Coastal Protection and Restoration Techniques

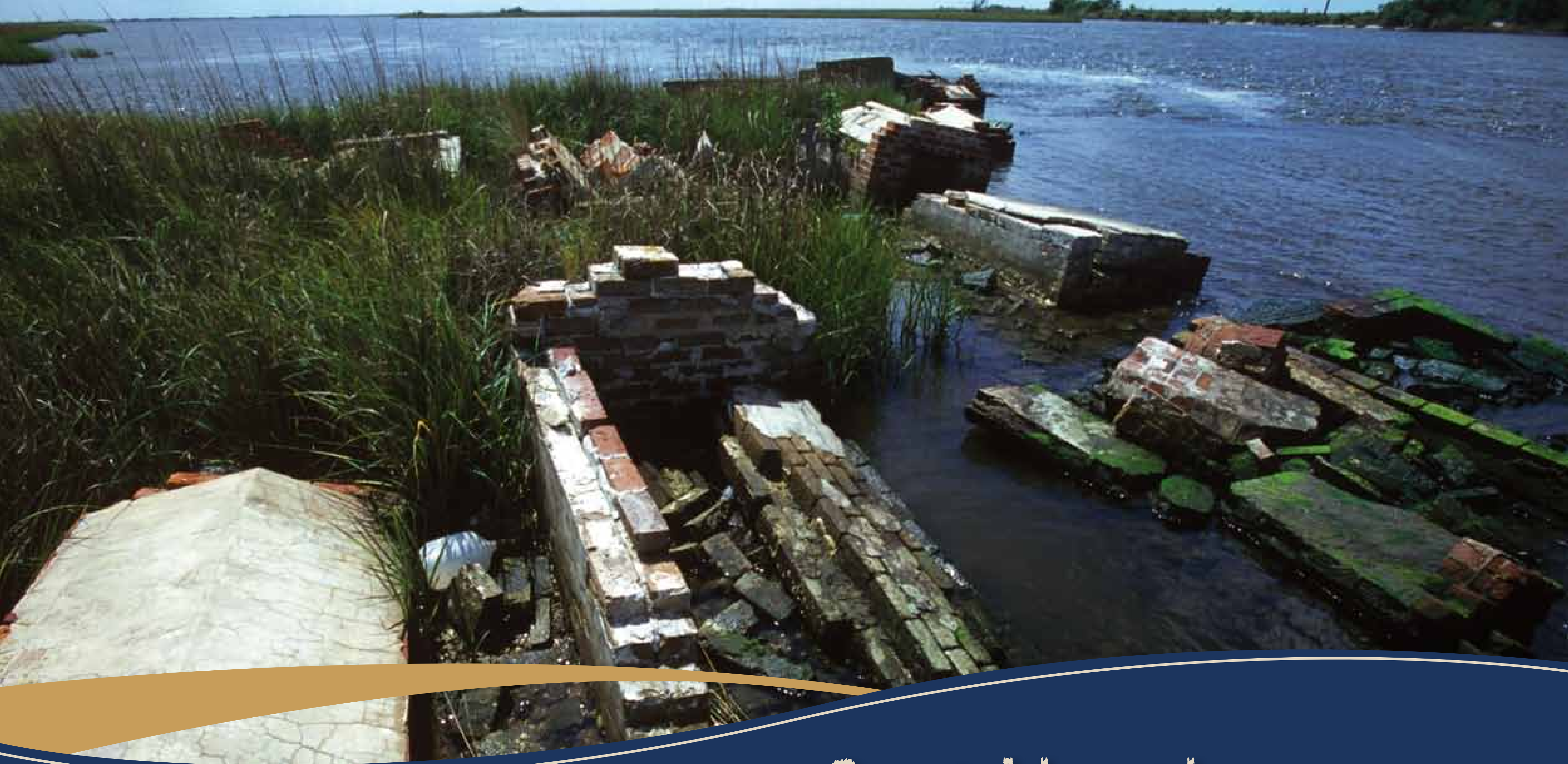
2010

Barataria-Terrebonne National Estuary Program

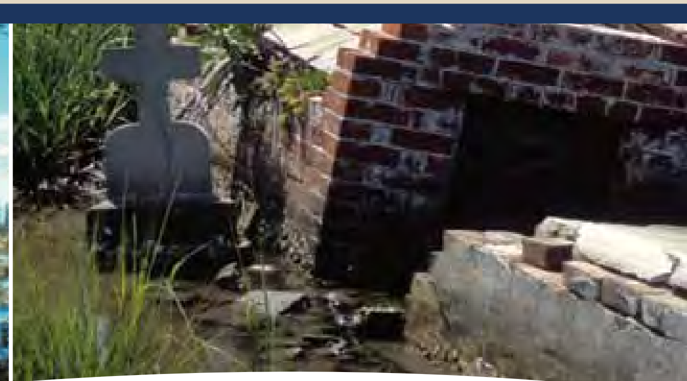
Tidal Graph Calendar

BTNEP

BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM



Coastal Land Loss

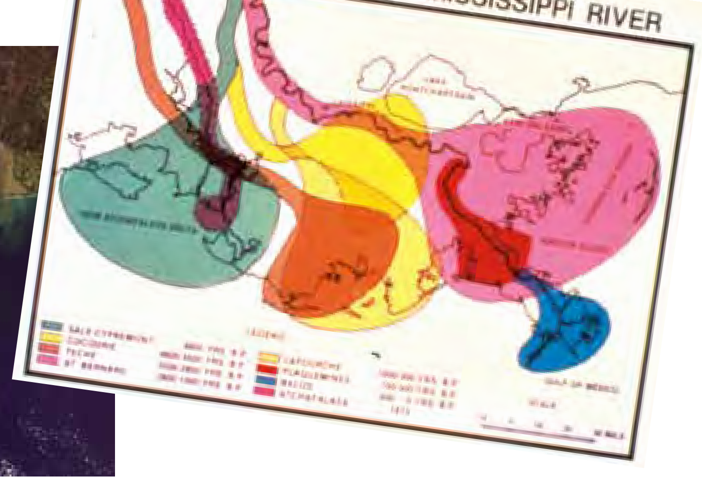


Louisiana is disappearing. Since 1930, 1,900 square miles of Louisiana, an area approximately the size of Delaware has washed away. With this land goes our homes, our economy, and our culture.

To understand the disappearance of our home, we must first understand how it came to be. Over the past 7,000 years, the Mississippi River has carried sediment-rich water from 31 states and 2 Canadian provinces and deposited its payload in coastal Louisiana. Centuries of deposition formed the barrier islands, marshes, natural ridges, swamps, and bayous we call home. But the river has not always held the form we see today. Over time the mighty Mississippi forged new channels to the Gulf, moving west to Vermillion Bay and east through St. Bernard Parish. At each stop, the river would rest for hundreds of years, slowly filling coastal areas with sediment and building new land. When the river abandoned one path for another, the loosely deposited sediment would gradually compact in a process known as subsidence. As the land compacted, it would slowly disappear below the water but, in time, the river would return to this place to rebuild what had been lost.

When Europeans first explored Louisiana, they recognized the importance of the Mississippi River for transportation and commerce. They also found the soils of the region to be fertile and the wilderness to be lush with resources. All these things made Louisiana and the Mississippi River Valley a region ripe for settlement. Pioneer families quickly learned that with the bountiful resources of the Mississippi River came many risks. The spring floods that once replenished the coastal heartland now threatened to wash away established communities and farms. Over the next century, the fledgling nation built levees to control the Mississippi River and prevent annual flooding. By the mid-twentieth century, public demands had been met and the massive engineering feat was a resounding success. Spring floods no longer threatened the lower Mississippi River Valley, and the threatening torrents were safely conveyed to the Gulf of Mexico.

Controlling the Mississippi River made it possible for the United States to develop a vigorous economy based on agriculture, manufacturing, and commerce, but it also changed the face of coastal Louisiana. The Mississippi River could no longer replenish subsiding deltas, and the naturally sinking lands would never again be rebuilt by the river's sediment-rich waters. Today, the life-giving deposits of the river are lost to the Gulf of Mexico, near the continental shelf where waters are too deep to build new wetlands. Meanwhile the wetlands continue to subside. We helplessly watch 24 square miles of wetlands disappear each year, equivalent to a football field every 38 minutes. In 2005 alone, 200 square miles of wetlands disappeared with the landfall of two powerful hurricanes – Katrina and Rita.



The control of the Mississippi River isn't the only wound humans have inflicted on coastal Louisiana. In the early 1900s, oil and natural gas discoveries began to spur extensive exploration of Louisiana's coastal marshes. Petroleum was vital to the security and economy of the United States. In coastal Louisiana, it was impossible to drive over the soft, wet soil; so canals were dug to transport men and equipment to oil wells where they extracted the valuable resources hidden deep underground. In addition to directly impacting coastal wetlands in their construction, these canals allowed salt water from the Gulf of Mexico to creep further inland, destroying plants that were not adapted to the higher salinity of Gulf waters. As plants died, roots no longer held together the fragile soils beneath them and marshes easily eroded away. In addition to oil exploration canals, larger canals were dug to provide for transportation and increase commerce. These canals, such as the Mississippi River Gulf Outlet and the Houma Navigation Canal, stretched even farther inland, allowing salt water to infiltrate even the freshest wetland environments.

Today, we recognize the importance of our coastal habitats and the role they play in our protection, economy, leisure, and culture. But recognition alone will not save our home. This year's calendar explores a number of techniques that each play a part in the restoration of this nationally significant region. As we continue to learn about coastal restoration and protection, we must remember that we have spent the last century sacrificing ourselves for the benefit of the nation, and now we must ask the nation to help us heal. Louisiana should not have to and cannot do this alone.

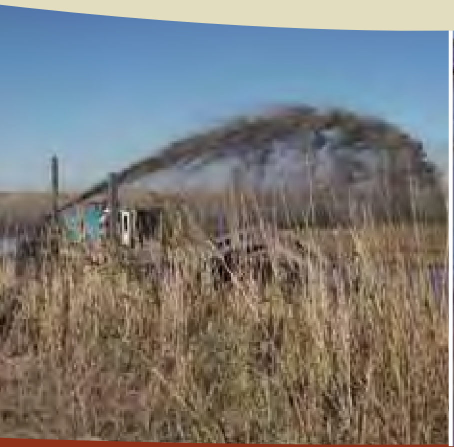
BTNEP
BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

Barataria-Terrebonne National Estuary Program

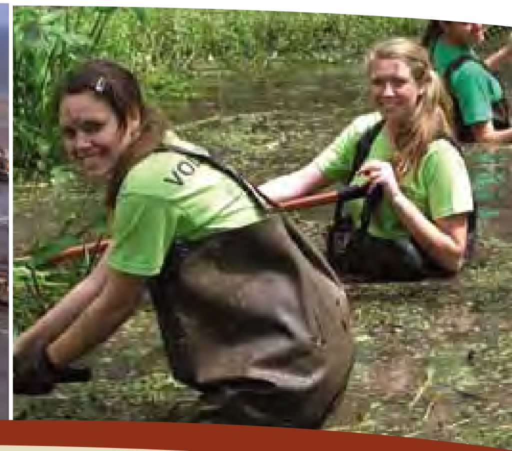
By the 1980s scientists, governmental officials, and the public were becoming more aware of the disappearance of coastal Louisiana, our degrading water quality, and changes to our living resources. In response to these threats to our homes, culture, and livelihood, Governor Buddy Roemer nominated the Barataria-Terrebonne estuarine complex for inclusion in the National Estuary Program in 1989. In September of 1990, United States Environmental Protection Agency (EPA) and the State of Louisiana committed to a cooperative agreement under the National Estuary Program to form the Barataria-Terrebonne National Estuary Program (BTNEP), one of 28 recognized nationally significant estuaries in the United States and its territories. The Program's charter was to develop a consensus-driven plan utilizing a coalition of government, private, and commercial interests to preserve the Barataria and Terrebonne basins. This coalition underwent a five-year planning process through which they identified problems, assessed trends, developed resource management strategies, recommended corrective actions, and sought implementation commitments. The culmination of this process is the Comprehensive Conservation and Management Plan, or CCMP. The CCMP contains 51 action items addressing the environment, economics, coordinated planning, and citizen involvement. The coalition of stakeholders that formed the CCMP (now called the Management Conference) acts as a board of directors. Together, the Management Conference and the BTNEP program office continue to implement the action plans of the CCMP through research, restoration, outreach, and education. The mission of the Barataria-Terrebonne National Estuary Program (BTNEP) is the preservation and restoration of the Barataria-Terrebonne estuary system, the 4.2 million acres between the Atchafalaya and Mississippi river basins. BTNEP strives to rebuild and protect the estuary for future generations through the implementation of a science-based, consensus-driven plan that utilizes partnerships focused on the estuary's rich cultural, economic, and natural resources.

Established in 1991, the mission of the Barataria-Terrebonne Estuary Program (BTNEP) is the preservation and restoration of the Barataria-Terrebonne National Estuary Program estuarine system, the 4.2 million acre region between the Atchafalaya and Mississippi Rivers. The BTNEP strives to rebuild and protect the estuary for future generations through the implementation of a science-based, consensus-driven plan that utilizes partnerships focused on the estuary's rich cultural, economic and natural resources.

