-term health of the surrounding estuarine environment.



Louisiana's 2012 Coastal Master Plan, a 50-year blueprint laying out coastal restoration solutions, predicts a grim future if no action is taken. The red areas in this map represent potential future land loss if restoration plans are not implemented.

Photo by Ashley Peters

Photo by Erik Johnson

100 million

birds live in or pass through the delta each year.

Photo by Gerry Ellis

Restoring a Naturally Functioning and Sustainable Delta and Gulf Ecosystem

Estuaries are typically found where a river meets the sea and fresh water mixes with salt water. The estuary where the Mississippi River meets the Gulf of Mexico is one of the most productive in the world.

A productive and healthy estuary consists of a range of habitat types and landscape features. Habitat types tend to shift from the fresher areas in the landward parts of an estuarine basin (swamps, bottomland hardwoods and fresh marsh) to the intermediate and more salt water dominated habitats closer to the Gulf (intermediate marsh, brackish marsh, saline marsh and mangroves). Higher elevation habitats, such as ridge forests and beach dunes, are also important to healthy estuaries in Louisiana.

Landscape features, such as natural levees, ridges, distributaries, barrier islands and land-bridges, also help dictate how habitat types are distributed throughout the basin and can be key to maintaining the integrity of the estuarine wetlands. For instance, barrier islands in Barataria Basin provide protection to the marshes from erosion by tides and storm waves. Without these key features, wetland loss rates in the basin would increase dramatically. Therefore, we must look at restoration as a system of estuarine function and productivity.

We evaluated each basin for the suite of projects best suited to ensure long-term benefits and favored projects that improve the overall health and natural function of ecosystems. As with the Coastal Master Plan, we judged that a keystone to basin-wide health is restoring or reestablishing natural processes or conditions that once existed for the overall health of the wetlands and all other restoration projects. An example is sediment diversions, which mimic nature by using the power of the river and the sediment, fresh water and nutrients it carries to restart deltaic processes to build new marsh and to help sustain the existing wetlands that would otherwise disappear. By harnessing the power of the river to move sediment, sediment diversions are less energy-intensive and more sustainable than other major wetland-building restoration tools.

Using a Full Suite of Restoration Solutions

Restoration that restarts natural processes, such as deltaic land building, is inherently preferable to engineered man-made restoration that relies on continued and expensive maintenance, but that does not mean that other restoration projects are not essential to our success. In addition, some areas of the Mississippi River Delta are now completely cut off from the river, and diverting sediment and nutrients from the river is an immensely difficult challenge.

Barrier islands and barrier headlands are an essential first line of defense against tropical storms and work synergistically with sediment diversions to capture sediment in the basin. Marsh creation provides a mechanism to build small areas of wetlands in critical areas, such as protective marsh land-bridges, or in areas that cannot be easily reached with a sediment diversion. Sediment diversions can work together with marsh creation by extending the lifespan of these projects. Ridges in the basins are a key feature to reduce saltwater intrusion and protect from storm surge. Restoring these natural features will not only provide key habitats, but will also protect from storm surge and help retain sediment and fresh water in the basin from sediment diversions.

Barrier island restoration, ridge restoration and marsh creation projects all involve mechanically dredging sediment and transporting it through large pipes or in barges to project locations, often many miles from the source. Once sediment is transported and in place, sea level rise, subsidence and erosion by wind and waves will gradually overtake such projects, and many will erode and subside. Despite these long-term limitations, we are in a crisis and need immediate actions to reduce future losses.

Hydrological restoration projects help to re-establish something closer to the historical distribution of fresh water and salt water by building barriers to saltwater intrusion or enhancing freshwater flows into targeted areas. While these projects don't directly build land, we have prioritized hydrological restoration projects in targeted areas where there is no prospect of significant near-term sediment re-introduction and in areas where salinity imbalances are best treated by structural modifications to man-made channels.

Finally, in our choice of shoreline protection project sites, we have looked for areas where the principal threat is erosion, where no sandy barriers existed historically and where intervention now could have significant mid-term benefits – in other words, where subsidence is not a dominant factor driving land loss. Our preference is for use of artificial oyster reef structures, where salinities will support them, either alone or in combination with other tested techniques, such as building sediment-capturing breakwaters parallel to the shoreline, rather than perpendicular. These parallel breakwaters have proven highly effective on various segments of the Louisiana coast. Oyster reefs have the advantage of long-term sustainability, since they can continue to grow vertically to offset relative sea level rise while providing significant fisheries habitat and wildlife value. Oyster reefs existed for vast distances along our coast before European settlement, and we should strive to re-establish them today.

Photo by Melanie Driscoll

What is a basin?

A basin is an area that is hydrologically connected, such as a river basin, lake basin or drainage basin. In the Mississippi River Delta, large basins are separated by hydrologic barriers, or landscape features that do not allow water to cross from one side to the other. For example, the Mississippi River and its levee system create a hydrologic barrier between the Breton Sound Basin on the east and the Barataria Basin on the west. Other major basins in the Mississippi River Delta include the Pontchartrain Basin, Terrebonne Basin and the Atchafalaya-Vermilion Basin.

RESTORING THE DELTA: AN INVESTMENT IN OUR FUTURE

THE RESTORE ACT

As the entire nation – and spectators from all over the world – watched the 2010 oil spill unfold, Congress began work to direct financial resources flowing from the spill to the states affected. Gulf Coast members of Congress led a two-year landmark effort to craft and win broad support for the RESTORE Act, formally called the "Resources and Ecosystem Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast Act of 2012." The RESTORE Act passed the House and Senate with bipartisan support, and the President signed the bill on July 6, 2012.

The RESTORE Act created a Gulf Coast Restoration Trust Fund, which will receive 80 percent of any Clean Water Act civil and administrative penalties paid by BP and other liable companies for their roles in 2010 Gulf oil disaster. The Trust Fund will support a variety of ecological and economic restoration and recovery projects in the Gulf. The RESTORE Act also created the Gulf Coast Ecosystem Restoration Council (Council), which is composed of high-ranking federal and state officials and is responsible for Gulf-wide ecosystem restoration. Depending on the outcome of the trial, penalties could range between $4.5 and $17.6 billion.

Restoration Space and Resources

What do we mean when we discuss "space" and "resources or opportunity"? We mean that you can complete bigger projects using more of the available natural resources – sediment, fresh water and nutrients – in the Mississippi River Delta than anywhere else in the Gulf of Mexico. Because of decades of land loss and the fact that land loss continues, coastal Louisiana offers space for wetland restoration on a scale not present elsewhere in the Gulf. The sheer size of the area of land lost provides unequaled space for restoration. And because we can project future land loss, it provides a "future-without-action" baseline against which progress can be measured. Restoration will prevent the encroachment of the Gulf of Mexico, thereby maintaining wetlands in the Mississippi River Delta and a range of salinities from fresh water to salt water that provide estuarine space for the entire Gulf. Estuarine space equals nursery space for estuarine species, which means more fish to catch and thriving populations of dolphins and birds for us and our children to enjoy. Simple as that. Nowhere else provides the space to accomplish restoration on such a scale.

