Water Marks

Louisiana Coastal Wetlands Planning, Protection and Restoration News

December 2008 Number 39

www.lacoast.gov

House by house, road by road, parish by coastal parish

Do CWPPRA Projects Make a Difference?

Inside:

December 2008
Number 39

WaterMarks is published three times a year by the Louisiana Coastal Wetlands Conservation and Restoration Task Force to communicate news and issues of interest related to the Coastal Wetlands Planning, Protection and Restoration Act of 1990.
This legislation funds wetlands restoration and enhancement projects nationwide, designating approximately $60 million annually for work in Louisiana. The state contributes 15 percent of total project costs.

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ABOUT THIS ISSUE'S COVER . . .
Early in the construction phase of CWPPRA's West Lake Boudreaux Shoreline Protection and Marsh Creation project, rock dikes outline an area to be filled with material dredged from the lake bottom. Once stabilized and vegetated behind the protective rock, the marsh will repulse the advance of open water toward the nearby communities of Dulac and Boudreaux.

Photo: U.S. Fish and Wildlife Service

WATERMARKS
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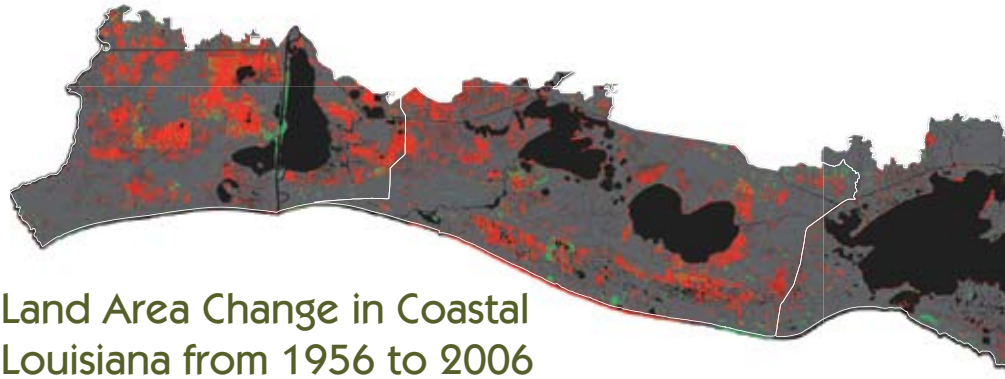

Land Area Change in Coastal Louisiana from 1956 to 2006

- 1956 Land
- 1956 Water
- Fastlands: Agricultural, developed, and upland areas surrounded by levees that are generally considered non-wetlands (LOSR, 2002) and that are excluded from calculations of net land area change.
- 1956 to 2006 Land Loss*: Based on direct comparison of 1956 and 2006 (modified from Barras and others, 2008).
- 1956 to 2006 Land Gain*: Based on direct comparison of 1956 and 2006 (modified from Barras and others, 2008).
- Basin Boundary: These boundaries include the shared area between the hydrologic basins defined by CWPPRA (1993) and the boundary of the LCA study (Barras and others, 2003).

For more information about Louisiana's coastal wetlands and the efforts planned and under way to ensure their survival, check out these sites on the World Wide Web:

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www.lacpra.org
www.btnep.org
www.crcl.org