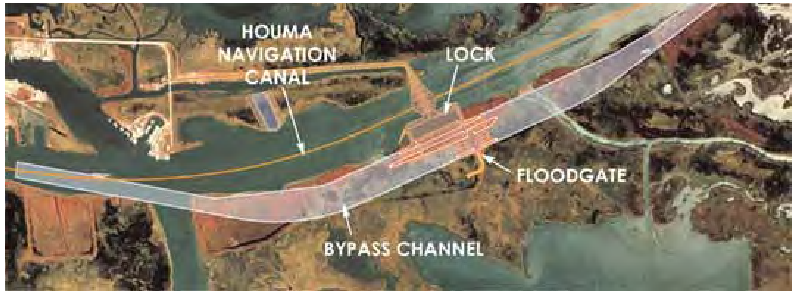
BTNEP
BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM







Coastal Protection and Restoration



Louisiana is vulnerable. Each year, summer brings with it the arrival of hurricane season. For six months the Gulf Coast and much of the eastern seaboard watch anxiously as storms grow in the Atlantic Ocean and the Gulf of Mexico, and begin their journey toward the Americas. Perhaps nowhere has vulnerability to hurricane storm surge increased so much over time as in coastal Louisiana.

When communities like New Orleans were founded over 250 years ago, settlers were just beginning to grasp the harsh reality of tropical cyclones. To cope with these threats, residents elevated homes slightly, established settlements on the highest land, and built inland when it was practical. At the time, 44 miles of nearly continuous wetlands, natural ridges, and barrier islands lay between New Orleans and the Gulf of Mexico to the south. Since that time coastal Louisiana has lost over 1,900 square miles of wetlands with most of this loss in southeastern Louisiana. Today we know that these once vibrant coastal features act as a buffer against storm surge, absorbing energy and decreasing flooding as hurricanes move ashore. The risks to early settlers were acceptable, as they were protected by a vast wetlands complex interspersed with miles of natural ridges with trees towering over 20 feet high. However, various human activities have caused these protective features to collapse over time. Today we face higher risks to our lives and our property. As wetlands deteriorate, they can no longer provide protection and we're forced to build higher, wider, and more expensive levees or abandon communities that can no longer be protected.

Recognizing the role that wetlands play in reducing storm surge, in 2005 the State of Louisiana passed legislation combining oversight of coastal restoration and hurricane protection under a single entity, the Coastal Protection and Restoration Authority or CPRA. Efforts continue today to fully integrate these two once separate approaches. Neither levees alone nor the wetlands we have left can provide us with the level of protection we need. When these once independent efforts are combined, we can best utilize the limited funding and resources available to conduct restoration and construct levee systems that together result in a coastal system that provides an acceptable level of protection from inevitable future storms.

Barataria-Terrebonne National Estuary Program: P.O. Box 2663, NSU Campus, N. Babington Hall, Room 105, Thibodaux, LA 70310 - 1.800.259.0869 - www.btnep.org

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PIPELINE SEDIMENT DELIVERY

The Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) has initiated a multitude of projects in the past that utilized sediment dredging techniques targeting marsh and barrier island restoration. For effective system-wide restoration, these projects must continue, but on a much larger scale.

Each year, the federal government spends hundreds of millions of dollars to maintain the Mississippi and Atchafalaya Rivers for navigation by removing sediment from the river bottom. While some of this dredged material is used beneficially, the majority of it is lost to the deep waters of the Gulf of Mexico. If we are to restore our coastal heartland, it is imperative that all material be used beneficially.

Dredge at work

The transport and strategic placement of dredge material from the Mississippi and Atchafalaya Rivers, as well as from offshore sources via pipeline, is called Pipeline Sediment Delivery. Pipeline Sediment Delivery (PSD) can introduce large sediment loads to subsiding and deteriorating coastal wetlands, providing a platform on which marsh vegetation can grow. This flexible sediment delivery system can also repair and restore important ridges and cheniers, re-creating the topographical variety required for a diversity of plant growth. **Combined with small and medium freshwater diversions and complete barrier island restoration and maintenance, Pipeline Sediment Delivery can facilitate the rebuilding, restoration, and sustainability of Louisiana's wetlands.** When sediment is added through Pipeline Sediment Delivery (PSD), the salinities of waterways and bays are not heavily impacted, allowing the local ecology to remain similar to pre-restoration conditions.

In 2009, work began on The Mississippi River Long Distance Sediment Pipeline Project, a Coastal Impact Assistance Program (CIAP) project administered under the Louisiana Office of Coastal Protection and Restoration. Plaquemines, Jefferson and Lafourche Parishes are working together to build an infrastructure network that will deliver much needed sediment to all three parishes. The Mississippi River Long Distance Sediment Pipeline project will harvest sediment from the bed of the Mississippi River and pump it to strategically chosen areas within the Barataria Basin. The primary goal of the project is to establish a long-distance pipeline network for conveying renewable Mississippi River sediment to build marsh and ridges in Plaquemines, Jefferson, and Lafourche parishes. The project will bring a new source of sediment into a system experiencing some of the highest land loss rates on Earth. This project will not only be an example of what can be accomplished with pipeline sediment delivery, but also what can be attained by pooling the resources of partners who could never achieve such an ambitious goal alone.

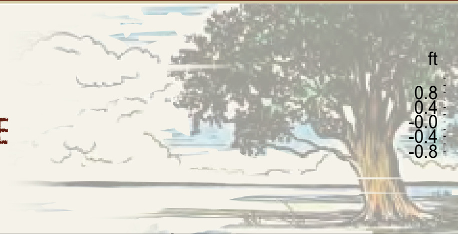
Louisiana cannot afford to waste the valuable sediment resources that are currently lost to the deep gulf waters beyond the continental shelf. In addition to utilizing sediment dredged for navigation, dedicated dredging projects can mine the depositional areas along the lower reaches of the Mississippi and Atchafalaya Rivers. Millions of cubic yards of riverbed sediment could and should be harvested to help restore our coastal landscape.

Pipeline Sediment Delivery is a way to efficiently capture, in a relatively short period of time, the lifeblood of sediment that has made coastal Louisiana such a rich and diverse environment.

Close-up of Dredge Photo courtesy of Koupal Communications

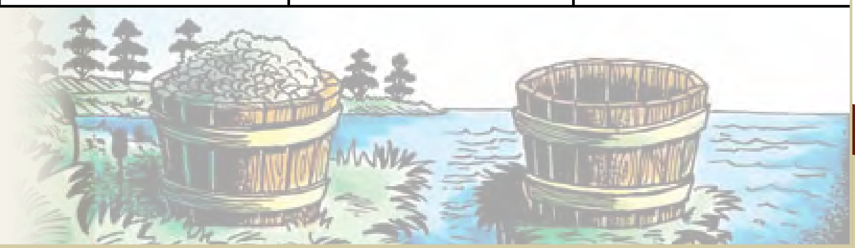
January 2010

BAYOU LAFOURCHE WAS ONCE A FORK OF THE MISSISSIPPI RIVER. IN FACT, IT WAS ONCE THE MAIN CHANNEL OF THE MISSISSIPPI.



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 8:26 am -0.7 10:08 pm 1.2 *New Year's Day*	2 9:13 am -0.6 10:57 pm 1.0
3 9:51 am -0.4 11:41 pm 0.8	4 10:12 am -0.2	5 12:07 am 0.5 9:48 am 0.0 6:28 pm 0.3	6 7:04 am 0.1 4:31 pm 0.4	7 3:25 am -0.1 4:23 pm 0.6	8 3:47 am -0.3 4:49 pm 0.8	9 4:26 am -0.4 5:30 pm 0.9
10 5:09 am -0.5 7:17 pm 0.9	11 5:53 am -0.6 7:07 pm 1.0	12 6:36 am -0.6 7:56 pm 0.9	13 7:19 am -0.6 8:42 pm 0.9	14 7:57 am -0.5 9:23 pm 0.9	15 8:31 am -0.5 10:00 pm 0.8	16 8:59 am -0.4 10:34 pm 0.7
17 9:17 am -0.3 11:04 pm 0.6	18 9:23 am -0.2 11:32 pm 0.5 *MLK, Jr. Day*	19 9:06 am -0.1 11:56 pm 0.3	20 8:17 am 0.0 10:12 pm 0.2 3:44 pm 0.2 10:59 pm 0.2	21 6:30 am 0.1 2:59 pm 0.3	22 2:34 am 0.0 3:09 pm 0.5	23 2:37 am -0.2 3:41 pm 0.6
24 3:16 am -0.4 4:28 pm 0.8	25 4:02 am -0.6 5:24 pm 0.9	26 4:52 am -0.7 7:25 pm 1.0	27 5:43 am -0.8 7:26 pm 1.1	28 6:35 am -0.8 8:27 pm 1.0	29 7:24 am -0.7 9:27 pm 1.0	30 8:09 am -0.6 10:26 pm 0.8
31 8:44 am -0.4 11:27 pm 0.6						

FISHERY PRODUCTION IS DIRECTLY CORRELATED WITH THE AMOUNT OF MARSH EDGE PRESENT IN THE ESTUARY. WITH CONTINUED LAND LOSS AND DECREASING MARSH EDGE, A DECREASE IN FISHERIES PRODUCTION IS PREDICTED.



High Tide:
January 1
10:08 pm • 1.2 ft

Low Tide:
January 28
6:35 am • -0.8 ft

Barataria-Terrebonne National Estuary Program: P.O. Box 2663, NSU Campus, N. Babington Hall, Room 105, Thibodaux, LA 70310 - 1.800.259.0869 - www.btnep.org
Tides from: Barataria Bay, Grand Isle, East Point, 29d 15′48″ N 89d 57′ 24″ W - Tides & Currents by Jeppesen Marine - www.nobeltec.com
[TIDE ADJUSTMENT TABLE CAN BE FOUND ON THE INSIDE BACK COVER]

Ridge restoration under construction

Ridge Restoration

In early 2001, the Barataria-Terrebonne National Estuary Program and the Greater Lafourche Port Commission fostered a partnership with other organizations to reestablish a chenier ridge and adjacent coastal marsh habitats in southeast Louisiana. This partnership was born from a desire to further the knowledge and expand the focus of habitat restoration in coastal Louisiana from a vision that only supported marsh restoration to one that encompassed other natural landscape features. Louisiana's unparalleled coastal wetland loss problem means dire consequences for many species of fish and wildlife. But of equal importance are the distributary ridges and chenier ridges that are also being lost at an alarming rate. These ridge habitats and associated wetlands are extremely important to many terrestrial animals including the millions of migrating Neotropical songbirds that cross the Gulf of Mexico in the spring each year on the way to their breeding grounds in the eastern United States and Canada. Upon reaching land, exhausted birds must feed and rest at the first opportunity they encounter. The first land they see, in many cases, are Louisiana's cheniers.

The Fourchon Maritime Forest Ridge Restoration project involves pumping earthen material via hydraulic dredge into shallow open water. Constructed in phases, each of the three components, when finished, will mean the restoration of over 120 acres of chenier ridge and marsh habitat. Phases one and two have been completed, representing the western reach of this project. Herbaceous grasses and woody plants that tolerate the harsh growing conditions of coastal Louisiana are currently being planted across the site. Species of grasses being planted include smooth cordgrass, marshhay cordgrass, salt grass, and others. Woody plants that are being used include those native species that are known to be important to Neotropical migrant songbirds including live oak, red mulberry, hackberry, yaupon, and others.

The Barataria-Terrebonne National Estuary Program is evaluating many different species of plants to determine their ability to grow at different elevations and salinity concentrations. Lessons learned here can be applied to similar future coastal restoration projects.

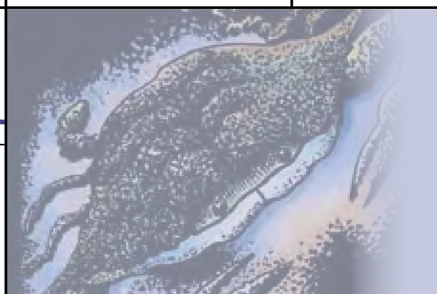
This restoration project has occurred largely through the generous contributions and grants of numerous funding partners. Shell Oil Company, the most recent contributor to this project, has provided a substantial grant to the Barataria-Terrebonne National Estuary Program and its Foundation that went directly to on the ground work. To date, project partners include the following: Greater Lafourche Port Commission, National Oceanic and Atmospheric Administration, Louisiana Department of Natural Resources, Natural Resource Conservation Service, Shell Oil Company, Gulf of Mexico Foundation, Gulf of Mexico Program, and the Barataria-Terrebonne National Estuary Program. Each of these partners has provided funding and labor resources to make this project a reality.

Recently identified as a sanctuary where no consumptive use is allowed, this area will soon become one of the premier birding destinations in the State of Louisiana. Boardwalks, foot bridges, observation platforms, signage, and an interpretive center will be constructed to promote avian tourism at the site.

Similar to the Fourchon Martime Forest Ridge project, Bayou Dupont Ridge Creation and Marsh Restoration project is currently being fast-tracked by the Office of Coastal Protection and Restoration (CWPPRA). This project will create and nourish marsh using sediment dredged from the Mississippi River and transported via pipeline to the project area. The project will also create a ridge along the southwestern shoreline of Bayou Dupont. The ultimate goal of the project is to create approximately 184 acres of brackish marsh, nourish an additional 118 acres of existing marsh, and construct 15 acres of maritime ridge habitat. Additional large scale projects should be initiated across the state to ensure that the habitats we restore include the same topographical and biological diversity that once thrived in coastal Louisiana.