In addition to the physical space available for restoration, the Mississippi River could provide the resources needed for massive restoration. As currently managed, most of the millions of tons of sand and mud carried by the Mississippi River every year are unavailable to build new land and maintain existing wetlands – but they could be. What this means is that in the delta we not only have the space, but we also have the sediment resources to build the wetlands needed to sustain the delta's robust estuarine – and therefore Gulf-wide – fisheries and wildlife production. The opportunity provided by the sediment load of the Mississippi River also provides an unrivaled long-term economical and sustainable source for the material needed to refill some of that space. Additionally, in an era of accelerating sea level rise, annual riverine inputs provide a clear and defined means to sustain those rebuilt wetlands.

We need only change the way we manage the river and its sand and mud to restore the delta.

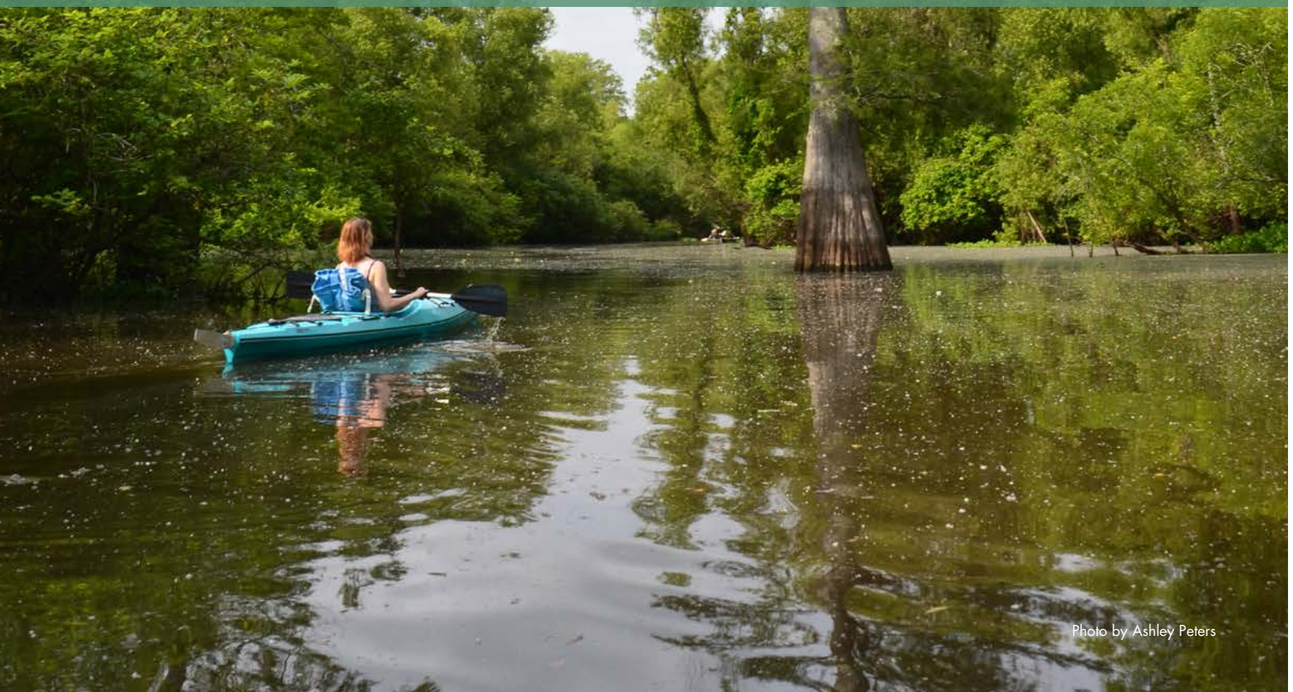


Photo by Ashley Peters

Our 19 priority projects encompass a wide variety of project types, including:

- sediment diversions to build and sustain marsh;
- freshwater diversions to sustain swamps;
- pipeline sediment delivery systems for marsh creation;
- barrier island and headland reconstruction;
- ridge restoration;
- shoreline protection, and
- hydrological modifications to alleviate salinity intrusion into vulnerable marshes and swamps.

The 19 Priority Projects

These projects are grouped within five distinct basins across coastal Louisiana and address a range of restoration priorities that both complement and enhance one another.

Pontchartrain-Maurepas Basin Projects:

- West Maurepas Freshwater Diversions
- Central Wetlands Diversion and Wetland Restoration
- Golden Triangle Marsh Creation (via Sediment Conveyance Pipeline East)
- New Orleans East Land-Bridge Restoration by Marsh Creation

The Pontchartrain-Maurepas Basin is dominated by three large estuarine lakes that are connected by tidal passes, with a gradient that runs from fresh to salt, running roughly west to east. Coastal habitats in the basin include bottomland hardwood forest, freshwater swamps and marshes and brackish and saltwater marshes. In the upper basin, the swamps are cut off from the nourishing fresh water, nutrients and sediment of Mississippi River by levees installed for flood protection and navigation. As a result, these swamps are sinking and converting to marsh and open water. Marshes in the lower part of the basin are suffering from similar problems, exacerbated by the construction of the Mississippi River Gulf Outlet shipping channel, levees and other navigation canals. These marshes are rapidly becoming open water. The freshwater swamps once found in the lower basin have almost completely disappeared.

The priority projects chosen for this basin restore freshwater flows into the upper basin swamps (West Maurepas) and lower basin marshes (Central Wetlands Diversion), coupled with marsh and swamp restoration. They also restore or sustain two marsh or swamp land-bridges: one between lakes Maurepas and Pontchartrain, and one between Pontchartrain and Borgne. These projects help to prevent these three lakes from becoming a single arm of the Gulf. The built or sustained marshes will not only provide important habitats to birds, fish and wildlife - they will also help buffer the new surge barrier on the east side of Lake Borgne (Golden Triangle). The first two diversions are necessary for the long-term success of the latter two projects.

West Maurepas Freshwater Diversions Ascension, Livingston, St. James, St. Charles and Tangipahoa Parishes

This diversion project encompasses as many as three individual freshwater conduits from the Mississippi River in the vicinity of Hope Canal, Convent/Blind River and the Bonnet Carré Spillway. It would benefit the western Maurepas

67 percent

of waterfowl in the Central and Mississippi flyway spend part of their year in the delta.

Photo by Karen Westphal

An example of an oyster reef restoration project

swamps, the land-bridge between Lakes Maurepas and Pontchartrain and the LaBranche wetlands. Dominated by baldcypress and water tupelo trees, this swamp complex is one of the largest forested wetlands in the nation.