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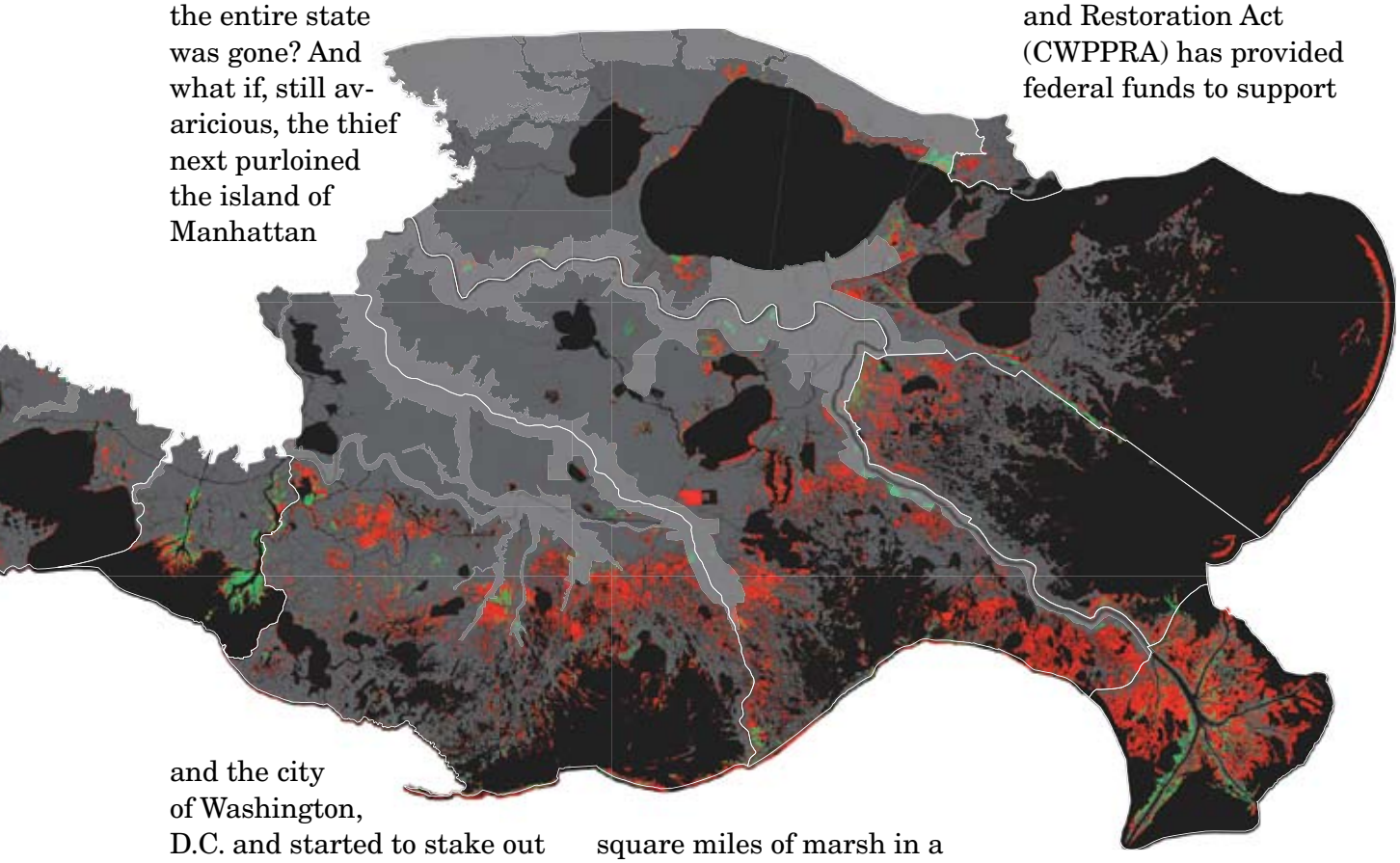
Acre by Acre, CWPPRA Projects Beat Back Coastal Demise

What if, in the 1930s, a thief had begun to steal Delaware? What if, acre by acre, year after year, the thief stashed the land of Delaware out of sight and out of reach until the entire state was gone? And what if, still avaricious, the thief next purloined the island of Manhattan and the city of Washington, D.C. and started to stake out Miami and Des Moines and Carson City?



U.S. Geological Survey

Louisiana has suffered such a thievery of land. During the past century water swept away 1,900 square miles of the state's coastal zone, an area approximately the size of Delaware. And millennium predictions of losing another 500 square miles — more area than Manhattan and these other cities combined — over the next 50 years did not foresee hurricanes Katrina and Rita destroying more than 200 square miles of marsh in a single season.

Louisiana's coast, America's wetlands

Like many a victim of stealthy theft, Louisiana did not detect the extent of its loss until a small decline here, a slight reduction there, coalesced into a crisis the scope of which could not be ignored. And although the address is Louisiana, land loss strikes at interests of national concern.

Since 1990, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) has provided federal funds to support projects combating Louisiana's land loss. To date CWPPRA has constructed 76 projects. Eighteen projects are currently under construction and 47 additional projects are approved and in the design phase.

Although small relative to Louisiana's vast, imperiled landscape, CWPPRA projects protect or restore areas of critical local and national concern. Benefits that CWPPRA projects contribute include

- protection or reclamation of wetland acreage
- protection or creation of estuarine and marine habitats
- natural buffers that mitigate wind, wave and storm surge damage to communities, infrastructure and hurricane protection structures
- protection of oil and gas pipelines and distribution networks
- storm floodwater storage
- filtration and purification of water
- nurseries for fisheries
- wildlife habitat
- data to create a baseline of wetland conditions and to evaluate the efficacy of various approaches to wetland restoration

Saving good earth for the future

"Every piece of land you can save or protect is land you can keep," says Kirby Verret, a longtime activist for coastal issues. Verret's heritage as a Houma Indian gives him a distinctive perspective on Louisiana's environmental problems. "My forefathers understood that if you take care of nature, nature will then take care of you."