February 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
	1 8:57 am -0.1	2 12:40 am 0.3 8:06 am 0.1 2:05 pm 0.2 9:43 pm 0.0 *Groundhog Day*	3 1:44 pm 0.4	4 12:47 am -0.2 2:11 pm 0.6	5 2:03 am -0.3 2:56 pm 0.7	6 3:02 am -0.5 3:51 pm 0.8
7 3:56 am -0.5 4:53 pm 0.8	8 4:47 am -0.5 5:57 pm 0.8	9 5:35 am -0.5 7:00 pm 0.8	10 6:20 am -0.5 7:55 pm 0.8	11 7:00 am -0.4 8:44 pm 0.8	12 7:33 am -0.3 9:26 pm 0.7	13 7:59 am -0.2 10:06 pm 0.6
14 8:14 am -0.1 10:47 pm 0.5 *Valentine's Day*	15 8:09 am 0.0 11:33 pm 0.4 *Presidents' Day*	16 7:33 am 0.1 12:36 pm 0.2 5:26 pm 0.1 *Mardi Gras*	17 12:37 am 0.3 6:18 am 0.2 12:12 pm 0.3 8:01 pm 0.1 *Ash Wednesday*	18 12:25 pm 0.4 10:26 pm 0.0	19 12:56 pm 0.6	20 12:14 am -0.2 1:41 pm 0.7
21 1:29 am -0.3 2:38 pm 0.8	22 2:33 am -0.4 3:44 pm 0.9	23 3:33 am -0.5 4:57 pm 1.0	24 4:29 am -0.6 6:12 pm 1.0	25 5:22 am -0.6 7:26 pm 1.0	26 6:11 am -0.5 8:41 pm 0.9	27 6:55 am -0.3 9:59 pm 0.7
28 7:27 am -0.1 11:31 pm 0.5						



THE BLUE CRAB'S SCIENTIFIC NAME, CALLINECTES SAPIDUS, MEANS BEAUTIFUL SAVORY SWIMMER.

THE BLUE CRAB PLAYS AN IMPORTANT ROLE IN THE ESTUARINE FOOD WEB, PROVIDING FOOD FOR MANY SPECIES.

High Tide:
February 24
6:12 pm • 1.0 ft

Low Tide:
February 24
4:29 am • -0.6 ft

Barataria-Terrebonne National Estuary Program: P.O. Box 2663, NSU Campus, N. Babington Hall, Room 105, Thibodaux, LA 70310 - 1.800.259.0869 - www.btnep.org
Tides from: Barataria Bay, Grand Isle, East Point, 29d 15'48" N 89d 57' 24" W - Tides & Currents by Jeppesen Marine - www.nobeltec.com
[TIDE ADJUSTMENT TABLE CAN BE FOUND ON THE INSIDE BACK COVER]

BTNEP BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

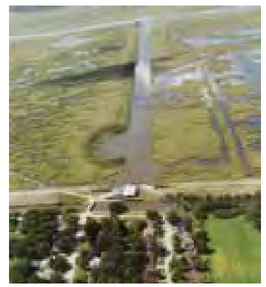
Storm Water Redirection

Pump stations of the Barataria and Terrebonne Basins

There are over 256 storm water pumping stations in the Barataria-Terrebonne National Estuary associated with levee systems. Levees protect communities from high tides and hurricane storm surge. Storm water pumps protect from flooding by moving rain water outside of the levee system. Pumping storm water into canals has the adverse effect of delivering polluted storm water directly to shellfish growing areas and bypassing wetlands that are in need of freshwater, nutrients, and sediment.

Storm water redirection uses storm water pumping stations as miniature freshwater diversions to wetlands. Redirection of storm water into adjacent wetlands can be achieved by diverting outfalls directly into wetlands or by blocking outfall canals to force sheet flow through adjacent wetlands. Pumps deliver freshwater, nutrients, and sediment to nourish adjacent wetlands, re-establish the salinity gradient, and increase the residence time of the storm water in the wetlands; reducing disease-causing bacteria and improving the water quality of oyster-growing waters.

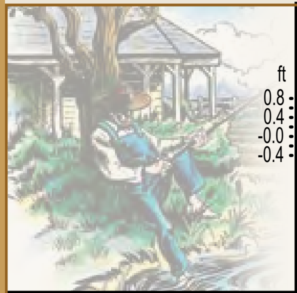
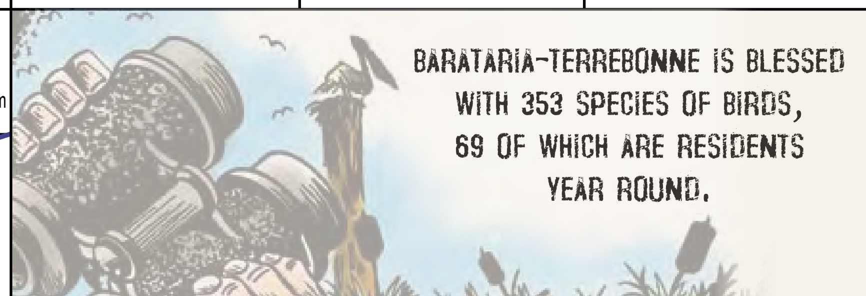
Working with Terrebonne Parish officials, the Barataria-Terrebonne National Estuary Program (BTNEP) and Louisiana State University completed a storm water redirection project in the Pointe aux Chenes Wildlife Management Area (WMA) in 2009. Data were collected before and after a pump station in the community of Pointe au Chien was installed.



All pre- and post-discharge data collection was completed in late 2008. Data collected included water levels, total suspended solids, nutrients, fecal coliform bacteria, salinity, vegetative cover/composition/response, soil composition, and sedimentation. Results indicate a decrease in salinity, fecal coliform, and nutrients and increased vegetated biomass and sedimentation near the outfall of the pumps. Water control flap gates in the Isle de Jean Charles culvert aid the decrease in salinity throughout the receiving area.

Results from the Pointe aux Chenes Storm Water Redirection Project will help educate coastal communities on the beneficial use of storm water pumps as miniature freshwater diversions to maximize wetland nourishment, shellfish protection, and community protection throughout coastal Louisiana.

March 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 11:35 am 0.2 7:21 am 0.2 5:54 pm 0.1	2 5:14 am 0.4 2:10 am 0.4 11:04 am 0.5 8:14 pm 0.0	3 10:08 pm -0.2 11:26 am 0.7	4 11:44 pm -0.3 12:07 pm 0.8	5 12:56 pm 0.9	6 1:04 am -0.3 1:52 pm 0.9
7 2:13 am -0.3 2:57 pm 0.9	8 3:15 am -0.3 4:10 pm 0.9	9 4:11 am -0.3 5:29 pm 0.9	10 5:00 am -0.2 6:42 pm 0.8	11 5:42 am -0.1 7:48 pm 0.8	12 6:16 am 0.0 8:48 pm 0.7	13 6:40 am 0.1 9:48 pm 0.6
14 11:55 am 0.3 6:46 am 0.2 2:05 pm 0.3 10:55 pm 0.6 *Daylight Savings Time Begins*	15 10:06 am 0.4 6:15 am 0.3 4:38 pm 0.2	16 4:51 am 0.4 12:30 am 0.5 9:51 am 0.5 6:10 pm 0.1	17 10:05 am 0.6 7:29 pm 0.1 *St. Patrick's Day*	18 10:33 am 0.8 8:48 pm 0.0	19 11:10 am 0.9 10:09 pm -0.1	20 11:55 am 1.0 11:30 pm -0.2 *First Day of Spring*
21 12:49 pm 1.1	22 12:46 am -0.3 1:52 pm 1.1	23 1:54 am -0.3 3:04 pm 1.1	24 2:55 am -0.3 4:25 pm 1.1	25 3:50 am -0.2 5:57 pm 1.0	26 4:38 am -0.1 7:41 pm 0.9	27 5:15 am 0.1 9:40 pm 0.7
28 5:26 am 0.4 10:11 am 0.4 4:23 pm 0.3	29 4:09 am 0.6 12:32 am 0.6 9:14 am 0.7 6:06 pm 0.1	30 9:20 am 0.9 7:28 pm 0.0	31 8:41 pm -0.1 9:52 am 1.0			

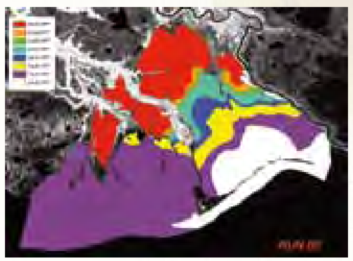
High Tide:
March 23
3:04 pm • 1.1 ft

Low Tide:
March 7
2:13 am • -0.3 ft

BTNEP
BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

Hydrologic Restoration

Hydrologic restoration is the use of plugs, weirs, culverts, shore stabilization and levee management to restore wetland hydrology to more accurately reflect historic water movement. The goal of hydrologic restoration is to restore the flow of water in the estuary in order to effectively use the fresh water, sediments, and nutrients that reach the basin's marshes and to mitigate the impacts of modifications that have been made to local waterways. The construction of specific structures depends upon the impacts to be addressed by the proposed project.



CWPPRA's GIWW to Clovelly Hydrologic Restoration project mitigated the effects of canal construction and erosion by using man-made structures to enhance the flow and retention of water near Little Lake. The project was designed to reduce marsh erosion; reduce saltwater intrusion and subsequent land loss; increase economic returns from trapping, recreation opportunities, and commercial fisheries; sustain marsh habitat for the continued existence of territorial, migratory, and threatened or endangered wildlife; and improve water quality. Construction included the installation of rock plugs, rock weirs, a culvert pipe with a flap gate, a variable crested sheet pile weir, shore protection, earthen bank stabilization and rock bank stabilization. The GIWW to Clovelly Hydrologic Restoration project returned the flow of fresh water to natural watercourses as opposed to a rapid exit though man-made canals. This helped to retain fresh water in the area and limit harmful salinity spikes that threatened plant and animal communities.

Other projects within the estuary that utilize hydrologic restoration include:

West Pointe a la Hache Outfall Management Project (CWPPRA, BA-04C)

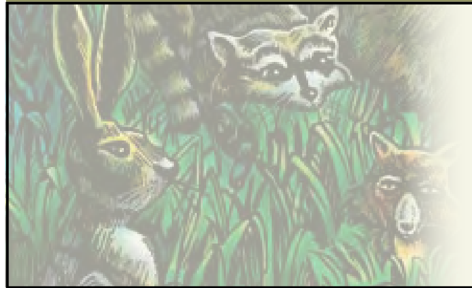
GIWW(Gulf Intracoastal Waterway) to Clovelly Hydrologic Restoration – CWPPRA (BA-02)

Naomi Outfall Management – CWPPRA (BA-03a)

Grand Bayou/GIWW Freshwater Diversion (TE-10)

Reintroduction of Mississippi River water into Bayou Lafourche

April 2010

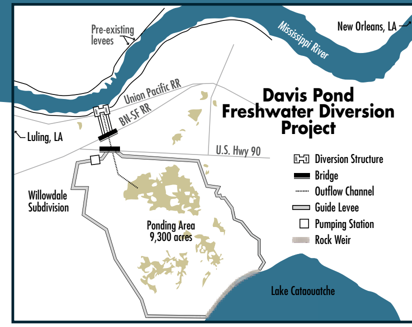
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		SOME INHABITANTS OF BARATARIA-TERREBONNE'S FORESTED WETLANDS INCLUDE RACCOON, ALLIGATOR, WHITE-TAILED DEER, LOUISIANA BLACK BEAR, AND BALD EAGLE.	ft 1.2 0.8 0.4 -0.0	1 10:32 am 1.2 9:52 pm -0.2 *April Fool's Day*	2 11:17 am 1.2 11:03 pm -0.2 *Good Friday*	3 12:07 pm 1.2
4 1:13 am -0.2 2:01 pm 1.1 *Easter*	5 2:19 am -0.1 3:01 pm 1.1	6 3:18 am 0.0 4:08 pm 1.0	7 4:09 am 0.0 5:26 pm 0.9	8 4:50 am 0.2 6:58 pm 0.8	9 5:19 am 0.3 8:42 pm 0.7	10 5:29 am 0.4 11:52 am 0.5 3:09 pm 0.5 10:37 pm 0.7
11 5:01 am 0.5 9:53 am 0.6 5:08 pm 0.4	12 9:22 am 0.7 6:14 pm 0.3	13 9:26 am 0.9 7:10 pm 0.2	14 9:46 am 1.0 8:02 pm 0.1	15 10:17 am 1.1 8:57 pm 0.0	16 10:54 am 1.2 9:57 pm -0.1	17 11:37 am 1.3 11:02 pm -0.2
18 12:26 pm 1.4	19 12:08 am -0.2 1:19 pm 1.4	20 1:12 am -0.2 2:17 pm 1.3	21 2:11 am -0.1 3:19 pm 1.2	22 3:01 am 0.0 4:33 pm 1.0 *Earth Day*	23 3:39 am 0.2 6:51 pm 0.8	24 3:52 am 0.4 10:44 am 0.7 4:40 pm 0.5 11:14 pm 0.6
25 2:39 am 0.6 9:16 am 0.8 5:58 pm 0.3	26 8:56 am 1.0 6:58 pm 0.1	27 9:12 am 1.2 7:53 pm -0.1	28 9:43 am 1.3 8:47 pm -0.2	29 10:22 am 1.4 9:41 pm -0.2	30 11:04 am 1.4 10:36 pm -0.2	 TERRE BONNE IS FRENCH FOR "GOOD EARTH".