However, levees constructed along the river and the closure of Bayou Manchac have isolated the area from spring floods and the vital fresh water, nutrients and sediments they bring. This isolation coupled with rising salinities throughout the Pontchartrain Basin has left the swamp in a state of rapid decline – trees are dying, and young trees are not growing to replace them. The West Maurepas Freshwater Diversions will benefit the swamp by reconnecting it with the river, preventing further loss and the conversion to open water, as well as helping to temper rising salinities throughout the entire Pontchartrain Basin.

Central Wetlands Diversion and Wetland Restoration
Orleans and St. Bernard Parishes

This diversion and restoration project will benefit the Central Wetlands Unit in eastern Orleans and St. Bernard parishes, including the Bayou Bienvenue Triangle. The area was once primarily a freshwater system, dominated by baldcypress swamp and freshwater marsh, but today deteriorating brackish marsh is the predominant habitat type, and much of what was swamp is now open water. The destruction of the swamp habitat was caused by saltwater intrusion into this system through the Mississippi River Gulf Outlet navigation channel. This project will help sustain remaining marsh and swamp in the Central Wetlands and will facilitate restoration of marsh and swamp in areas that are now open water by utilizing dredged sediment through the project. Additionally, fresh water from this project could help maintain optimum salinities for oysters and other estuarine organisms in the nearby Lake Borgne and Biloxi marshes.

Golden Triangle
Orleans and St. Bernard Parishes

This marsh creation project is located near the confluence of the Mississippi River Gulf Outlet shipping channel and the Gulf Intracoastal Waterway. Dominated by brackish marsh, this area was badly damaged by saltwater intrusion and erosion following the dredging of the Mississippi River Gulf Outlet. This project will use a sediment conveyance pipeline to create and restore marsh. The restored marsh will help buffer the newly constructed surge barrier and eventually provide important estuarine habitat for Lake Borgne.

New Orleans East Land-Bridge Restoration
Orleans and St. Tammany Parishes

This project consists of marsh creation located in eastern New Orleans on a narrow land-bridge separating Lake Pontchartrain from Lake Borgne, where local subsidence and canals have raised salinities. This, combined with the exposure to high wave energy, has resulted in rapid retreat of the shoreline and the expansion of ponds and lakes within the marsh. This project will create and restore marsh via a sediment conveyance pipeline. The project area is a critical landscape feature that includes the Bayou Sauvage National Wildlife Refuge, the largest urban refuge in the nation. It separates Lake Pontchartrain from the Gulf, providing estuarine habitat. It is also a crucial line of defense from storm surge for more than 1.5 million people in eight parishes, including the cities of New Orleans, Laplace, Madisonville, Mandeville and Slidell.

Breton-Chandeleur Basin Projects:

- Mid-Breton Sediment Diversion
- Lower Breton Sediment Diversion
- Bayou la Loutre Ridge Restoration
- Biloxi Marsh Oyster Reef Restoration

The Breton-Chandeleur Basin is a large, open sound bordered on the east by remnants of a barrier island chain and on the west by the Mississippi River flood-protection levee system. Habitats in the basin range from freshwater to saltwater marshes. To the north is the Biloxi Marsh, which is among the most stable marsh platforms remaining in coastal Louisiana. However, wave-induced erosion along the marsh edge has contributed to significant land loss. Marshes in the mid-part of the basin have been starved of sediment for almost a century and have some of the highest recent marsh loss rates along the coast. In contrast, marshes in the lower basin periodically receive fresh water and sediment from the river during high flows and have much lower rates of loss.

The priority projects selected for this basin reintroduce sediment and freshwater flows from the river to slow the rate of land loss, strengthen soils and build new land in the mid-basin (Mid-Breton Sediment Diversion) and in the lower basin (Lower Breton Sediment Diversion). Two projects – the Bayou la Loutre Ridge Restoration and the Biloxi Marsh Oyster Reef – will provide natural structural protection by reducing wave and tidal energy, thus prolonging the life of the marshes while providing habitats for neotropical migratory birds on the ridge and fish on the reef.

Mid-Breton Sediment Diversion
Plaquemines Parish

To be located along the east bank of the Mississippi River, perhaps in the vicinity of White Ditch, this sediment diversion will convey fresh water and sediments into deteriorating marshes that drain into Breton Sound. The brackish marshes in the influence area have disappeared due to a combination of changes in the supply and distribution of fresh water, rapid subsidence, saltwater intrusion, sediment starvation and storm events. This project will reconnect the influence area with the river and divert sediment and fresh water during flood pulses, building new land and sustaining existing marsh.

Lower Breton Diversion
Plaquemines Parish

This sediment diversion project is planned for lower Breton Sound along the east bank of the Mississippi River, in a location to be determined. The brackish and salt marshes in the influence area have low rates of loss relative to many other parts of the coast, which may be attributed to the sediment and fresh water it periodically receives when the river overtops the natural levee during high flows. This project will divert sediment and fresh water into the basin to build new land, maintain existing marshes and increase the resiliency of the influence area to sea level rise and storm events.

$19+ billion
in Gulf wildlife-related tourism – nearly
$2 billion
from Louisiana

Photo by Derek Brockbank

Photo by Ashley Peters

Bayou la Loutre Ridge Restoration
St. Bernard Parish

This project will restore the Bayou la Loutre Ridge, which stretches from the southwestern side of the Mississippi River Gulf Outlet to the Biloxi Marsh. The Bayou la Loutre Ridge is actually two parallel natural levees flanking old Bayou la Loutre (Otter Bayou), which is part of the structural underpinning of the Biloxi marshes. Construction of the Mississippi River Gulf Outlet breached the ridges, dramatically altering the hydrology of the area and leading to saltwater intrusion and extensive wetland loss. The ridge has suffered from subsidence, saltwater intrusion and canal breaches. The purpose of this project is to re-establish the ridge by adding soil and elevation, improve hydrology, provide storm surge protection, decrease saltwater intrusion and provide important resting habitat for migratory birds.

Biloxi Marsh Oyster Reef
St. Bernard Parish

This project will build an oyster barrier reef along the eastern shore of the Biloxi Marsh. The Biloxi Marsh platform is relatively stable geologically as it has a fairly low rate of subsidence. However, erosion on the marsh edge by wave action has resulted in significant loss of this productive habitat. Re-establishment of vertical oyster reefs in conjunction with the reintroduction of small amounts river water via West Maurepas and Central Wetlands diversions will help slow marsh deterioration. In addition to providing protection against waves and storm surge, oyster reefs also provide a broad range of other ecosystem and economic benefits. Once established, these reefs are naturally self-maintaining.