The cards may appear stacked against taking care of nature in coastal Louisiana. Long-term forecasts predict hurricanes increasing in size, frequency and severity, posing an unrelenting threat. Because restored wetlands are subject to the same forces of degradation as are natural wetlands, restoration is an ongoing process, not a static state. And the costs to restore and protect the environment seem continually to rise. Demand for services following recent hurricanes outstrips supply, driving prices up. The cost of fuel, significant in water-borne delivery of materials and in construction processes, spirals upward.

But there are people throughout the coastal region who clamor to express their optimism, to declare the value of CWPPRA projects. "If nothing had been done —" Verret says, and lets the sentence hang, knowing that large expanses of open water now adjoin marshes where nothing was done for too long.

Instead Verret points to places like Lake Boudreaux and Bayou Dularge. "CWPPRA projects in these areas are critical to taking care of the land," Verret says. "They reduce erosion, halt saltwater intrusion, and strengthen our marshes. The name of our parish, Terrebonne, means good earth. By conserving our land, we can look ahead to passing along our good earth to future generations." WM

USDA-NRCS

Left: With no protective feature to buffer the force of Hurricane Katrina, this area of marsh broke into small, isolated patches and was overwhelmed by water.

Above: In contrast, marsh behind a rock barrier remained intact and undamaged through both hurricanes Katrina and Rita.

SLCoogle, Koupal Communications

IT'S IN THEIR BACKYARDS

Do CWPPRA Projects Matter? Ask a Coastal Resident

On the map, green dots representing new land are tiny while red ones, indicating land lost to water, spread like a rash across Louisiana's wetlands. The big picture might suggest that restoration projects on the scale of CWPPRA's are insignificant, but on the ground, in daily life along the coast, they can make the difference between flooding and drainage, protection and exposure, hope and despair. In the following four stories, Louisianans discuss why CWPPRA projects are important to their communities.

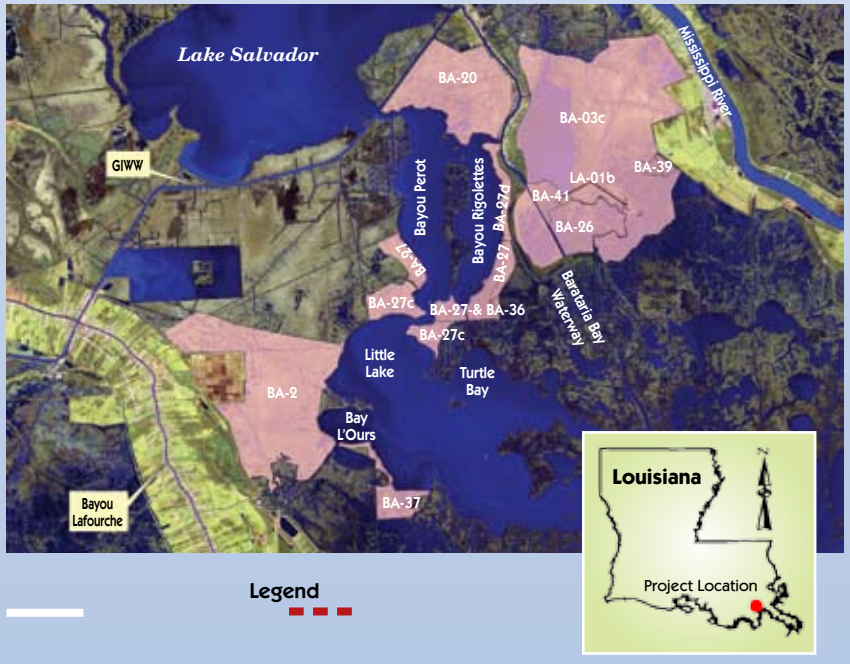
In the initial phase of the Barataria Landbridge project, engineers tested several methods of shoreline protection, including various kinds of rock dikes and concrete pile and panel walls. Construction and maintenance costs, constructability and structural stability supported the selection of concrete walls, a test section of which is shown above, as most suitable for conditions within the project's boundaries.

Too Big a Problem for One Family to Solve

Marietta Greene manages wetland acres that have been in the Webb branch of her family for generations. "Thirty years ago, my father and I watched in despair as shorelines eroded and acre after acre of marsh converted to open water. We knew that without help, all of coastal Louisiana could disappear."