High Tide:
April 30
11:04 am • 1.4 ft

Low Tide:
April 29
9:41 pm • -0.2 ft

Diversions

By strategically managing fresh water inputs through diversion structures, we can introduce enough fresh water to mimic historic salinity gradients, protecting and nourishing existing and newly restored wetlands.



When early settlers began to construct levees along the Mississippi River and its distributaries, they were unaware that they were laying the groundwork for the disappearance of coastal Louisiana. Spring flooding and shifting delta lobes created and sustained coastal Louisiana but these natural processes made development difficult. To combat flooding, settlers constructed levees to protect their property. Eventually the federal government would undertake a massive public works project to levee the entire Lower Mississippi River. Today, communities exist in Louisiana and throughout the Mississippi River Valley because levees protect them from devastating spring floods.

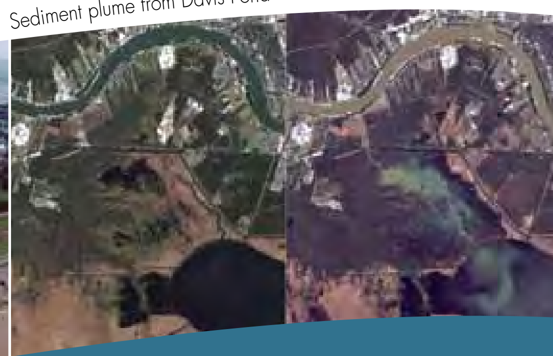
When the levee construction was completed, fresh water and sediment could no longer annually flow over south Louisiana, which allowed salt water from the Gulf of Mexico to creep farther inland. Subsidence, a natural deltaic process, could no longer be offset by annual deposits of sediment. Saltwater intrusion killed plants that were accustomed to fresher environments. This limited biological diversity and allowed fragile marsh soils to be washed away without the protection of plant roots.

Today, much of our coastal land loss can be attributed to the management of the Mississippi River. To combat this loss we must, when practical, mimic the historic role of the river. The economy of much of Louisiana is based on the Mississippi River and the communities that surround it. Removing the levees and allowing annual flooding and the migration of the delta would make these communities uninhabitable. The various channels of the Mississippi River converged north of Baton Rouge, meaning that fully returning to the historic process would mean abandoning many communities, such as: New Orleans, Houma, Morgan City and all surrounding areas—an unwelcome scenario. Also, the land building capacity of the river has been limited in recent history by the construction of locks and dams throughout the Mississippi River Valley. Turbulent water that once carried sediment is now slowed behind these structures. Without movement, the water can no longer keep the sediment suspended, and soil particles fall to the bottom. This means the river today carries as little as 50% of the sediment load it did when it built our coast.

Despite these changes, the river remains a useful tool in coastal restoration. By strategically managing fresh water inputs through diversion structures, we can introduce enough fresh water to mimic historic salinity gradients, protecting and nourishing existing and newly restored wetlands.

There are two types of structures that are being used to reintroduce fresh water into Louisiana's wetlands. Although both are fresh water diversions, the term "diversion" most commonly refers to large box culverts that are placed under or through the flood control levee. These use the force of gravity to carry fresh water into adjacent wetlands. Siphons, the second type of diversion structures, are pipes that are placed over the top of the flood control levee. They use a difference in elevation to siphon river water through the pipes to be distributed into nearby wetlands. Siphons typically carry less water than diversions. The Davis Pond Diversion was designed to carry 10,650 cubic feet of river water per second when operated at its maximum while the Naomi Siphon is designed to divert 2,100 cubic feet per second.

Sediment plume from Davis Pond

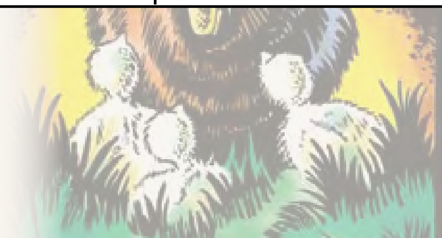


May 2010

THE BROWN PELICAN, OUR LOUISIANA STATE BIRD, BECAME LOCALLY EXTINCT BY EATING FISH CONTAMINATED WITH DDT AND OTHER PERSISTENT PESTICIDES.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 ft 1.2 0.8 0.4 -0.0 -0.4 11:49 1.4 11:33 pm -0.1
2 12:34 pm 1.3	3 1:20 pm 1.2 12:28 am 0.0	4 1:19 am 0.0 2:04 pm 1.1	5 ◑ 2:02 am 0.2 2:46 pm 1.0 *Cinco De Mayo*	6 2:32 am 0.3 3:18 pm 0.9	7 2:44 am 0.4 1:42 pm 0.7	8 2:19 am 0.5 9:48 am 0.7 5:19 pm 0.6
9 8:35 am 0.8 5:41 pm 0.4 *Mother's Day*	10 6:14 pm 0.2 8:17 am 0.9	11 6:51 pm 0.1 8:24 am 1.1	12 8:47 am 1.2 7:31 pm 0.0	13 ● 9:18 am 1.3 8:16 pm -0.1	14 9:56 am 1.4 9:06 pm -0.2	15 10:39 am 1.5 10:00 pm -0.2 *Armed Forces Day*
16 11:25 am 1.5 10:55 pm -0.2	17 12:13 pm 1.5 11:48 pm -0.2	18 12:59 pm 1.4	19 12:36 am -0.1 1:41 pm 1.2	20 ◐ 1:14 am 0.1 2:04 pm 1.0	21 1:30 am 0.3 11:26 am 0.8	22 12:46 am 0.5 8:50 am 0.8 5:44 pm 0.4
23 5:59 pm 0.2 7:55 am 1.0	24 6:37 pm 0.0 7:52 am 1.2	25 8:14 am 1.3 7:20 pm -0.2	26 8:48 am 1.4 8:05 pm -0.2	27 ○ 9:27 am 1.5 8:50 pm -0.3	28 10:09 am 1.5 9:37 pm -0.2	29 10:51 am 1.5 10:23 pm -0.2
30 11:33 am 1.4 11:06 pm -0.1	31 12:11 pm 1.3 11:45 pm 0.0 *Memorial Day*					

IN 1973, DDT WAS BANNED IN THE UNITED STATES, AND AS A RESULT, THE STATE BIRD POPULATION HAS MADE A COMEBACK.



High Tide:
May 16
11:25 am • 1.5 ft

Low Tide:
May 27
8:50 pm • -0.3 ft

Barataria-Terrebonne National Estuary Program: P.O. Box 2663, NSU Campus, N. Babington Hall, Room 105, Thibodaux, LA 70310 - 1.800.259.0869 - www.btnep.org
Tides from: Barataria Bay, Grand Isle, East Point, 29d 15′48″ N 89d 57′ 24″ W - Tides & Currents by Jeppesen Marine - www.nobeltec.com
[TIDE ADJUSTMENT TABLE CAN BE FOUND ON THE INSIDE BACK COVER]

Invasive Species Control

The list of invasive species in Louisiana is a long one

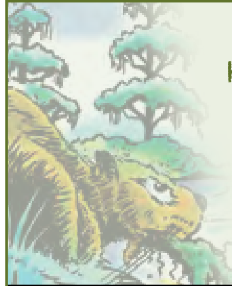
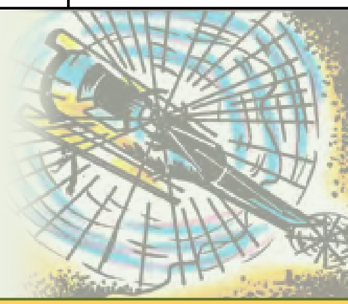
Invasive species are non-native plants or animals that are introduced to an area and cause damage to the ecology, economy, or to human health. Our international ports handle cargo from all over the world, and our mild climate provides exotic species with a higher likelihood of survival, making Louisiana particularly susceptible to invasion.

The list of invasive species in Louisiana is a long one. Aquatic weeds choke waterways, exotic fish crowd out native species, and ravenous snails munch away at our native vegetation. There are even invasive species offshore; large marine shrimp from Asia and jellyfish from Australia threaten our local fisheries.

Obviously some invaders are more troublesome than others, and some species clearly impede coastal restoration efforts in the state. The most highly visible of these is the nutria, a semi-aquatic rodent from South America. Nutria were introduced in the 1930s to bolster the fur trade, but soon began running rampant across the state's coastal marshes. Their numbers were kept in check for decades by trappers who collected nutria by the millions for their valuable pelts, but that industry collapsed in the 1980s due to lower demand for fur products worldwide. As fewer trappers worked the marshes, nutria began to dramatically overpopulate, causing widespread damage to wetlands by their voracious herbivory. Dense populations cause "eat outs" where marsh grasses are damaged past the point of re-growth. These areas usually convert to shallow open water, exacerbating the already critical problem of coastal land loss. To address this problem, the Louisiana Department of Wildlife & Fisheries with funding from the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA), has initiated a very successful incentive program that pays a $5 bounty to trappers for each nutria they collect. The program brings in over 300,000 nutria each year, and has resulted in a reduction of nutria-caused marsh damage from 102,000 acres in 1999 to just 20,000 acres in 2009.

Additionally, in 2009 BTNEP funded a project called "Righteous Fur" which attempts to further incentivize the trapping of nutria by developing and marketing a line of nutria teeth jewelry and nutria fur fashions and accessories. An increase in demand and a growing price per pelt inspired by this or other creative programs help to reduce the nutria population and can have a positive effect on the economics of trapping.

June 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
 HERBIVOROUS "PLANT EATING" ANIMALS SUCH AS NUTRIA DESTROY MARSH VEGETATION BY SOMETIMES EATING ENTIRE PLANTS, ROOTS AND ALL.		1 12:46 pm 1.2	2 12:15 am 0.1 1:12 pm 1.1	3 12:31 am 0.2 1:19 pm 0.9	4 12:24 am 0.3 11:55 am 0.8 11:32 pm 0.5	5 8:38 am 0.7 8:25 pm 0.5
6 7:27 am 0.8 5:51 pm 0.3	7 7:12 am 1.0 5:51 pm 0.2	8 7:23 am 1.1 6:17 pm 0.0	9 7:49 am 1.2 6:52 pm -0.1	10 8:24 am 1.4 7:33 pm -0.2	11 9:05 am 1.5 8:19 pm -0.3	12 9:51 am 1.5 9:07 pm -0.4
13 10:37 am 1.5 9:56 pm -0.4	14 11:24 am 1.5 10:42 pm -0.3 *Flag Day*	15 12:08 pm 1.4 11:21 pm -0.1	16 12:45 pm 1.2 11:46 pm 0.1	17 12:53 pm 0.9 1:39 pm 0.3	18 9:20 am 0.7 9:54 pm 0.4	19 7:05 am 0.8 5:24 pm 0.3
20 6:33 am 1.0 5:26 pm 0.1 *Father's Day*	21 6:44 am 1.2 5:59 pm -0.1 *Summer Begins*	22 7:14 am 1.3 6:40 pm -0.3	23 7:53 am 1.4 7:22 pm -0.3	24 8:37 am 1.5 8:06 pm -0.3	25 9:21 am 1.4 8:48 pm -0.3	26 10:05 am 1.4 9:29 pm -0.2
27 10:45 1.3 10:05 pm -0.1	28 11:22 1.3 10:35 pm -0.1	29 11:54 1.2 10:57 pm 0.1	30 12:20 pm 1.0 11:03 pm 0.2	DATA FROM HELICOPTER SURVEYS OF BARATARIA-TERREBONNE IN 1994 SHOWED THAT ABOUT 55,000 ACRES OF MARSH HAD BEEN DAMAGED BY HERBIVORES. 		

High Tide:
June 13
10:37 am • 1.5 ft

Low Tide:
June 12
9:07 pm • -0.4 ft

Barataria-Terrebonne National Estuary Program: P.O. Box 2663, NSU Campus, N. Babington Hall, Room 105, Thibodaux, LA 70310 - 1.800.259.0869 - www.btnep.org
Tides from: Barataria Bay, Grand Isle, East Point, 29d 15' 48" N 89d 57' 24" W - Tides & Currents by Jeppesen Marine - www.nobeltec.com
[TIDE ADJUSTMENT TABLE CAN BE FOUND ON THE INSIDE BACK COVER]

BTNEP
BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

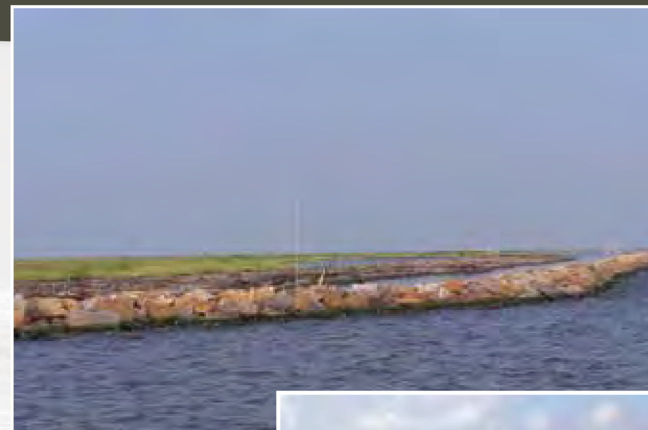




Shoreline Protection

A shoreline is the area where land and water meet and can be further defined as the land between the low tide mark and where the highest wave breaks. Shorelines exist on the banks of bayous, the rims of lakes, the edges of bays, and the shores of the Gulf of Mexico. As waves break on the shoreline, they dislodge plant roots and wash away soil. This physical erosion results in land loss and is a major contributing factor to the disappearance of coastal Louisiana. By protecting shorelines, erosion can be limited and coastal land loss rates can be reduced. In some cases, shoreline protection can help to create land and improve habitat. There are many shoreline protection techniques used in coastal Louisiana. The use of each one depends on the long-term goals and the location of the project. Two of the most commonly used techniques are revetments and terraces.