Barataria Basin Projects:

- Mid-Barataria Sediment Diversion
- Lower Barataria Sediment Diversion
- Barataria Land-Bridge, Large-Scale Marsh Creation via
- Sediment Conveyance Pipeline (West)
  Barataria Pass to Sandy Point Barrier Island Restoration
- Belle Pass to Caminada Pass Barrier Island Restoration

The Barataria Basin is one of the nation's most productive estuaries. The basin is bounded on the north and east side by the man-made Mississippi River levees, to the west by Bayou Lafourche and to the south by a barrier island chain. The Barataria Basin is a vital buffer to storm surge for communities on the West Bank of the river and in Plaquemines Parish. The basin hosts a variety of coastal habitats, including bottomland hardwood forests, cypress swamps, marshes ranging from fresh to saltwater, bays and barrier islands. The basin also contains the Barataria Preserve, which is the only natural area on the Louisiana coast that is part of the National Park System. Starved of sediment, habitats throughout the estuary system are collapsing. In the upper basin, cypress trees stand in stagnant waters, too deep for new trees to sprout, while freshwater marshes are converting to floating peat in the absence of a sediment source. The sediment-starved brackish marshes in the mid-basin have all but disintegrated. Barrier islands, with no supply of sand from the river, are rapidly eroding, offering little protection from salty Gulf waters that will eat away what remains of the upper estuary habitats.

The priority projects chosen for this basin include two sediment diversions (Mid and Lower Barataria), two large-scale barrier island restoration projects (Barataria Pass to Sandy Point and Belle Pass to Caminada Pass) and the rebuilding of a key marsh land-bridge (Barataria Marsh Restoration). These projects can work in concert to protect the upper basin freshwater wetlands, re-establish a barrier to Gulf intrusion, enhance storm surge protection and reintroduce annual infusions of freshwater, sediment and nutrients to build land and sustain existing wetlands.

Mid-Barataria Diversion
Jefferson and Plaquemines Parishes

This sediment diversion project into mid-Barataria Bay is located along the west bank of the Mississippi River, near Myrtle Grove. The brackish and freshwater wetlands in the influence area are highly degraded due to a combination of saltwater intrusion, decreased fresh water supply, alterations to the natural hydrology of the area and a lack of sediment input. This project will reconnect the river to the influence area and divert sediment and freshwater to build new land, maintain existing marshes and increase habitat resiliency to sea level rise and storm events.

THE CLEAN WATER ACT AND THE NATIONAL FISH AND WILDLIFE FOUNDATION

Following the 2010 Gulf oil disaster, BP and Transocean pled guilty to criminal charges under the Clean Water Act. As a result, more than $2.544 billion in fines are now on their way to the Gulf Environmental Benefit Fund, administered by the National Fish and Wildlife Foundation (NFWF). Of these funds, $1.272 billion has been designated specifically for sediment diversions and barrier island restoration in Louisiana, with an equal funding amount to be shared among the other Gulf States.

2.6 million
tourism-related jobs generated – nearly 83,000 in Louisiana

Lower Barataria Diversion
Jefferson, Lafourche and Plaquemines Parishes

This is a sediment diversion into what used to be marsh but is now lower Barataria Bay. Remaining marshes in the project's influence area are rapidly becoming open water due to high rates of subsidence and erosion, without the benefit of new sedimentary inputs from the river. This project will reconnect the river to the influence area by diverting sediment and fresh water to build new land, provide a sediment source to the Barataria Basin barrier islands, restore historical salinities in the basin and help buffer communities in lower Plaquemines Parish from storm surge.

Barataria Land-Bridge, Large-Scale Barataria Marsh Creation
West Jefferson, Lafourche and Plaquemines Parishes

This marsh creation project is in mid-Barataria Bay in the vicinity of Lafitte. Historically, there was a limited hydrological connection between the fresher upper basin and the saltier lower basin. Canal networks, erosion and subsidence have eaten holes through natural barriers, exposing wetlands in the upper basin to saltwater intrusion and increased wave energy. Long identified as a critical landscape feature, this project will build on projects that are already in place or under construction to strengthen the Barataria Land-bridge. Sediment conveyed from the river through a pipeline will be used to build new marsh, nourish existing marsh in the area, help restore historic salinities in the upper basin and help protect the nearby community of Lafitte from storm surge and tidal flooding.

Barataria Pass to Sandy Point Barrier Island Restoration
Jefferson and Plaquemines Parishes

This barrier island restoration project is located on the southeast side of Barataria Bay and stretches from Barataria Pass to Sandy Point. These barrier islands have retreated and been eroded through a combination of waves, storm surge, rising sea level, subsidence, and an increasing tidal range due to the expansion of interior bays, canals and navigation channels within the Barataria Basin. This has resulted in loss of barrier island habitat, exposed interior bay marshes to increases in salinity and wave action and increased the vulnerability of the entire interior of the basin to storm impacts. This project will use sediment to restore important migratory and shore bird habitat and improve the ecosystem function of the barrier island system, preventing the wholesale loss of the lower estuary.

Belle Pass to Caminada Pass Barrier Island and Headland Restoration Jefferson and Lafourche Parishes

This barrier island and headland restoration project is located on the southwestern side of Barataria Bay from west Belle Pass to Caminada Pass. Increasing tidal forces caused by ever-growing interior bays, canals, navigation channels, subsidence, wave action and sea level rise have all contributed to the erosion and retreat of the Caminada Headland and Elmer's Island. This sandy barrier system serves as critical habitat, helps protect the important shipping and navigation infrastructure at Port Fourchon and shelters interior marshes from salt water, waves and storm events. This project will use sediment to restore these barrier islands and provide protection to Caminada and Timbalier Bays by diminishing wave and storm surge energy.

An example of an oyster reef restoration project

Alternative Projects

Are these the only projects we would support? The answer is no. One of the triumphs of the Coastal Master Plan is the development of a Planning Tool that can re-evaluate project selection as conditions change. Further, the state's Coastal Master Plan process requires revision every five years. We embrace that flexibility. We also recognize that some funding sources, such as NRDA, may require projects targeted to specific resources, such as wildlife or fish species. Though such projects may not be part of the Coastal Master Plan, they are consistent with it.

Natural versus Man-Made Restoration

Why is marsh created by natural processes preferable to man-made marsh? What advantages do diversions have over dredges?

We will leave aside some common questions when comparing these two restoration techniques, including whether there is enough bed load in the river and enough money available to build sufficient new land mechanically, as well as how we will sustain marshes that are created with a dredge long-term.

Photo by Ashley Peters

The fundamental question is: "do man-made marshes differ from natural marshes?" The answer is yes." The difference is in the interaction between the marsh and the water. A man-made marsh is created by moving sediment and water through a dredge pipe that may stretch for miles. The man-made marsh is built to an elevation often two to five feet higher than the nearby natural tidal marsh in order to lengthen the lifespan of the project by offsetting the sinking expected due to the compaction of the pipeline-delivered sediment. The sediments are moved around the site mechanically to provide a flat and level surface. Adding features that mimic natural, meandering tidal flows adds cost. The result is a leveled platform of sediment perched high above the reach of the tide, and thus out of reach of fish or aquatic species. The reason for this construction method is that eventually the platform will subside to the elevation of nearby natural marsh, but that can take years after construction. Rain and tidal movement will eventually recontour the platform so that tidewater can flow through and over the marsh surface, providing a way for marsh creatures to swim in and out. Yet subsidence and sea level rise will continue, so eventually the plants drown and the area reverts to open water once again.