The threats to the Webb family property were much larger than a single landowner could tackle. They were system-wide responses to decades-long manipulations of the natural environment. Singly, each action — such as controlling Mississippi River floodwaters or dredging shipping channels — could be considered beneficial, justifiable, or simply inconsequential, but cumulatively they interrupted processes that have sustained the wetlands for eons. Now hundreds of square miles of Louisiana's coastal region are at risk of vanishing. The scale and complexity of the crisis require the coordination and the resources of both state and national government. Since 1990, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) has funded projects sponsored by state and federal agency partnerships that address local land loss and develop scientific and engineering techniques to restore Louisiana's wetlands.

The Webb property includes the last remaining ridge on a strip of land extending across the Barataria Basin south of Lake Salvador and north of Little Lake. Erosion threatens to wash away this narrow land bridge and precipitate the two lakes merging. To protect the land bridge and prevent the expansion of open water,



U.S. Geological Survey

Barataria Landbridge Shoreline Protection, Phases 1 and 2 (BA-27)

Erosion and interior marsh loss have enlarged the bayous Perot and Rigolettes, increasing the hydrologic connections between the freshwater marshes of the upper Barataria Basin and the brackish marshes and tidal channels of the lower basin. The Barataria Basin Landbridge Protection project (BA-27), constructed in several phases, protects the fragile land mass still existent between Lake Salvador and Little Lake. The top map shows the boundaries of the first two phases of the project.

The center map demonstrates the importance of maintaining the the land bridge to the region's environmental security by halting the expansion of open water. The map shows how other CWPPRA projects combine with BA-27 to address environmental protection and restoration on a landscape scale.

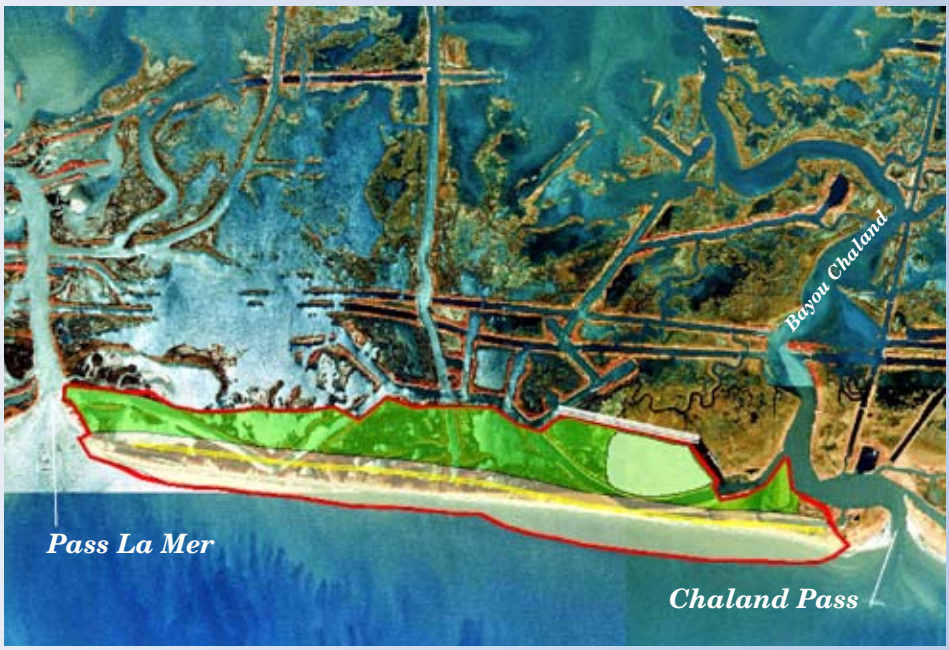
The inset map indicates the location of the landbridge project area in the state of Louisiana.

CWPPRA is sponsoring an ambitious project, Barataria Landbridge (BA-27), to shield 107,500 feet of shoreline from erosion caused by wind, wave action and tidal exchange.

In the first phase of BA-27, the project's federal lead agency, the Natural Resources Conservation Service (NRCS), evaluated several techniques for protecting the shoreline. The NRCS chose panel walls of pre-stressed concrete to use in areas where foundation soils are extremely poor. In areas with better soils, less costly rock dikes are the preferred option.

To date approximately 50,000 feet of protection have been put into place, with the remainder either under construction or awaiting funding. Tested by the 2008 hurricanes Gustav and Ike, the project proved effective in shielding marshes from storm damage. "There was no damage behind the rock structures," says Quin Kinler, project manager for the NRCS, "but where the project is not completed, we saw significant losses to the marsh."