A revetment is created by piling large rocks or broken concrete along a shoreline. Revetments are used on many restoration projects to protect lake rims in coastal Louisiana. Revetments are often combined with pipeline sediment delivery projects to protect newly created wetlands behind the revetment on the edge of a lake. An example of this is the CWPPRA project TE-46: West Lake Boudreaux Shoreline Protection and Marsh Creation.




Terraces are narrow strips of vegetated land built in lakes or bays. A number of terraces are often built parallel to each other and can be constructed in a variety of configurations. Terraces limit the distance that wind and waves can travel uninterrupted over water. By doing this, they reduce the size of wind-driven waves, thus protecting the shoreline. Terraces also intercept waves before they reach the shore. The area of water between parallel terraces remains calm, promoting the settlement of suspended sediment. This can help to reduce depth and improve water clarity, which encourages the growth of submerged and emergent vegetation, increasing habitat value. An example of terraces can be found south of Lafitte where Ducks Unlimited partnered with local landowners and other stakeholders in the construction of the Lafitte Terraces to protect shorelines and improve habitat.

In addition to revetments and terraces, shoreline protection can also include seawalls, breakwaters, jetties, groins, reconstructed oyster reefs, and bulkheads.

July 2010

SMALL MARITIME FORESTS FOUND ON GRAND ISLE AND CHENIERE CAMINADA ARE RESTING PLACES FOR MIGRATING BIRDS DURING SPRINGTIME.

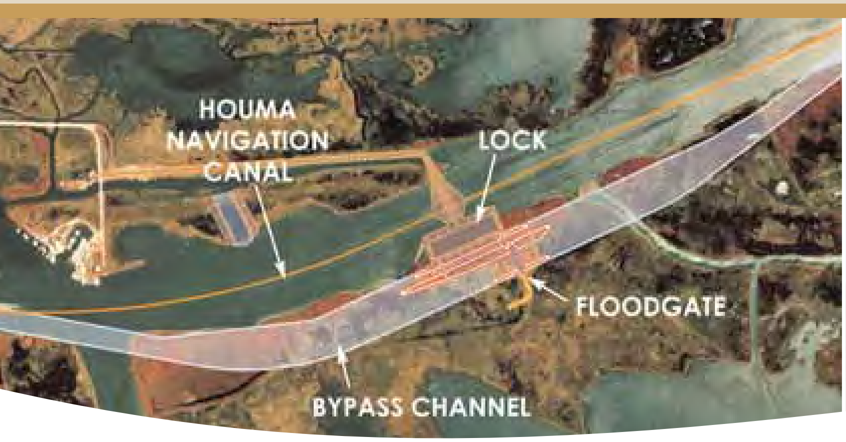
ft: 1.2, 0.8, 0.4, 0.0, -0.4

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
				1 12:34 pm 0.9 10:47 pm 0.3	**2** 12:00 pm 0.7 9:56 pm 0.4	**3** 7:10 am 0.7 8:00 pm 0.4
4 5:56 am 0.8 5:27 pm 0.3 *Independence Day*	**5** 5:49 am 0.9 5:05 pm 0.2	**6** 6:07 am 1.1 5:25 pm 0.0	**7** 6:41 am 1.2 6:00 pm -0.1	**8** 7:23 am 1.3 6:42 pm -0.3	**9** 8:11 am 1.4 7:26 pm -0.4	**10** 9:02 am 1.5 8:13 pm -0.4
11 9:53 am 1.5 8:59 pm -0.3	**12** 10:43 am 1.5 9:42 pm -0.2	**13** 11:32 am 1.3 10:16 pm -0.1	**14** 12:17 am 1.1 10:34 pm 0.2	**15** 12:49 pm 0.8 10:08 pm 0.4	**16** 6:20 am 0.7 7:30 pm 0.5	**17** 4:48 am 0.8 3:45 pm 0.3
18 4:47 am 1.0 4:15 pm 0.1	**19** 5:16 am 1.2 4:58 pm -0.1	**20** 6:00 am 1.3 5:44 pm -0.2	**21** 6:50 am 1.4 6:31 pm -0.2	**22** 7:43 am 1.4 7:16 pm -0.2	**23** 8:34 am 1.4 7:59 pm -0.2	**24** 9:22 am 1.4 8:38 pm -0.1
25 10:05 am 1.3 9:11 pm 0.0	**26** 10:43 am 1.2 9:37 pm 0.1	**27** 11:18 am 1.1 9:52 pm 0.2	**28** 11:48 am 1.0 9:52 pm 0.3	**29** 12:15 pm 0.9 9:27 pm 0.4	**30** 12:31 pm 0.7 8:27 pm 0.5	**31** 3:58 am 0.7 6:36 pm 0.5

High Tide:
July 11
9:53 am • 1.5 ft

Low Tide:
July 10
8:13 pm • -0.4 ft

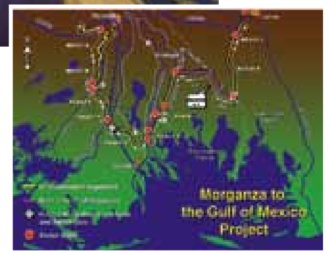
Levees



Water attacks coastal Louisiana from many fronts. Spring floods flow down the Mississippi River and threaten communities throughout the Mississippi River Valley. Coastal residents anxiously monitor weather reports as tropical storms and hurricanes sweep across the Gulf in the summer and fall. Even strong winter storm fronts and the southerly winds they bring can push tidal waters over low-lying roads in coastal communities because of coastal land loss.

Levee systems are a fundamental component of an integrated plan to restore coastal Louisiana and to protect the communities that call it home. Controversy continues to surround levee construction and its impact on Louisiana's wetlands. One thing is certain; levees will be constructed. We can minimize adverse impacts while providing needed protection to coastal communities only by considering levee systems within the context of a complete coastal protection and restoration strategy.

Levees alone cannot protect us. This was evident in the wake of hurricanes Katrina and Rita. A false sense of security was shattered when vulnerable levees that were once protected by miles of coastal wetlands were overwhelmed by floodwaters. The landscape of forests wetlands, natural ridges, marshes, and barrier islands helps to slow tides and storm surges as they move inland. An integrated approach to protection and restoration, including the re-establishment of these coastal features, will help protect levee systems and will help to minimize the need for higher, more costly levees. To limit adverse impacts, levee systems like the federally authorized Morganza to the Gulf Hurricane Protection Project in Terrebonne Parish follow existing hydrologic barriers like canal spoil banks, natural ridges, and roads. By following these existing barriers, the levee has a limited impact to the current hydrology of the system, minimizing damage to coastal wetlands.



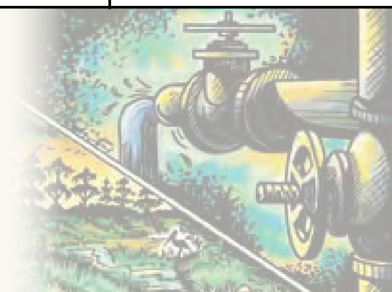
Over the coming years many levee systems will be proposed and evaluated. It is in the best interest of the citizens of coastal Louisiana to critically review potential levee alignments to guarantee all possible precautions are being taken to ensure minimal impact while providing necessary hurricane protection. Levees alone are not the solution. All the tools at our disposal will need to be utilized to provide the highest possible level of protection. While levees provide a tangible barrier to flood waters, they are subject to failure, and without a wetland buffer the potential for failure is significantly increased.

August 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
1 3:35 am 0.8 3:39 pm 0.4	**2** 3:50 am 1.0 3:35 pm 0.3	**3** 4:08 pm 0.1 4:24 am 1.1	**4** 5:10 am 1.2 4:50 pm 0.0	**5** 6:04 am 1.4 5:35 pm -0.1	**6** 7:03 am 1.5 6:23 pm -0.2	**7** 8:03 am 1.5 7:11 pm -0.2
8 9:02 am 1.5 5:56 pm -0.2	**9** 10:02 am 1.4 8:38 pm 0.0	**10** 11:02 am 1.3 9:12 pm 0.2	**11** 12:08 pm 1.1 9:22 pm 0.4	**12** 1:33 pm 0.8 8:27 pm 0.6	**13** 2:19 am 0.8 10:15 am 0.5	**14** 2:09 am 1.0 12:58 pm 0.3
15 2:38 am 1.2 2:23 pm 0.2	**16** 3:24 am 1.3 3:28 pm 0.0	**17** 4:20 am 1.4 4:26 pm 0.0	**18** 5:23 am 1.4 5:21 pm 0.0	**19** 6:29 am 1.4 6:11 pm 0.0	**20** 7:33 am 1.4 6:57 pm 0.0	**21** 8:31 am 1.4 7:37 pm 0.1
22 9:23 am 1.3 8:10 pm 0.2	**23** 10:09 am 1.2 8:34 pm 0.3	**24** 10:52 am 1.1 8:45 pm 0.5	**25** 11:34 am 1.0 8:31 pm 0.6	**26** 12:24 pm 0.9 7:43 pm 0.7	**27** 1:01 am 0.8 6:59 am 0.7 1:37 pm 0.8 6:12 pm 0.8	**28** 12:50 am 0.9 9:17 am 0.6
29 1:07 am 1.0 11:24 am 0.5	**30** :39 am 1.2 1:03 pm 0.4	**31** 2:22 am 1.3 2:13 pm 0.3				

ft 1.2 0.8 0.4 -0.0 -0.4

POINT SOURCE POLLUTION INCLUDES SOURCES SUCH AS FACTORY DISCHARGES AND CITY SEWERAGE SYSTEMS. NON-POINT SOURCE INCLUDES SOURCES SUCH AS STORM WATER DRAINAGE SYSTEMS AND CROPLAND RUNOFF.



High Tide:
August 7
8:03 am • 1.5 ft

Low Tide:
August 7
7:11 pm • -0.2 ft




Barrier Island Restoration

Barrier islands and barrier shorelines are our first line of defense against flooding caused by hurricane storm surge and the strong southerly winds that accompany winter storm fronts. Barrier islands act as speed bumps, slowing storm surge. The narrow passes between islands slow water as it flows into the estuary from the Gulf. Barrier islands also provide a unique and diverse habitat that sustains a variety of fish, crustaceans, birds, and reptiles; several are threatened or endangered. The restoration of a barrier island can include the use and combination of many of the techniques frequently employed in other coastal restoration activities.

Large-scale restoration of barrier islands often begins with pipeline sediment delivery. Sand is harvested by dredges from the Gulf of Mexico and pumped to barrier islands. Heavy equipment is used to distribute the sand and shape it into features like beaches, dunes, and marsh platforms. When work is complete, all equipment is removed and the island takes on a natural appearance and geomorphology.

After a barrier island's footprint has been re-established using pipeline sediment delivery, manual re-vegetation is often used to help jump-start plant communities whose roots help to hold the newly deposited sand in place. Most of the preferred plant species will not grow adequately from seed; as a result, small specimens must be

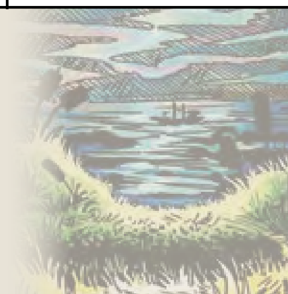
Photo courtesy of Koupal Communications

manually planted by hand to ensure maximum survival. Often, sand fences will also be erected on newly restored beaches to limit erosion and encourage dune formation.

Shoreline protection is also used in barrier island restoration and protection. Breakwaters can be placed in front of the island to absorb wave energy and limit beach erosion. Groins, or small jetties, may be constructed from the beaches that stretch out into the Gulf to help trap sediment that moves laterally along the coast. Jetties help to keep sand from barrier islands and headlands from filling shipping channels and also help to trap material as it moves along the coast.

Examples of barrier island restoration projects include CWPPRA's BA-35 – Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration and TE-50 – Whiskey Island Back Barrier Marsh Creation.

September 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
	CATASTROPHIC EVENTS LIKE OIL SPILLS AND HURRICANES POSE A HIGH RISK TO SEABIRD POPULATIONS THAT NEST ON EXPOSED BEACHES. ft 1.2 0.8 0.4 -0.0		**1** 3:16 am 1.4; 3:14 pm 0.2	**2** 4:19 am 1.5; 4:10 pm 0.1	**3** 5:29 am 1.5; 5:03 pm 0.1	**4** 6:42 am 1.5; 5:53 pm 0.1
5 7:56 am 1.5; 6:39 pm 0.2	**6** 9:12 am 1.4; 7:21 pm 0.3; *Labor Day*	**7** 10:34 am 1.3; 7:50 pm 0.5	**8** 12:15 pm 1.1; 7:39 pm 0.8; 11:59 pm 0.9	**9** 6:51 am 0.6; 11:35 pm 1.1	**10** 8:58 am 0.5	**11** 12:00 am 1.3; 10:43 am 0.3
12 12:41 am 1.5; 12:14 pm 0.2; *Grandparent's Day*	**13** 1:31 am 1.5; 1:34 pm 0.2	**14** 2:28 am 1.6; 2:45 pm 0.2	**15** 3:31 am 1.6; 3:49 pm 0.2	**16** 4:42 am 1.5; 4:44 pm 0.2	**17** 5:58 am 1.4; 5:33 pm 0.3	**18** 7:13 am 1.4; 6:14 pm 0.4
19 8:23 am 1.3; 6:47 pm 0.5	**20** 9:28 am 1.2; 7:06 pm 0.7	**21** 10:35 am 1.1; 11:57 am 0.8; 7:01 pm 0.8	**22** 4:05 am 0.8; 11:52 pm 1.0; 6:13 pm 0.9; 10:46 pm 1.0	**23** 6:01 am 0.7; 2:07 pm 1.0; 4:06 pm 1.0; 10:38 pm 1.1; *First Day of Autumn*	**24** 7:22 am 0.7; 10:54 pm 1.2	**25** 8:34 am 0.6; 11:21 pm 1.3
26 9:44 am 0.5; 11:55 pm 1.4	**27** 10:58 am 0.4	**28** 12:38 am 1.5; 12:13 pm 0.3	**29** 1:29 am 1.6; 1:23 pm 0.3	**30** 2:27 am 1.6; 2:27 pm 0.2	IF EITHER OCCUR DURING BREEDING SEASON, WHOLE COLONIES COULD FAIL TO REPRODUCE.	