Now consider a natural marsh built by sediment-rich water. By its very nature, it begins life by emerging from water, giving fish and wildlife immediate access to the plants that establish on the emerging marsh platform. As the ground subsides or the sea rises, the moving water brings in new sediment to the marsh to build upon the old. And the plants, fed by nutrients in the water, do a better job of adding peat to the soil and capturing sediment from the moving water. Even before land emerges, the river water sustains a rich community of underwater plants, sheltering fish and feeding hordes of ducks that migrate south in the winter.

Natural marshes have more diversity of plants growing in them, more types of animals and produce more sheer weight of plants and wildlife each season. They have a wider variety of habitats because the sediments settle out differently – sands build up higher banks, silts fall on a gradient away from the channel and the finest clays fall out in the slack water, often captured miles away by existing marsh. This produces ranges of elevations, soils and salinities as the river water mixes with the sea. You get a delta, continuously growing and changing, with its branching tree-like pattern of channels and islands.

So why do we support marsh creation projects? Why should we do marsh creation at all? Because they have strategic and near-term value, and although they don't provide all the ecological benefits of natural marsh, they still provide an important function in reducing storm surges. There are many places on our coast, built when the river occupied different channels than it does today, that are out of reach of sediment diversions. There are other places that need repair quickly because they protect vital areas or vulnerable communities. In those instances marsh creation with dredging is the right answer. But marsh creation projects (along with barrier island projects, shoreline protection projects, ridge restoration projects and hydrological projects) will be most effective when coupled with river diversions, because cyclically flowing fresh water and sediment – even the finest clays that can be transported many miles away – along with nutrients, can add decades to the life of man-made projects.

Terrebonne-Atchafalaya Basin Projects

- Increase Atchafalaya Flow into Terrebonne Marshes
- Isles Dernieres Barrier Island Restoration
- Timbalier Islands Barrier Island Restoration
- Houma Navigation Canal Hydrologic Restoration

The Terrebonne and Atchafalaya Basins occupy the central coast of Louisiana. The area is bordered to the east by Bayou Lafourche, a former outlet of the Mississippi River, and to the west by the Chenier Plain. It includes the growing deltas of the Atchafalaya River – the largest remaining natural distributary of the Mississippi River. Habitats include bottomland hardwood forests; baldcypress swamps; barrier islands; and freshwater, brackish and saltwater marsh. In Atchafalaya Bay, on the western side of the basin, the Atchafalaya River and its Wax Lake Outlet are building new land. However, in Terrebonne Bay, on the eastern side of the basin, wetlands are collapsing and becoming open water as the sediment-starved land sinks and salt water intrudes into freshwater wetlands.

The priority projects selected for this basin focus on stabilizing the barrier island system (Isles Dernieres Barrier Island and Timbalier Islands Barrier Island Restoration) and re-establishing a balance of fresh and salt water as well as sediment and nutrient distribution. To accomplish that, two of the proposed projects will use the existing network of navigation canals. One project (Increase Atchafalaya River Flow into Terrebonne Marshes) will take advantage of the Atchafalaya River to the west and the existence of the Intracoastal Waterway to move fresh water and sediment eastward. To increase the effectiveness of the project and the retention times of the fresh water within the basin, a gate (Houma Navigation Canal Hydrologic Modification) is needed to block salt water that currently penetrates deep into the estuary. In the future, oyster reef restoration will play an important role in protecting remaining and newly created marshes and providing key habitat.

Increase Atchafalaya Flow into Terrebonne Marshes Lafourche, St. Mary and Terrebonne Parishes

This hydrologic diversion project stretches from the Atchafalaya River to the Houma Navigation Canal, which is part of the Gulf Intracoastal Waterway system. The marshes in the influence area are nearly equidistant between the Mississippi and Atchafalaya Rivers and are blocked from significant amounts of river water and sediment. As a result of saltwater intrusion and sediment starvation, these marshes have been rapidly converted to open water. This project would dredge and deepen the Gulf Intracoastal Waterway to increase the flow of fresh water from the Atchafalaya River, to help sustain Terrebonne Marsh.

$2.5 billion

annually in state and local tax revenues from Gulf wildlife-related tourism – more than $201 million from Louisiana

Photo by Karen Westphal

Isles Dernieres Barrier Island Restoration
Terrebonne Parish

This project will restore the Isles Dernieres barrier islands located on the western end of the Terrebonne Basin barrier shoreline. Storm-induced breaching and erosion, sediment starvation, sea level rise, tidal increases caused by interior land loss, subsidence and canal-induced hydrological changes have reduced the size of these islands. This loss directly impacts the fish and wildlife of the region and leaves the marshes and infrastructure in the interior of Terrebonne Bay vulnerable to saltwater intrusion, higher wave energies and storm surge. This project will restore the Isles Dernieres barrier islands, providing dune, beach and back barrier marsh habitat, which will help reduce the impact of storm surge and waves in the Terrebonne Basin.

Timbalier Islands Barrier Island Restoration
Lafourche and Terrebonne Parishes

This project will restore the Timbalier Islands located on the eastern end of the Terrebonne Basin barrier shoreline. Sediment starvation, sea level rise, tidal increases and storm events have driven migration of the islands to the northwest and severely reduced their length and width. This has diminished important barrier island habitat in the area and increased the vulnerability of interior Terrebonne Bay marshes to high-energy waves and storm surge. This project will restore dune and beach habitat as well as reduce the impact of storm surge and waves in the Terrebonne Basin and lower Lafourche Parish.

Houma Navigation Canal Hydrologic Restoration
Terrebonne Parish

This project will construct a lock on the Houma Navigation Canal located in western Terrebonne Bay. The Houma Navigation Canal is a significant conduit for salt water into Terrebonne's rapidly disappearing marshes. Construction of this project would help control salinities in the navigation canal and increase the effectiveness of the Increase Atchafalaya Flow into Terrebonne Marshes project by retaining and enhancing the distribution of fresh water in the wetlands to the north of the lock.