How important is the project to residents nearby in Lafitte and Barataria? "This project is at their doorstep," says Kinler, "protecting a land mass that surely would erode over years. Without it, open water would continue to engulf the marshes and advance toward these communities."



U.S. Geological Survey

Barataria Barrier Island Complex Project, Chaland Headland

Legend:

- Sand fence
- Access canal
- Discharge
- Beach
- Marsh creation
- Project boundary

Appearing to be little more than a thin line of sand separating the Gulf of Mexico from the highly fragmented marshes of Plaquemines Parish, this narrow barrier island is nonetheless essential to protecting the coastal landscape. Basing restoration strategies on barrier islands' resilient natural structure enhances their potential for recovery from storm damage.

Renewal and Retreat a Barrier Island's Natural Cycle

When asked if the Chaland Headland segment of CWPPRA's Barataria barrier island restoration project had helped her parish weather the hurricanes Gustav and Ike, Albertine Kimble declared, "Thank God it was done!"

A program manager in the department of coastal zone management in Plaquemines Parish, Kimble surveyed damage shortly after the second storm had passed in September 2008. "We lost some shoreline, but we expect that," Kimble says. "However, the Chaland Headland project made a tremendous difference in protecting our marshes. Without the project, interior marsh loss would have been much more severe."

Known as the first line of defense against storms, barrier islands blunt the force of waves and wind blowing in from the gulf. "They function as a natural speed bump," says Rachel Sweeney, the Chaland Headland project manager and an ecologist with the National Oceanic and Atmospheric Administration (NOAA)-Fisheries. "Without the islands, the full brunt of a storm's energy batters the interior marshes. And without a buffer of healthy marshes, the Gulf of Mexico laps at the door of our hurricane protection levees."

Part of the Barataria Barrier Island Complex Project: Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38), work at Chaland Headland increased the island's width and average height using materials dredged from a site in the Gulf of Mexico. Sand fencing and vegetative plantings further enhanced and protected the island's dune, swale and

Robert Spears, GIS Manager, Plaquemines Parish Government

Habitat, bounty and beauty — a restored barrier island is not merely a bulwark against hurricanes. Nurturing marine fisheries, providing food and shelter to coastal birds and wildlife, offering a destination to fishermen and eco-tourists, barrier islands are intrinsic to the environmental and cultural life of southern Louisiana.

intertidal marsh habitats. Work was completed in 2007.

No comprehensive assessment of 2008 storm damage has yet been made, but Sweeney says, "Bottom line, the project got hit hard. But we expect these projects to get hit hard. Our modeling and engineering analysis anticipate this kind of storm event."

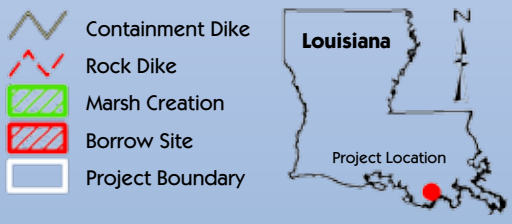
By nature's design these islands morph and migrate, rolling over on themselves as storms push sand from dunes into an island's back bay marshes. "At Chaland Headland, a six-foot vegetated dune was reduced to four feet from overwash," says Sweeney, "but the project is designed to keep sand within the barrier island system. If there's enough sediment in the system, these islands have a chance to recover on their own."

Looking at a battered island with many of its restored features diminished, it may seem odd to declare it a success, but Kimble has no doubt that this CWPPRA project performed as desired, reducing damage to marshes in her parish. And Sweeney has confidence that the project will continue to perform well, re-formed by the storms but enduring. For the marine communities that flourish along its shores and for the human populations that live beyond it, the barrier island is more an essential function than a fixed feature in the coastal environment.

U.S. Geological Survey

West Lake Boudreaux Shoreline Protection and Marsh Creation

Shoreline protection features of this CWPPRA project are intended to halt wave-induced erosion, while newly re-created marsh restores a critical buffer between the lake and the communities built along Bayou Grand Caillou.



Sportsman Sees Marsh in Life-or-death Struggle

For Don Grissom, land loss in Louisiana isn't an abstract swarm of colored dots on a map. A man who's hunted and fished for decades in this sportsman's paradise, he describes his home parish of Terrebonne as fighting for its very survival. "On a daily basis, the marshes are falling apart," he says. "Twenty-five years ago I

U.S. Fish and Wildlife Service

A pipe from the borrow site within the lake delivers sediment to an area bounded by containment dikes. Even without vegetation the newly created marsh provided some protection against the forces of hurricanes Gustav and Ike.