High Tide:
September 30
2:27 am • 1.6 ft

Low Tide:
September 3
5:03 pm • 0.1 ft

Revegetation

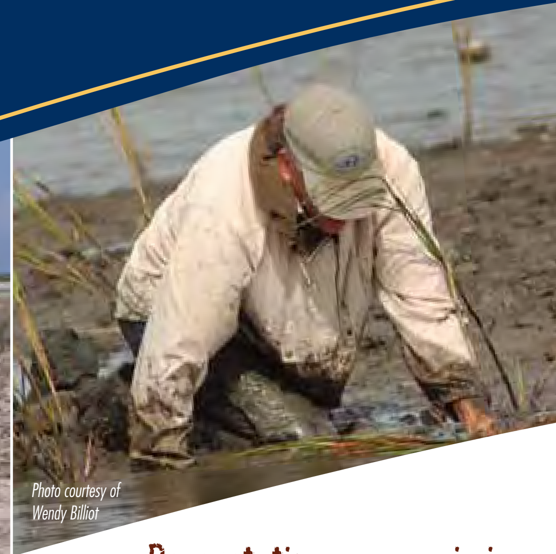
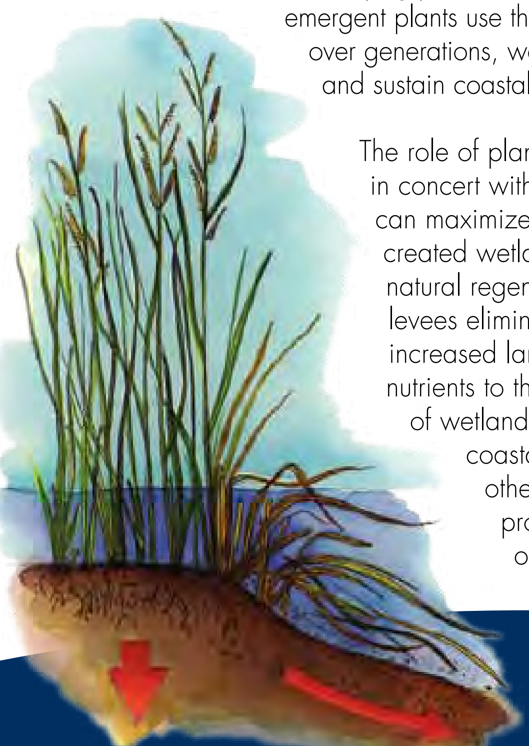


Photo courtesy of Wendy Billiot

Revegetation can maximize project effectiveness by helping to sustain newly created wetland platforms and reduce the time needed for the natural regeneration of coastal habitat

The deltaic plain of coastal Louisiana began thousands of years ago when the Mississippi River laid down fertile soil carried here from throughout North America. Upon that soil grew the plants that uniquely characterize the cypress swamps, flotant marsh, and salt marsh. In addition to providing diverse habitats, plants anchor soils and contribute to the creation and maintenance of the wetland platform. When plants age and die, they don't disappear. The decaying plant matter becomes another layer atop the marsh, and newly emergent plants use this rich organic matter to grow taller. By this process, over generations, wetland plants increased elevation and helped to create and sustain coastal Louisiana.

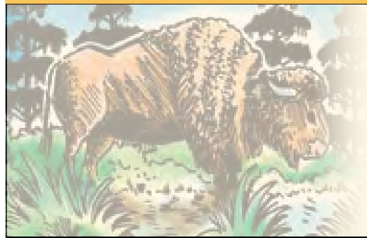
The role of plants today is as important as ever. When used as a tool in concert with other common restoration techniques, revegetation can maximize project effectiveness by helping to sustain newly created wetland platforms and reduce the time needed for the natural regeneration of coastal habitat. The construction of modern levees eliminated annual flooding from the Mississippi River and increased land loss rates by reducing the input of sediment and nutrients to the estuary. In addition to the continued subsidence of wetlands, global climate change will likely amplify threats to coastal communities. Revegetation, when combined with other restoration techniques, will be a valuable tool in protecting coastal Louisiana and addressing the impacts of global sea level rise.

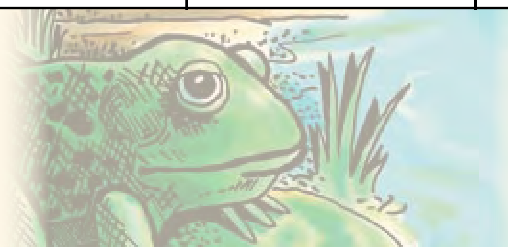


Revegetation is the physical planting of appropriate plant species in existing, restored, or newly created wetlands. Choosing the correct plant types is critical to an effective revegetation program. When choosing the appropriate plants for a restoration site, consideration must be given to a variety of factors including water depth, salinity, elevation, temperature, and regional ecology. Most species used in coastal restoration do not survive in adequate numbers when planted from seed. As a result, plants must be grown and cared for at a nursery before being transported to the restoration site and planted by hand. This can be a labor-intensive and costly process. The use of volunteers helps to minimize costs and ensure that limited funding is used as effectively as possible. The BTNEP volunteer program recruits hundreds of volunteers annually and plants tens of thousands of wetland plants throughout the 4.2 million acres of the Barataria-Terrebonne National Estuary. Volunteer opportunities provide citizens with a chance to become dynamically engaged in coastal restoration, which leads to a better understanding of the plight of coastal Louisiana and a deeply rooted motivation to protect our homes, our economy, and our culture.

October 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
BUFFALO ONCE ROAMED BARATARIA-TERREBONNE. EARLY FRENCH SETTLERS CALLED THEM BOEUF SAUVAGE, HENCE THE NAMES BAYOU BOEUF, LAKE BOEUF, AND BAYOU TERRE AUX BOEUFS.					1 3:33 am 1.6 3:25 pm 0.2	2 4:49 am 1.6 4:17 pm 0.3
3 6:16 am 1.5 5:02 pm 0.4	4 8:01 am 1.3 5:36 pm 0.6	5 10:10 am 1.2 5:43 pm 0.8 10:43 pm 0.9	6 5:14 am 0.7 1:28 pm 1.0 4:08 pm 1.0 9:52 pm 1.1	7 ● 6:53 am 0.5 9:59 pm 1.4	8 8:12 am 0.3 10:31 pm 1.5	9 9:25 am 0.2 11:13 pm 1.7
10 10:35 am 0.2	11 12:00 am 1.7 11:46 am 0.2 *Columbus Day*	12 12:51 am 1.7 12:55 pm 0.2	13 1:45 am 1.6 2:59 pm 0.2	14 ◐ 2:42 am 1.5 2:57 pm 0.3	15 3:44 am 1.4 3:46 pm 0.4	16 4:54 am 1.3 4:24 pm 0.5
17 6:20 am 1.2 4:48 pm 0.7	18 8:14 am 1.1 4:49 pm 0.8 11:13 pm 0.9	19 3:59 am 0.9 10:33 am 1.0 4:00 pm 0.9 9:39 pm 1.0	20 5:30 am 0.7 9:15 pm 1.1	21 6:28 am 0.6 9:20 pm 1.2	22 ○ 7:16 am 0.5 9:41 pm 1.3	23 8:03 am 0.4 10:09 pm 1.4
24 8:53 am 0.3 10:44 pm 1.5	25 9:48 am 0.2 11:25 pm 1.6	26 10:47 am 0.2	27 12:10 am 1.6 11:48 am 0.1	28 1:00 am 1.6 12:48 pm 0.1	29 1:52 am 1.6 1:42 pm 0.2	30 ◑ 2:48 am 1.5 2:30 pm 0.3
31 2:51 am 1.3 2:06 pm 0.4 *Halloween*	REPTILES AND AMPHIBIANS HELP CONTROL INSECT POPULATIONS.			THERE ARE 22 SPECIES OF AMPHIBIANS AND 51 SPECIES OF REPTILES IN BARATARIA-TERREBONNE.		





High Tide:
October 11
12:00 am • 1.7 ft

Low Tide:
October 28
12:48 pm • 0.1 ft




Non-Structural

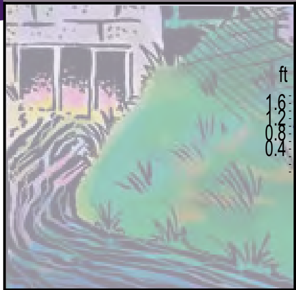
It will be decades before extensive coastal protection and restoration goals will be fully implemented. Even then, many communities will find themselves outside of levee protection systems and still vulnerable to damaging hurricane storm surge. Structural flood protection has historically been the preferred method of flood damage reduction. Structural flood risk reduction is the use of constructed barriers, such as levees, to limit flood threats by keeping floodwaters away from communities.

Non-structural flood risk reduction includes measures such as relocation, acquisition, flood proofing, structural elevation, flood insurance, flood preparedness/warning/response, and public education to limit the impact of flooding.* Non-structural flood protection may be the preferred alternative for communities where levee construction is impractical or economically prohibitive. Non-structural flood risk reduction can also compliment structural techniques to limit damages when flood height exceeds a levee's ability to protect communities within the levee system. The use of non-structural techniques is an essential part of a comprehensive coastal protection and restoration strategy. In addition to providing protection, the use of non-structural techniques helps to limit the impact of flood risk reduction on the environment. This is especially true when non-structural techniques are compared to levee construction, which in some cases can adversely impact plants, animals, and the flow of water in a region.

Non-structural flood risk reduction has been used extensively throughout south Louisiana. A visit to coastal communities will reveal homes that are elevated on pilings far above the ground. This elevation allows floodwaters to pass beneath homes, resulting in little or no damage to the structures. As Louisiana's coastal wetlands have disappeared, storm surges have encountered less resistance, allowing floodwaters to push further inland. This has exposed more communities to flood threats, requiring the elevation of homes that were built on or near the ground. Even residents of previously elevated homes are finding it necessary to raise structures higher to limit losses from storm surges that have grown higher as Louisiana's vast wetland complex continues to deteriorate, and with it, the protection it once provided. The continued and expanded use of non-structural flood risk reduction will help to ensure the maximum practical level of protection to coastal communities and in many cases may be the only means to sustain the unique culture that defines our region.

**Adapted from "Non-Structural Flood Damage Reduction Within the Corps of Engineers: What Districts Are Doing". US Army Corps of Engineers. October 2001*

November 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	**1** 4:43 am 1.0 2:16 pm 0.6 9:26 pm 0.9 *All Saint's Day*	**2** 3:25 am 0.8 9:26 am 0.9 1:07 pm 0.8 7:56 pm 1.0	**3** 4:40 am 0.5 7:36 pm 1.2	**4** 5:39 am 0.3 7:52 pm 1.4	**5** ● 6:35 am 0.1 8:26 pm 1.6	**6** 7:31 am 0.0 9:07 pm 1.7
7 8:28 am -0.1 9:52 pm 1.7 *Daylight Savings Time Ends*	**8** 9:25 am -0.1 10:39 pm 1.6	**9** 10:23 am 0.0 11:25 pm 1.6	**10** 11:19 am 0.1	**11** 12:11 am 1.4 12:09 pm 0.1 *Veterans Day*	**12** 12:53 am 1.3 12:49 pm 0.3	**13** ◐ 1:30 am 1.2 1:18 pm 0.4
14 1:51 am 1.0 1:24 pm 0.5 11:42 pm 0.8	**15** 12:46 pm 0.6 8:30 pm 0.8	**16** 4:51 am 0.6 6:23 pm 0.9	**17** 4:54 am 0.5 6:09 pm 1.0	**18** 5:20 am 0.3 6:18 pm 1.1	**19** 5:53 am 0.2 6:42 pm 1.2	**20** 6:30 am 0.1 8:13 pm 1.3
21 ○ 7:12 am 0.0 8:50 pm 1.4	**22** 7:58 am -0.1 9:30 pm 1.5	**23** 8:47 am -0.2 10:14 pm 1.5	**24** 9:38 am -0.2 10:59 pm 1.5	**25** 10:28 am -0.2 11:43 pm 1.4 *Thanksgiving Day*	**26** 11:13 am -0.1	**27** 12:25 am 1.2 11:49 am 0.1
28 ◑ 12:54 am 1.0 12:07 pm 0.2 11:58 pm 0.7	**29** 11:32 am 0.4 6:30 pm 0.7	**30** 4:25 am 0.4 6:30 pm 0.9		MINI FRESHWATER DIVERSION PROJECTS -- REROUTING STORM WATER PUMP DISCHARGES FROM DRAINAGE CANALS TO ADJACENT MARSHES CAN REDUCE NEGATIVE IMPACTS FROM PATHOGENS AND NUTRIENTS AND ENHANCE MARSH GROWTH.		