Chenier Plain Projects

- Calcasieu Ship Channel Salinity Control Measures
- Freshwater Bayou to Southwest Pass Shoreline Protection

The Chenier Plain coast was built by sediment drifting westward over the last seven thousand years from the changing active arms of the Mississippi River, including the Atchafalaya. Cycles of shoreline erosion and sediment deposition built ridges, or cheniers, running east-west between wide expanses of marsh. The sediment transport west along the coastline from the Atchafalaya River has been interrupted by coastal infrastructure. The interior Chenier Plain is characterized by fresh to brackish marshes and interior lakes that are fed by the Vermilion, Mermentau, Calcasieu and Sabine rivers. It is being overwhelmed by saltwater intrusion due to navigation features, such as the Calcasieu Ship Channel, Sabine Waterway, the Mermentau Navigation Channel and the Freshwater Bayou Canal. These channels allowed salt water from the Gulf to penetrate deeply into formerly fresh water marshes, leading to widespread marsh loss, while the jetty systems interrupted the flow of sediment from east to west.

The priority projects chosen in this basin focus on increasing sustainability of the basin by reducing tidal action in Calcasieu Lake (Calcasieu Ship Channel Hydrological Modification) to help reduce interior salinity. In addition, shoreline protection (Freshwater Bayou to Southwest Pass) will reduce shoreline retreat on the critical southeast corner of the Chenier Plain.

Calcasieu Ship Channel Salinity Control Measures
Calcasieu, Cameron, Jefferson Davis and Vermilion parishes

This project is located in the Calcasieu Ship Channel which connects the Gulf to Calcasieu Lake. The Chenier Plain was once a stable platform, but dredging of navigation canals dramatically changed the hydrology of the system. Saltwater intrusion led to the extensive loss of freshwater marshes and increased the threat of storm surge to communities in the lake's interior. This project will build structures that will limit saltwater intrusion through the Calcasieu Ship Channel and into adjacent marshes and could also provide minor storm surge protection in the ship channel.

Gulf Shoreline Protection: Freshwater Bayou to Southwest Pass
Vermilion Parish

This project will be located on the eastern side of the Chenier Plain, near Vermilion Bay, extending from Freshwater Bayou to Southwest Pass. Chenier Plain beaches are a critical landscape feature and protect highly productive wetlands from erosion. The project will use shoreline parallel structures, possibly including man-made oyster reef, to reduce wave energy and trap sediments, slowing shoreline retreat and anchoring the critical southeast corner of the Chenier Plain.

Risk Reduction – Multiple Lines of Defense

The Coastal Master Plan combines projects that build or maintain coastal wetlands with projects that provide enhanced storm risk reduction for coastal communities. Analyzing the relationship between restoration and risk reduction projects is ongoing, but we encourage restoration project design that maximizes risk reduction, and we believe this suite of projects lends itself to that goal by where they are sited within the landscape. This approach to storm protection is known as "Multiple Lines of Defense."

THE OIL POLLUTION ACT AND THE NATURAL RESOURCE DAMAGE ASSESSMENT

Under the Oil Pollution Act, passed by Congress in response to the 1989 Exxon Valdez spill, the parties responsible for the Gulf oil disaster are required to pay for direct remediation of the environmental harm done by the oil through a process called the Natural Resource Damage Assessment (NRDA). The NRDA evaluation is still underway, and the final cost may not be known for years, but BP has already agreed to a $1 billion down payment specifically for NRDA projects, some of which have already begun in Louisiana and other states.

PROJECT MAP

ABRIDGED PROJECT DESCRIPTIONS

TOP 19 PRIORITY PROJECTS FOR RESTORING THE LOUISIANA COAST

See more at: www.mississippiriverdelta.org/map

SEDIMENT DIVERSION

Sediment diversion projects mimic nature's historic land-building by using the power of the river to move sediment and fresh water into nearby basins.

1. Mid-Breton Sediment Diversion
This project will be located along the east bank of the river, perhaps in the vicinity of White Ditch. This sediment diversion will convey fresh water and sediments into deteriorating marshes that drain into Breton Sound. The brackish marshes in the influence area have disappeared due to a combination of changes in the supply and distribution of fresh water, rapid subsidence, saltwater intrusion, sediment starvation and storm events. This project will reconnect the influence area with the river and divert sediment and fresh water during flood pulses, building new land and sustaining existing marsh.

2. Lower Breton Sediment Diversion
This sediment diversion project is planned for lower Breton Sound along the east bank of the river. The brackish and salt marshes in the influence area have low rates of land loss relative to many other parts of the coast. This may be attributed to the sediment and fresh water it periodically receives when the river overtops the natural levee during high flows. This project will divert sediment and fresh water into the basin to build new land, maintain existing marshes and increase the resiliency of the influence area to sea level rise and storm events.

3. Mid-Barataria Sediment Diversion
This sediment diversion project into mid-Barataria Bay is located along the west bank of the river, near Myrtle Grove. The brackish and freshwater wetlands in the influence area are highly degraded due to a combination of saltwater intrusion, decreased fresh water supply, alterations to the natural hydrology of the area and a lack of sediment input. This project will reconnect the river to the influence area and divert sediment and fresh water to build new land, maintain existing marshes and increase habitat resiliency to sea level rise and storm events.

4. Lower Barataria Sediment Diversion
This is a sediment diversion into what used to be marsh but is now lower Barataria Bay. Remaining marshes in the project's influence area are rapidly becoming open water due to high rates of subsidence and erosion, without the benefit of new sedimentary inputs from the river. This project will reconnect the river to the influence area by diverting sediment and fresh water to build new land, provide a sediment source to the Barataria Basin barrier islands, restore historical salinities in the basin and help buffer communities in lower Plaquemines Parish from storm surge.

HYDROLOGIC RESTORATION

Hydrologic restoration projects restore fresh water flows through man-made channels or use gates, or similar structures, to reduce or prevent saltwater intrusion.

5. West Maurepas Freshwater Diversions
This diversion project encompasses as many as three individual freshwater conduits from the river. It would benefit the western Maurepas swamps, the landbridge between Lakes Maurepas and Pontchartrain and the LaBranche wetlands. Dominated by bald cypress and water tupelo trees, this swamp complex is one of the largest forested wetlands in the nation. However, levees constructed along the river and the closure of Bayou Manchac have isolated the area from spring floods and the vital fresh water, nutrients and sediments they bring. This isolation coupled with rising salinities throughout the Pontchartrain Basin has left the swamp in a state of rapid decline – trees are dying, and young trees are not growing to replace them. The West Maurepas Freshwater Diversions will benefit the swamp by reconnecting it with the river, preventing further loss and the conversion to open water, as well as helping to temper rising salinities throughout the entire Pontchartrain Basin.

6. Central Wetlands Diversion and Wetland Restoration
This diversion and restoration project would benefit the Central Wetlands Unit in eastern Orleans and St. Bernard parishes, including the Bayou Bienvenue Triangle. The area was once primarily a freshwater system, dominated by bald cypress swamp and freshwater marsh, but today deteriorating brackish marsh is the predominant habitat type and much of what was swamp is now open water. The destruction of the swamp habitat was caused by salt water intrusion into this system through the Mississippi River Gulf Outlet navigation channel. This project will help sustain remaining marsh and swamp in the Central Wetlands and will facilitate restoration of marsh and swamp in areas that are now open water by utilizing dredged sediment through the Sediment Conveyance Pipeline East project. Additionally, fresh water from this project could help maintain optimum salinities for oysters and other estuarine organisms in the nearby Lake Borgne and Biloxi marshes.