U.S. Fish and Wildlife Service

Wind-driven waves and high water eroded the historical rim of Lake Boudreaux, narrowing its shoreline and exposing the interior marsh lying west of the lake to high-energy waves. The federal sponsor of the West Lake Boudreaux project, the U.S. Fish and Wildlife Service, recognized that restoring the deteriorating marsh would serve the dual purposes of protecting adjacent infrastructure and conserving a huge area of nursery habitat for shrimp, crab and fish.

hunted on good, hard marshland. Today it's submerged under open water. Back then we didn't need to build elevated houses —the marshes knocked down storm surge and kept us from flooding. But now we're getting wave action right up to our levees. Open water pushes at our infrastructure, menacing the businesses that service the oil and gas industry. And when the marshes are gone, estuarine nurseries will collapse, taking all our fishing jobs with them."

A map depicting Lake Boudreaux and the nearby bayou community of Dulac illustrates the geography of the peril that Grissom describes. Erosion has shoved the lake's shoreline westward, threatening to dissolve the marshes and engulf the lagoon lying between

U.S. Fish and Wildlife Service

As vegetation emerges, newly created marsh begins to function as a wetland ecosystem. Roots stabilize the soil and decaying plant material adds organic bulk to the system and feeds myriad organisms that comprise essential links in the wetland food chain.

USDA-NRCS

A mature, self-sustaining marsh flourishes behind a rock barrier. Such barriers will encourage the stabilization of Lake Boudreaux project areas by protecting them from wave-induced erosion.

the town and the lake. The resulting large body of open water would be separated from Dulac only by an old, low, earthen drainage levee.

The goal of CWPPPRA project West Lake Boudreaux Shoreline Protection and Marsh Creation (TE-46) is to create a buffer of healthy marsh, rich in valuable estuarine habitat, between the lake and the levee. The project used two techniques to accomplish this: rock was placed along a stretch of the lake's western shoreline to reduce the erosive force of waves, behind which marsh was built using sediment dredged from the lake's bottom.

The project was completed just before hurricanes Gustav and Ike struck the area. "Right now it just looks like a big pile of mud and dirt with a few plants," says Robert Dubois, senior field biologist for the U.S. Fish and Wildlife Service and project manager. "This kind of intermediate to brackish marsh tends to vegetate on its own via the seedbank contained in lake bottom sediments, plus seeds blown in from surrounding marshes or carried in by birds. In five years the area should be fully vegetated."

But rock and a pile of mud have already demonstrated their worth. Dubois says the project suffered essentially no damage from the storms, whereas marsh in an adjacent area was "chopped into little pieces. We'll probably lose that marsh and within seven years waves will be lapping at the levees," says Dubois. "Without the CWPPRA project, the same thing would be happening to Dulac and the West Lake Boudreaux area."