High Tide:
November 7
9:52 pm • 1.7 ft

Low Tide:
November 24
9:38 am • -0.2 ft

Putting It All Together

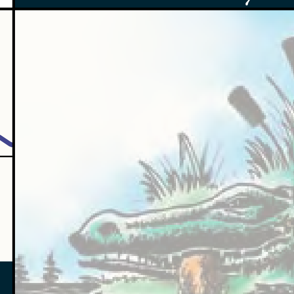
Louisiana is disappearing

Each month, this calendar introduced you to a unique method of preserving, protecting, or restoring our wetlands, our communities, and our livelihood through various coastal restoration and protection techniques. Not one of these techniques alone is the answer. Each technique is a piece of the comprehensive plan to restore coastal Louisiana. Tools such as storm water redirection, hydrologic restoration, and diversions help to preserve the functional value of existing wetlands. Invasive species control, shoreline protection, levees, and non-structural flood risk reduction help to protect our coast and our communities. Pipeline sediment delivery, barrier island restoration, and revegetation restore land that has been lost to open water. The collective benefits of these varied techniques will lead to a vibrant coastal system that maintains the diverse ecology of our region while providing the protection necessary for the survival of our communities and our way of life.

Louisiana is disappearing. In the last century, 1900 square miles of Louisiana has turned to open water. This trend continues today as the equivalent of a football field of land sinks below the waves on average every 38 minutes. Averages indicate that while you enjoyed this calendar over the last year, approximately 24 square miles of wetlands vanished. These numbers are remarkable, but the trend can be reversed. Large-scale restoration utilizing all of the techniques at our disposal must begin immediately.

You can make a difference. A commitment must be made by state and federal leaders to provide the funding necessary to initiate meaningful large-scale restoration to protect this national treasure. Your voice is the final and most important tool in coastal restoration. By sharing the knowledge you've gained here and by voicing your experiences in coastal Louisiana, you can help to build the sentiment needed to focus the world's attention on the plight of our fragile ecosystem. We encourage you to participate in the political process so that those that represent you can understand you and your interests related to coastal restoration. For more information about how you can work with BTNEP and its partners please visit www.btnep.org.

December 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6	6 n 6
 “LAFOURCHE” IS FRENCH FOR FORK.			**1** 4:34 am 0.1 6:27 pm 1.1	**2** 5:13 am -0.1 6:52 pm 1.3	**3** 5:58 am -0.3 7:29 pm 1.4	**4** 6:46 am -0.4 8:12 pm 1.4
5 7:36 am -0.4 8:58 pm 1.4	**6** 8:25 am -0.4 9:44 pm 1.4	**7** 9:14 am -0.3 10:27 pm 1.3	**8** 10:00 am -0.3 11:08 pm 1.2	**9** 10:40 am -0.2 11:43 pm 1.1	**10** 11:10 am 0.0	**11** 12:11 am 0.9 11:25 am 0.1
12 12:19 am 0.7 11:13 am 0.2 10:52 pm 0.6	**13** 10:09 am 0.3 7:14 pm 0.6	**14** 6:42 am 0.3 6:05 pm 0.6	**15** 4:47 am 0.2 5:57 pm 0.8	**16** 4:50 am 0.0 6:12 pm 0.9	**17** 5:15 am -0.1 6:42 pm 1.0	**18** 5:48 am -0.3 7:18 pm 1.1
19 6:27 am -0.4 7:59 pm 1.2	**20** 7:10 am -0.5 8:44 pm 1.2	**21** 7:55 am -0.5 9:29 pm 1.2 *First Day of Winter*	**22** 8:40 am -0.5 10:14 pm 1.2	**23** 9:23 am -0.5 10:58 pm 1.1	**24** 10:01 am -0.3 11:38 pm 0.9	**25** 10:27 am -0.2 *Christmas Day*
26 12:06 am 0.7 10:24 am 0.0 8:53 pm 0.4	**27** 8:55 am 0.2 5:25 pm 0.5	**28** 3:43 am 0.1 4:53 pm 0.7	**29** 3:49 am -0.2 5:08 pm 0.9	**30** 4:28 am -0.4 5:44 pm 1.0	**31** 5:13 am -0.6 6:30 pm 1.1 *New Year’s Eve*	

High Tide:
December 4
8:12 pm • 1.4 ft

Low Tide:
December 31
5:13 am • -0.6 ft

The bellowing of an alligator…
A cypress cottage shaded by live oaks with Spanish moss…
A sprinkling of filé, made from the leaves of the sassafras tree, to thicken the gumbo….
A parish called Plaquemines, the French word for persimmon, which used to grow in abundance there…this is Louisiana.

Europeans long searched for the riches that were undoubtedly hidden among the powerful landscapes shaped by the Mississippi River. Vast deposits of gold, a strategic northwest passage, and the life-giving waters of the fountain of youth were never discovered. The treasures that awaited early Louisiana settlers were far greater than they imagined. The fertile soils of coastal Louisiana produced bountiful harvests. The lakes, bays, and bayous were overflowing with delectable seafood. Marshes, swamps, and upland forest provided game and fur. Later, the earth's hidden secrets were unveiled as wells tapped valuable oil and gas reserves.

Settlers knew the risk. Powerful storms blew in from the Gulf of Mexico, covering low-lying land with water while strong winds strained sturdy homes. The risks were acceptable. At that time, a vast complex of wetlands protected residents by acting as a buffer against high tides and hurricane storm surge. Communities were built on natural ridges formed by the great rivers and bayous and, where necessary, homes were slightly elevated so that flood waters could flow harmlessly beneath them.

As the economy grew, man wrestled with nature for control. Earthen levees severed wetlands from the life-giving flood waters of the Mississippi and canals sliced gaping wounds through fragile marsh. In 70 years, man destroyed what took nature 7000 years to build. Today we face the constant risk of flood from storm surge and high tide, but it hasn't always been this way. When our ancestors settled here, natural defenses protected them. The unwitting results of man's battle with nature have resulted in the collapse of our shielding wetland system. We are not a people who settled where we shouldn't have been; we are a people whose home was sacrificed for the good of the nation. Today we ask the nation to repay that debt.

Debates over the correct course of action continue, but one thing is certain: We must move forward. We need the return of our defensive wetland complex now. The varied techniques that have been covered in this calendar all play a role in the long-term restoration of a sustainable coast. Of these, one has the potential to build meaningful amounts of land in an acceptably short time frame, providing the protection we can't live without. In January, this calendar introduced you to Pipeline Sediment Delivery. Pipeline Sediment Delivery is the harvest and transport of sediment from river bottoms, lakes, bays, and the Gulf of Mexico. Construction using these materials is effective and efficient, and to date, has been the primary tool used to rebuild Louisiana's vanishing wetlands. The most effective of Pipeline Sediment Delivery projects will harvest sources in Mississippi and Atchafalaya rivers, contributing millions of cubic yards of new material into our wetland complexes that were cut off from our rivers nearly a century ago. Funding is limited, and our efforts today must be focused on the most effective strategies that go the furthest in providing the protection we so desperately need.

With warm regards,
The Barataria-Terrebonne National Estuary Program
www.btnep.org

BTNEP
BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

BTNEP thanks
The Bayou Lafourche Fresh Water District and Terrebonne Parish
for their generous contribution in helping to print this calendar.

USGS
science for a changing world

2010 Tidal Graph Calendar

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Cover map and legend by: Jason Byrd

Design and layout by: deGravelles & Associates

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Tide Corrections

To find the best time to fish your favorite locations, find a location that is closest to your area and add or subtract the time from the corresponding daily prediction.

AREA	LOW (Hours:Minutes)	High (Hours:Minutes)
Shell Beach, Lake Borgne	+5:10	+4:01
Chandeleur Lighthouse	+0:38	+0:05
Venice, Grand Pass	+1:28	+1:06
Southwest Pass, Delta	-0:29	-1:29
Empire Jetty	-1:35	-2:03
Bastian Island	+0:22	-0:19
Quatre Bayou Pass	+0:27	+1:18
Independence Island	+2:09	+1:29
Caminada Pass	+1:44	+1:14
Timbalier Island	+0:33	-0:41
Cocodrie, Terrebone Bay	+2:50	+1:10
Wine Island	+1:12	+0:08
Raccoon Point	-0:10	-1:03
Ship Shoal Light	-1:40	-2:54

Charts in this calendar are intended for use solely as a reference guide to Louisiana fishing. It is not intended for navigational use. BTNEP makes no warranty, expressed or implied, with respect to the accuracy or completeness of the information contained in these charts. BTNEP assumes no liability with respect to the use of any information contained in this document.

Fishing Regulations

This is not a comprehensive or official copy of the laws in effect and should not be utilized as such. Size and creel limit regulations are presented for selected species only. These species as well as other species may be managed by seasons, quotas and permits. Different regulations for bass, catfish and crappie may apply within specific areas. **Contact the Louisiana Department of Wildlife and Fisheries (LDWF) for specific information 225-765-2800.**

Freshwater Species

SPECIES	SIZE LIMIT	DAILY LIMIT
Largemouth and Spotted Bass	None	10
(Atchafalaya Basin and Lake Verret-Palourde Area)	14" Minimum (TL)	10
Crappie (Sac-a-lait)	None	50
Striped or Hybrid Striped Bass	None: 2 over 30" (TL)	5 *(Any combination)*
White Bass	None	50
Yellow Bass	None	50
Channel Catfish	25 less than 11" (TL)	100
Blue Catfish	25 less than 12" (TL)	100
Flathead Catfish (Spotted, Yellow or Opelousas)	25 less than 14" (TL)	100
Freshwater Drum (Gaspergou)	25 less than 12" (TL)	No Limit over 12"

100 total of these three species

Saltwater Species

SPECIES	SIZE LIMIT	DAILY LIMIT
Speckled Trout*	12" Minimum (TL)	25
(Cameron & Calcasieu Parish**)	12" Minimum (TL), two over 25"	15
Red Fish*	16" Minimum (TL), one over 27"	5
Black Drum	16" Minimum (TL), one over 27"	5
Southern Flounder	None	10
Amberjack	State & Federal Reg. 30" Min. (FL)	1
Cobia (Ling or Lemon Fish)	State & Federal Reg. 33" Min. (FL)	2
King Mackerel	State & Federal Reg. 24" Min. (FL)	2
Spanish Mackerel	State & Federal Reg. 12" Min. (FL)	15
Red Snapper***	State & Federal Reg. 16" Min. (TL)	2

** For Red Drum (Redfish) and Spotted Seatrout (Speckled Trout): Recreational saltwater anglers may possess a two-day bag limit on land; however, no person shall be in possession of over the daily bag limit in any one day or while fishing on the water, unless that recreational saltwater angler is aboard a trawler engaged in commercial fishing for a consecutive period of longer than 25 hours.*

*** (Cameron & Calcasieu Parishes) Daily take and possession limit of 15 Spotted Seatrout (Speckled Trout), no person shall possess, regardless of where taken, more than two spotted seatrout exceeding 25 total inches in length, which are considered part of the daily bag and possession limit in state and coastal territorial waters South of 1-10 at the Louisiana/Texas border eastward to Hwy's 14 and 27 near Holmwood, south along Hwy. 27 to Hwy. 82 to the Gulf of Mexico.*

**** There are specific regulations for Red Snapper and Shark. Contact the LDWF for more information.*

FORK LENGTH (FL): Tip of snout to fork of tail. TOTAL Length (TL): Tip of snout to tip of tail.

The development of this product was supported by the BTEF, LUMCON, LDWF and LA SeaGrant.