7. Increase Atchafalaya Flow into Terrebonne Marshes
This hydrologic diversion project stretches from the Atchafalaya River to the Houma Navigation Canal, which is part of the Gulf Intracoastal Waterway system. The marshes in the influence area are nearly equidistant between the Mississippi and Atchafalaya rivers and are blocked from significant amounts of river water and sediment. As a result of saltwater intrusion and sediment starvation, these marshes have been rapidly converted to open water. This project would dredge and deepen the Gulf Intracoastal Waterway to increase the flow of fresh water from the Atchafalaya River, to help sustain Terrebonne Marsh.

8. Houma Navigation Canal Lock Hydrologic Restoration
This project will construct a lock on the Houma Navigation Canal located in western Terrebonne Bay. The Houma Navigation Canal is a significant conduit for salt water into Terrebonne's rapidly disappearing marshes. Construction of this project would help control salinities in the navigation canal and increase the effectiveness of the Increase Atchafalaya Flow into Terrebonne Marshes project by retaining and enhancing the distribution of fresh water in the wetlands to the north of the lock.

9. Calcasieu Ship Channel Salinity Control Measures
This project is located in the Calcasieu Ship Channel which connects the Gulf to Calcasieu Lake. The Chenier Plain was once a stable platform, but dredging of navigation canals dramatically changed the hydrology of the system. Saltwater intrusion led to the extensive loss of freshwater marshes and increased the threat of storm surge to communities in the lake's interior. This project will build structures that will limit saltwater intrusion through the Calcasieu Ship Channel and into adjacent marshes and could also provide minor storm surge protection in the ship channel.

BARRIER ISLAND/HEADLAND RESTORATION

Barrier island restoration projects use sand to rebuild and restore barrier island beaches and dunes.

10. Barataria Pass to Sandy Point Restoration
This barrier island restoration project is located on the southeast side of Barataria Bay and stretches from Barataria Pass to Sandy Point. Increasing tidal forces caused by ever-growing interior bays, canals, navigation channels, subsidence, wave action and sea level rise have all attributed to the erosion and retreat of these barrier islands. This has resulted in loss of barrier island habitat, exposed interior bay marshes to increases in salinity and wave action and increased the vulnerability of the entire interior of the basin to storm impacts. This project will use sediment to restore important migratory and shore bird habitat and improve the ecosystem function of the barrier island system, preventing the wholesale loss of the lower estuary.

Abridged Project Descriptions Continued...

ABRIDGED PROJECT DESCRIPTIONS

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See more at: www.mississippiriverdelta.org/map

11. Belle Pass to Caminada Pass Restoration
This barrier island and headland restoration project is located on the southwestern side of Barataria Bay from west Belle Pass to Caminada Pass. Increasing tidal forces caused by ever-growing interior bays, canals, navigation channels, subsidence, wave action and sea level rise have all attributed to the erosion and retreat of the Caminada Headland and Elmer's Island. This sandy barrier system serves as critical habitat, helps protect the important shipping and navigation infrastructure at Port Fourchon and shelters interior marshes from salt water, waves and storm events. This project will use sediment to restore these barrier islands and provide protection to Caminada and Timbalier bays by diminishing wave and storm surge energy.

12. Isles Dernieres Restoration
This project will restore the Isles Dernieres barrier islands located on the western end of the Terrebonne Basin barrier shoreline. Storm-induced breaching and erosion, sediment starvation, sea level rise, tidal increases caused by interior land loss, subsidence and canal-induced hydrological changes have reduced the size of these islands. This loss directly impacts the fish and wildlife of the region and leaves the marshes and infrastructure in the interior of Terrebonne Bay vulnerable to saltwater intrusion, higher wave energies and storm surge. This project will restore the Isles Dernieres barrier islands, providing dune, beach and back barrier marsh habitat, which will help reduce the impact of storm surge and waves in the Terrebonne Basin.

13. Timbalier Islands Restoration
This project will restore the Timbalier Islands located on the eastern end of the Terrebonne Basin barrier shoreline. Sediment starvation, sea level rise, tidal increases and storm events have driven migration of the islands to the northwest and severely reduced their length and width. This has diminished important barrier island habitat in the area and increased the vulnerability of interior Terrebonne Bay marshes to high-energy waves and storm surge. This project will restore dune and beach habitat as well as reduce the impact of storm surge and waves in the Terrebonne Basin and lower Lafourche Parish.

MARSH CREATION
Marsh creation projects use sediment from the Mississippi River or nearby water bottoms to build land in shallow open water areas, typically where land has recently been lost.

14. Golden Triangle Marsh Creation
This marsh creation project is located near the confluence of the Mississippi River Gulf Outlet shipping channel and the Gulf Intracoastal Waterway. Dominated by brackish marsh, this area was badly damaged by saltwater intrusion and erosion following the dredging of the Mississippi River Gulf Outlet. This project will use a sediment conveyance pipeline to create and restore marsh in the area through the Sediment Conveyance Pipeline East project. The restored marsh will help buffer the newly constructed surge barrier and eventually provide important estuarine habitat for Lake Borgne.

15. New Orleans East Land-Bridge Restoration
This project consists of marsh creation via the Sediment Conveyance Pipeline East project and is located in east New Orleans on a narrow landbridge separating Lake Pontchartrain from Lake Borgne, where local subsidence and canals have raised salinities. This, combined with the exposure to high wave energy, has resulted in rapid retreat of the shoreline and the expansion of ponds and lakes within the marsh. This project will create and restore marsh via a sediment conveyance pipeline.
Restoration of the project area is a critical landscape feature. It separates Lake Pontchartrain from the Gulf, providing an estuarine habitat. It also is a crucial line of defense from storm surge for more than 1.5 million people in eight parishes, including the cities of New Orleans, Laplace, Madisonville, Mandeville and Slidell.

16. Barataria Land-Bridge, Large Scale Marsh Creation
This diversion and restoration project would benefit the Central Wetlands Unit in eastern Orleans and St. Bernard parishes, including the Bayou Bienvenue Triangle. The area was once primarily a freshwater system, dominated by bald cypress swamp and freshwater marsh, but today deteriorating brackish marsh is the predominant habitat type and much of what was swamp is now open water. The destruction of the swamp habitat was caused by salt water intrusion into this system through the Mississippi River Gulf Outlet navigation channel. This project will help sustain remaining marsh and swamp in the Central Wetlands and will facilitate restoration of marsh and swamp in areas that are now open water by utilizing dredged sediment through the Sediment Conveyance Pipeline East project. Additionally, fresh water from this project could help maintain optimum salinities for oysters and other estuarine organisms in the nearby Lake Borgne and Biloxi marshes.