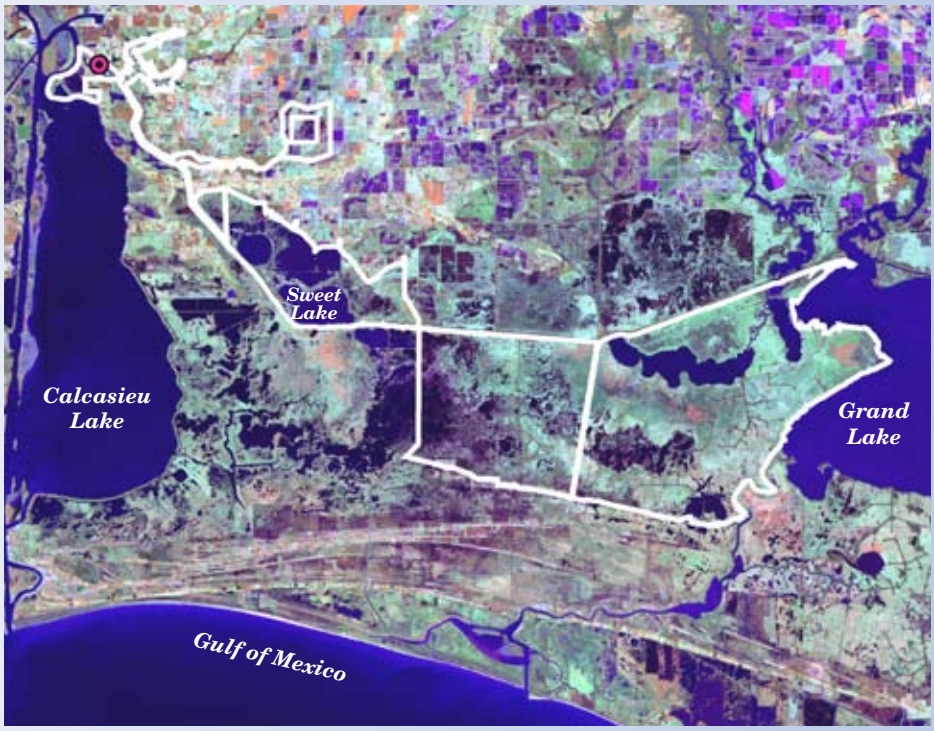
USDA-NRCS

Shown during construction, the gated culverts built under Louisiana Highway 384 restore historic drainage through Black Bayou into Lake Calcasieu. However, the project also provides managers with the option to respond to drought by pinning the gates shut and retaining water in the interior marshes.

Approaching Storm Tests a New Project's Operations

In mid-September 2008, David Richard was monitoring the track of Hurricane Ike as the storm made its way toward his corner of Louisiana. Trained as a wetlands biologist, Richard knew the damage flooding can inflict on marshes, and as a land manager for Stream Properties he had seen the effects of prolonged inundation in the Mermentau Lakes sub-basin. But a new CWPPRA project on the sub-basin's boundary promised to restore a historical drainage pattern that had been blocked for years, and Richard was eager to see how it would perform under the assault of a major storm.

Historically Black Bayou provided westerly drainage



U.S. Geological Survey

Black Bayou Culverts Hydrologic Restoration

The Black Bayou culverts project restores a westerly drainage pattern to a broad swath of interior marsh, including acreage that David Richard manages for Stream Property Management, Inc. Executive vice president of the company, Richard well understands the merits of controlling hydrology to promote healthy wetlands throughout Louisiana's coastal region.

for wetlands lying between Grand Lake in Cameron Parish and Calcasieu Lake. The construction of Louisiana Highway 384, followed by the Gulf Intracoastal Waterway, shut this hydrologic escape route. Floodwaters, trapped for as long as 60 days, degraded marsh vegetation and eroded shorelines in tens of thousands of wetland acres.

Black Bayou Culverts Hydrologic Restoration (CS-29) manages water levels in the region. The project consists of ten 10-foot by 10-foot culverts under Highway 384 that open when water levels to the east rise above the level of Calcasieu Lake. When waters recede, flap gates on the culverts prevent the more highly saline lake waters from passing eastward into the predominately freshwater marshes.

The gates may also be pinned shut during dry spells to retain needed water in the sub-basin. That was the situation when Ike approached. But Richard was not alone in watching forecasts of the storm's path and intensity; expecting as much as 25 inches of rainfall, a team from the project's federal lead agency, the NRCS, decided to open the gates and made certain they were ready to function before the storm hit.

"This team's forethought and diligence ensured the project was operating optimally at the time of extreme need," says Richard. "Not only did opening the culverts start drainage of the sub-basin immediately, it also assisted navigation by reducing the velocity of currents in nearby shipping channels."

Team member Ronnie Faulkner, the project's manager and design engineer, says the culverts provide ecological functions closely equivalent to those of the original Black Bayou. "Typically restoration projects protect marshland and enhance fisheries and wildlife habitat — they conserve what we love so much down here. But restored wetlands also directly benefit our communities by providing resistance to hurricane wave action, preserving the quality of our water supplies and affording recreational opportunities. By speeding the drainage of floodwaters and improving the health of our marshes, this project absolutely makes a difference to the people in the area." WM

MONITORING DELIVERS JUST THE FACTS

Data Perform as Star Witnesses in Project Planning and Evaluation

Cooks know you can't perfect the recipe if you never taste the soup. Similarly, scientists and engineers know they can't improve restoration techniques if they never evaluate the results. By monitoring wetland conditions, scientists can determine how effectively restoration projects are rehabilitating Louisiana's coast and if they are producing unintended, adverse consequences.