Selected Louisiana Coastal Restoration Projects 2008

USGS science for a changing world

BTNEP BARATARIA-TERREBONNE NATIONAL ESTUARY PROGRAM

Projects Legend

- Section 204: Beneficial Use of Dredge Materials for Ecosystem Restoration
- Section 206 (WRDA96): Aquatic Ecosystem Restoration
- Section 1135: Project Modification for Improvement of the Environment
- CWPPRA Project Boundary
- Louisiana State Project Boundary
- Federal Project Boundary
- Louisiana Coastal Area Ecosystem Restoration Plan Boundary
- LA03a - Nutria Harvest for Wetland Restoration Demonstration and LA03b - Coastwide Nutria Control Program Project Boundaries
- Louisiana Parish Boundary

Water Resources Development Act (WRDA) Projects

Selected Federal Projects

BA-01	Davis Pond Freshwater Diversion and Davis Pond Forced Drainage Area
BS-08	Caernarvon Freshwater Diversion
RAINEY	Rainey Wildlife Management Terracing
FTL-01	Fort Livingston
CIAPFifi	Fifi Island Restortion
BRM-01	Brown Marsh
MAN-01	Manchac Wildlife Management Area Prairie Shoreline Protection

Louisiana Coastal Area Ecosystem Restoration Plan *

Recommended for Conditional or Programmatic Authorization

1. MRGO Environmental Restoration Features
2. Small Diversion at Hope Canal
3. Barataria Basin Barrier Shoreline Restoration
4. Small Bayou Lafourche Reintroduction
5. Medium Diversion with Dedicated Dredging at Myrtle Grove
6. Multi-purpose Operation of Houma Navigation Canal Lock
7. Terrebonne Basin Barrier Shoreline Restoration

Recommended for Approval With Future Congressional Construction Authorization

8. Maintain Land Bridge Between Caillou Lake and Gulf of Mexico
9. Small Diversion at Convent / Blind River
10. Increase Amite River Diversion Canal Influence by Gapping Banks
11. Medium Diversion at White's Ditch
12. Stabilize Gulf Shoreline at Point Au Fer Island
13. Convey Atchafalaya River Water to Northern Terrebone Marshes
14. Modification of Caernarvon Diversion
15. Modification of Davis Pond Diversion

State Projects

BA-03	Naomi Siphon Diversion
BA-04	West Pointe a la Hache Siphon Diversion
BA-05b	Queen Bess
BA-05c	Baie de Chactas
BA-15x1	Lake Salvador Shoreline Protection Extension
BA-16	Bayou Segnette
BA-25b	Mississippi River Reintroduction Into Bayou Lafourche
BD	Brannon Ditch
CAT-01	Cheniere au Tigre
CS-01	Holly Beach
CS-02	Rycade Canal Marsh Management
CS-04a-1	Cameron-Creole Structure Automation
CS-BL	Blind Lake
CS-ST	Sabine Terraces
GIBSB	Grand Isle Bay Side Breakwaters
LA-01a	Dedicated Dredging Program - Lake Salvador
LA-01b	Dedicated Dredging Program - Bayou Dupont
LA-01c	Dedicated Dredging Program - Pass a Loutre
LA-01d	Dedicated Dredging Program - Terrebonne Parish School Board
LA-01e	Dedicated Dredging Program - Grand Bayou Blue
LA-01f	Dedicated Dredging Program - Point au Fer Site
ME-01	Pecan Island Freshwater Introduction
MR-01b	Small Sediment Diversions
NGI	North Grand Isle Breakwaters
NP-05	Elmers Island
PO-01	Violet Siphon Diversion
PO-02c	Bayou Chevee
PO-03	LaBranche Shoreline Stabilization and Canal Closure
PO-03b	LaBranche Shoreline Protection
PO-08	Central Wetlands Pump Outfall
PO-10	Turtle Cove Shore Protection
RI	Raccoon Island Repair
SBG	Spoilbank along the GIWW
SSB	Sabine Shellbank Stabilization
TE-01	Montegut Wetland
TE-02	Falgout Canal Wetland
TE-03	Bayou LaCache Wetland
TE-06	Point au Chien
TE-07b	Lower Petit Caillou
TE-14	Point Farm Refuge Planting
TV-06	Marsh Island Control Structures
TV-11	Freshwater Bayou Bank Protection
TV-13b	Oaks/Avery Structures
TV-4355np1	Quintana Canal/Cypremort Point

Coastal Wetlands Planning, Protection and Restoration Act Projects

AT-02	Atchafalaya Sediment Delivery
AT-03	Big Island Mining
AT-04	Castille Pass Channel Sediment Delivery
BA-02	GIWW (Gulf Intracoastal Waterway) to Clovelly Hydrologic Restoration
BA-03c	Naomi Outfall Management
BA-04c	West Pointe a la Hache Outfall Management
BA-15	Lake Salvador Shore Protection Demonstration
BA-19	Barataria Bay Waterway Wetland Restoration
BA-20	Jonathan Davis Wetland Restoration
BA-23	Barataria Bay Waterway West Side Shoreline Protection
BA-26	Barataria Bay Waterway East Side Shoreline Protection
BA-27	Barataria Basin Landbridge Shoreline Protection, Phases 1 and 2
BA-27c	Barataria Basin Landbridge Shoreline Protection, Phase 3
BA-27d	Barataria Basin Landbridge Shoreline Protection, Phase 4
BA-28	Vegetative Plantings of a Dredged Material Disposal Site on Grand Terre Island
BA-30	East/West Grand Terre Restoration
BA-33	Delta Building Diversion at Myrtle Grove
BA-34	Mississippi River Reintroduction Into Northwestern Barataria Basin
BA-35	Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration
BA-36	Dedicated Dredging on the Barataria Basin Landbridge
BA-37	Little Lake Shoreline Protection/Dedicated Dredging Near Round Lake
BA-38	Barataria Barrier Island Complex Project: Pelican Island and Pass La Mer to Chaland Pass Restoration
BA-39	Mississippi River Sediment Delivery System - Bayou Dupont
BA-40	Riverine Sand Mining/Scofield Island Restoration
BA-41	South Shore of the Pen Shoreline Protection and Marsh Creation
BA-42	Lake Hermitage Marsh Creation
BA-47	West Pointe a la Hache Outfall Management
BA-48	Bayou Dupont Marsh and Ridge Creation
BS-03a	Caernarvon Diversion Outfall Management
BS-10	Delta Building Diversion North of Fort St. Philip
BS-11	Delta Management at Fort St. Philip
BS-12	White Ditch Resurrection and Outfall Management
BS-13	Bayou Lamoque Freshwater Diversion
BS-15	Bohemia Missisippi River Reintroduction
BS-16	Caernarvon Outfall Mangement/Lake Lery Shoreline Restoration
CS-04a	Cameron-Creole Maintenance
CS-09	Brown Lake Hydrologic Restoration
CS-11b	Sweet Lake/Willow Lake Hydrologic Restoration
CS-17	Cameron Creole Plugs
CS-18	Sabine National Wildlife Refuge Erosion Protection
CS-19	West Hackberry Vegetative Planting Demonstration
CS-20	East Mud Lake Marsh Management
CS-21	Highway 384 Hydrologic Restoration
CS-22	Clear Marais Bank Protection
CS-23	Replace Sabine Refuge Water Control Structures at Headquarters Canal, West Cove Canal, and Hog Island Gully
CS-24	Perry Ridge Shore Protection
CS-25	Plowed Terraces Demonstration
CS-27	Black Bayou Hydrologic Restoration
CS-28	Sabine Refuge Marsh Creation, Increment 1
CS-29	Black Bayou Culverts Hydrologic Restoration
CS-30	GIWW - Perry Ridge West Bank Stabilization
CS-31	Holly Beach Sand Management
CS-32	East Sabine Lake Hydrologic Restoration
LA-06	Shoreline Protection Foundation Improvements Demonstration
LA-08	Bio-Engineered Oyster Reef Demo
ME-04	Freshwater Bayou Wetland Protection
ME-09	Cameron Prairie National Wildlife Refuge Shoreline Protection
ME-11	Humble Canal Hydrologic Restoration
ME-13	Freshwater Bayou Bank Stabilization
ME-14	Pecan Island Terracing
ME-16	Freshwater Introduction South of Highway 82
ME-17	Little Pecan Bayou Hydrologic Restoration
ME-18	Rockefeller Refuge Gulf Shoreline Stabilization
ME-19	Grand-White Lakes Landbridge Protection
ME-20	South Grand Chenier Hydrologic Restoration Project
ME-21	Grand Lake Shoreline Protection
ME-22	South White Lake Shoreline Protection
ME-23	South Pecan Island Freshwater Introduction
ME-24	Southwest LA Gulf Shoreline Nourishment and Protection
MR-03	West Bay Sediment Diversion
MR-06	Channel Armor Gap Crevasse
MR-09	Delta Wide Crevasses
MR-10	Dustpan Maintenance Dredging Operations for Marsh Creation in the Mississippi River Delta Demonstration
MR-12	Mississippi River Sediment Trap
MR-13	Benneys Bay Diversion
MR-14	Spanish Pass Diversion
MR-15	Venice Ponds Marsh Creation and Crevasses
PO-06	Fritchie Marsh Restoration
PO-16	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 1
PO-17	Bayou LaBranche Wetland Creation
PO-18	Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 2
PO-19	Mississippi River Gulf Outlet (MRGO) Disposal Area Marsh Protection
PO-22	Bayou Chevee Shoreline Protection
PO-24	Hopedale Hydrologic Restoration
PO-27	Chandeleur Islands Marsh Restoration
PO-29	River Reintroduction into Maurepas Swamp
PO-30	Lake Borgne Shoreline Protection
PO-32	Lake Borgne and MRGO Shoreline Protection
PO-33	Goose Point/Point Platte Marsh Creation
PO-34	Alligator Bend Marsh Restoration and Shoreline Protection
TE-10	Grand Bayou/GIWW Freshwater Diversion
TE-17	Falgout Canal Planting Demonstration
TE-18	Timbalier Island Planting Demonstration
TE-20	Isles Dernieres Restoration East Island
TE-22	Point Au Fer Canal Plugs
TE-23	West Belle Pass Headland Restoration
TE-24	Isles Dernieres Restoration Trinity Island
TE-25	East Timbalier Island Sediment Restoration, Phase 1
TE-26	Lake Chapeau Sediment Input and Hydrologic Restoration, Point Au Fer Island
TE-27	Whiskey Island Restoration
TE-28	Brady Canal Hydrologic Restoration
TE-29	Raccoon Island Breakwaters Demonstration
TE-30	East Timbalier Island Sediment Restoration, Phase 2
TE-32a	North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management
TE-34	Penchant Basin Natural Resources Plan, Increment 1
TE-37	New Cut Dune and Marsh Restoration
TE-39	South Lake De Cade Freshwater Introduction
TE-40	Timbalier Island Dune and Marsh Creation
TE-41	Mandalay Bank Protection Demonstration
TE-42	Move Existing Atchafalaya Water to Central Terrebonne
TE-43	GIWW Bank Restoration of Critical Areas in Terrebonne
TE-44	North Lake Mechant Landbridge Restoration
TE-45	Terrebonne Bay Shore Protection Demonstration
TE-46	West Lake Boudreaux Shoreline Protection and Marsh Creation
TE-47	Ship Shoal: Whiskey West Flank Restoration
TE-48	Raccoon Island Shoreline Protection/Marsh Creation
TE-49	Avoca Island Diversion and Land Building
TE-50	Whiskey Island Back Barrier Marsh Creation
TE-51	Madison Bay Marsh Creation and Terracing
TE-52	West Belle Pass Barrier Headland Restoration
TV-03	Vermilion River Cutoff Bank Protection
TV-04	Cote Blanche Hydrologic Restoration
TV-09	Boston Canal/Vermilion Bay Bank Protection
TV-11b	Freshwater Bayou Bank Stabilization - Belle Isle Canal to Lock
TV-12	Little Vermilion Bay Sediment Trapping
TV-13a	Oaks/Avery Canal Hydrologic Restoration, Increment 1
TV-14	Marsh Island Hydrologic Restoration
TV-15	Sediment Trapping at "The Jaws"
TV-16	Cheniere Au Tigre Sediment Trapping Demonstration
TV-17	Lake Portage Land Bridge
TV-18	Four Mile Canal Terracing and Sediment Trapping
TV-19	Weeks Bay Marsh Creation and Shore Protection/Commercial Canal Freshwater Redirection
TV-20	Bayou Sale Shoreline Protection
TV-21	East Marsh Island Marsh Creation

Selected Projects of the Continuing Authorities Program

Section 206 (WRDA96): Aquatic Ecosystem Restoration Projects

1. City of Mandeville Wetlands Assimilation
2. Buras Marsh Creation
3. Comite River, Blackwater Conservation Area
5. Lake Martin Aquatic Ecological Restoration
6. New Iberia
7. Atchafalaya Basin-Buffalo Cove-Beau Bayou
8. Mille Lake
9. Bayou Duralde
10. False River, Point Coupee
11. Lake Verret Ecosystem Restoration

Section 204: Beneficial Use of Dredge Materials for Ecosystem Restoration Projects

1. MRGO - Breton Island Berm Mile -2 to -3
2. MRGO - Berm Mile -2 to -3 1999 and 2000
3. MRGO - Breton Island Berm Mile 2 to 3.2
4. MRGO - Mile 12 to 14
5. MRGO - Mile 11 to 14
6. Pass a Loutre Sediment Mining
7. Barataria Bay - Mile 24.5 to 31
8. Houma Navigational Canal - Mile 12 to 31
9. Houma Navigational Canal - Bar Channel - Wine Island Extension
10. Atchafalaya River Bar Channel
11. Brown Lake
12. Barataria Bay Waterway, Grand Terre Island
13. Barataria Bay Waterway, Grand Terre Back Bay
14. MRGO, South Jetty Wing Dike
15. Atchafalaya River and Bayous Chene, Boeuf, and Black

Section 1135: Project Modification for Improvement of the Environment

1. GIWW - Plaquemine Lock
2. New River
3. Port Allen Lock
4. Bayou Sorrell Lock
5. Bayou Boeuf
6. Lake Fausse Pointe
7. GIWW - Weeks Bay
8. GIWW - Mile 220-222 West of Harvey Lock
9. Calcasieu River Hydraulic Restoration 1993 and 1996
10. MRGO - Mile 3.0 to -4.0

* Denotes that projects have been proposed but not authorized.

Map produced by:
U.S. Geological Survey
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Image Source:
2000 TM Satellite Imagery

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Louisiana Department of Natural Resources
National Oceanographic and Atmospheric Administration - National Marine Fisheries Service
U.S. Department of Agriculture - Natural Resources Conservation Service
U.S. Army Corps of Engineers - New Orleans District
U.S. Geological Survey

This map represents a select inventory of coastal restoration projects that have been approved by State and Federal agencies as of 2008. It should be noted that some projects as of yet are not constructed and some may never be constructed because of lack of funding or other issues.