RIDGE RESTORATION
Ridge restoration projects use sediment to restore historic ridges. A ridge is a strip of land, usually a remnant of the bank of an abandoned bayou or stream. Ridges are elevated above the marsh surface and typically populated with trees.

17. Bayou La Loutre Ridge Restoration
This project will restore the Bayou la Loutre Ridge, which stretches from the south-western side of the Mississippi River Gulf Outlet to the Biloxi Marsh. The Bayou la Loutre Ridge is actually two parallel natural levees flanking old Bayou la Loutre (Otter Bayou), which is part of the structural underpinning of the Biloxi marshes. Construction of the Mississippi River Gulf Outlet breached the ridges, dramatically altering the hydrology of the area and leading to saltwater intrusion and extensive wetland loss. The ridge has suffered from subsidence, saltwater intrusion and canal breaches. The purpose of this project is to re-establish the ridge by adding soil and elevation, improve hydrology, provide storm surge protection, decrease saltwater intrusion and provide important resting habitat for migratory birds.

SHORELINE PROTECTION
Shoreline protection projects are narrow "walls" made of rock or similar material placed along shorelines of lakes, bayous and open bays.

18. Freshwater Bayou to Southwest Pass Shoreline Protection
This project will be located on the eastern side of the Chenier Plain, near Vermillion Bay, extending from Freshwater Bayou to Southwest Pass. Chenier Plain beaches are a critical landscape feature and protect highly productive wetlands from erosion. The project will use shoreline parallel structures, possibly including man-made oyster reef, to reduce wave energy and trap sediments, slowing shoreline retreat and anchoring the critical southeast corner of the Chenier Plain.

OYSTER REEF RESTORATION
Oyster reef restoration projects use natural and man-made materials to encourage the establishment of oysters to create living shorelines.

19. Biloxi Marsh Oyster Reef Restoration
This project will build an oyster barrier reef along the eastern shore of the Biloxi Marsh. The Biloxi Marsh platform is relatively stable geologically as it has a fairly low rate of subsidence. However, erosion on the marsh edge by wave action has resulted in significant loss of this productive habitat. Re-establishment of vertical oyster reefs in conjunction with the reintroduction of small amounts river water via West Maurepas and Central Wetlands diversions will help slow marsh deterioration. In addition to providing protection against waves and storm surge, oyster reefs also provide a broad range of other ecosystem and economic benefits. Once established, these reefs are naturally self-maintaining.

Photo by Karen Westphal

CONCLUSION

With coastal wetlands in Louisiana disappearing at the rate of a football field an hour, now is the time for the public, businesses and policymakers to rally behind specific projects that are most essential to the long-term success of coastal restoration. Any delay in using the available funding for the most important projects will continue to put coastal cities, communities and vital ecosystems at increased risk from hurricanes and rising sea levels.

The damage from continued wetland loss in Louisiana has Gulf-wide repercussions. The rewards of restoration in the Mississippi River Delta region will not be confined to Louisiana. Continued deterioration of the Louisiana coast threatens the very ecosystems that support regional communities and cultures, both in Louisiana and across the Gulf. Ecosystems do not recognize political boundaries and neither do fish, birds or marine mammals. Thus, restoration of the Mississippi River Delta will have far-reaching benefits throughout the Gulf Coast states. For instance, it will enhance the productivity of the adjacent Mississippi Sound. And by improving the health of federal waters off the delta, seafood landings in the other Gulf states will be sustained.

The 2010 Gulf oil disaster compounded the injury of coastal wetland loss in Louisiana. Only five years after Hurricanes Katrina and Rita ravaged New Orleans and much of the already-weakened coast, the deadly explosion of the Deepwater Horizon oil rig – followed by months of oil spewing from the depths of the Gulf – constituted the largest man-made marine oil disaster in our history. While the full extent of the damages are not yet understood, the known impacts to the coastal ecosystems of Gulf states will require tens of billions of dollars in restitution, remediation and restoration.

This list of priority projects was identified as the most urgent and most compliant with applicable funding criteria. Equally important, these 19 projects are a central part of the Coastal Master Plan, which was developed after months of comprehensive scientific research, modeling and stakeholder input. By expediting funding and construction of these projects, we have a historic opportunity to both restore the health of our coastal wetlands and protect the thousands of businesses and jobs that depend on a healthy Gulf.

The Mississippi River Delta Restoration Coalition includes the Environmental Defense Fund, National Audubon Society, National Wildlife Federation, Coalition to Restore Coastal Louisiana and Lake Pontchartrain Basin Foundation, working with partners in The Nature Conservancy of Louisiana, the Louisiana Wildlife Federation and Restore or Retreat. The coalition is made up of scientists, policy experts, economists and outreach professionals working together to advance long-term solutions for Louisiana's coastal ecosystem by reconnecting the Mississippi River to its wetlands to protect people, wildlife and jobs. The ultimate goal of our coalition is a sustainable future for coastal Louisiana. Our members advocate for:

1) A science-based comprehensive plan to restore the Mississippi River Delta;

2) The establishment of a governance team with the authority, capacity and leadership to implement meaningful restoration;

3) The commitment of dollars necessary to implement projects that will stave off continuing land loss and restore the natural processes of land building;

4) Education and outreach to connect communities, scientists, economists and policymakers in an effort to expand the understanding of what is possible for restoration.

i Shorelines and Coastal Habitats in the Gulf of Mexico

ii Watermarks, 2007

iii 15 Great Places to Hunt Waterfowl

iv Saving Important Bird Areas

v Wildlife Tourism and the Gulf Economy

vi U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

vii Couvillion, B.R.; Barras, J.A.; Steyer, G.D.; Sleavin, William; Fischer, Michelle; Beck, Holly; Trahan, Nadine; Griffin, Brad; and Heckman, David, 2011, Land area change in coastal Louisiana from 1932 to 2010: U.S. Geological Survey Scientific Investigations Map 3164, scale 1:265,000, 12 p. pamphlet.

viii Louisiana's Comprehensive Master Plan for a Sustainable Coast

ix Wildlife Tourism and the Gulf Economy

x U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

xi Watermarks, 2007

xii Saving Important Bird Areas

xiii Michel, J.; Owens, E.H.; Zengel, S.; Graham, A.; Nixon, Z.; Allard, T.; Holton, W.; Reimer, P.; Lamarche, A.; White, M.; Rutherford, N.; Childs, C.; Mauseth, G.; Challenger, G.; Taylor, E. 2013. Extent and degree of shoreline oiling: Deepwater Horizon oil spill, Gulf of Mexico, USA. PLOS ONE vol. 8.

xiv Wildlife Tourism and the Gulf Economy

xv Quarterly census of employment and wages

xvii Wildlife Tourism and the Gulf Economy

Photo by Ashley Peters