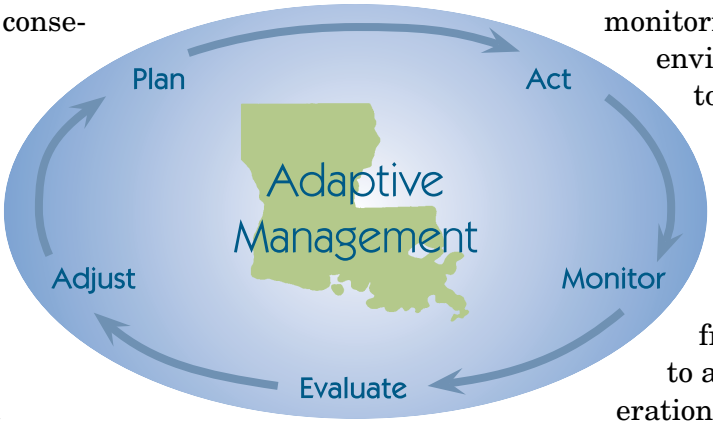
To acquire information about wetland conditions, CWPPRA relies on the Coastwide Reference Monitoring System – Wetlands (CRMS-Wetlands). Developed through a partnership with the Louisiana Department of Natural Resources (LDNR) and the United States Geological Survey (USGS) in 2003, CRMS-Wetlands collects biological, chemical, physical and climatological data from 390 monitoring stations located randomly throughout 3.67 million acres in coastal Louisiana.

Monitoring guides management

LDNR scientists collect data from each monitoring station, where instruments continuously record wetland conditions such as

- water levels
- surface salinity levels
- pore water salinity levels
- sediment elevations
- soil composition and bulk density
- vegetation species and cover

Another essential measure of wetland health is the rate of land loss or gain. The USGS determines this by analyzing aerial photographs that document changes in the ratio of land to water over time.



Through a comparison of data from sites without projects — control sites — to data from within project boundaries, results of restoration practices become evident. Data analysis leads scientists to determine how coastal ecosystems respond to diverse influences such as water flow pulsed through diversions, drainage accelerated through control structures or nutrient-laden sediment sprayed in a thin layer over fragile marsh. Accumulations of data permit scientists to discern landscape trends resulting from restoration projects as well as from natural events, and the geographical reach of the monitoring system allows environmental managers to assess the cumulative effects of multiple coastal zone projects.

Managers use the knowledge derived from monitoring to adjust project operations through a process known as adaptive management. CWPPRA continuously improves project selection, engineering, design and construction by applying the lessons learned from evaluating project performance.

Modeling relies on monitoring data

Data collected through monitoring is also used to develop, validate and refine computer models of environmental change. Models of coastal wetlands provide a

framework for scientists to explore relationships among physical processes, geomorphic features and ecological succession. The more comprehensive the set of data used, the more accurately modeling can depict the influences on and changes to the actual coastal ecosystem.

In a project's design phase, engineers may use models to examine and refine different approaches to achieving the project's goal. Designers can test features through modeling, selecting those that increase a project's efficacy and reduce construction and maintenance expenses.

Models developed during the design process also provide a tool for evaluating a completed project's performance. By adding data collected after the project becomes operational, managers can assess how well the project is achieving its goals and adjust management practices to increase its success. WM

CWPPRA projects withstand 2008 storms

While determining the lasting effects of hurricanes Gustav and Ike on Louisiana's wetlands won't be possible for months, teams have already surveyed CWPPRA projects for storm damage.

"In general, inland projects fared well," says Garrett Broussard, an operations and maintenance engineer with Louisiana's Office of Coastal Protection and Restoration. "About eight suffered damage that we'll need to repair."

But barrier islands were hit harder. "They served their ecological function," Broussard says, "but in the process they lost a lot of sand. If the sand has stayed within the barrier island system, we might be able to find it and use it in rebuilding these islands."

Broussard describes Rita and Ike as similar high-water storms. "After the '05 storms we noted which construction methods best withstood the storms and where damage tended to occur. It was evident that erosion often occurred at the edges of structures. Rock structures with adjacent abutments held up much better than those without abutments, and we adapted our designs accordingly."

Scientists collect data at a remote station of CRMS-Wetlands. Recording periodic measurements of various environmental conditions, the system is developing a bank of information that will guide future restoration practices and wetland management.

Office of Coastal Protection and Restoration

WaterMarks Interview with Jerome Zeringue

Coastal Plan Maximizes Synergy Between Protection and Restoration

Jerome Zeringue is Director of Planning and Programs for the Governor's Office of Coastal Activities

Watermarks: For the second time in three years, Louisiana was hit in 2008 by a pair of major hurricanes. What did we learn from the storms Katrina and Rita that influenced preparations for Gustav and Ike?

Zeringue: Even though Rita and Ike had storm surges nearly identical in height, the aftermath of these storms was considerably different. Katrina and Rita exposed the need to coordinate preparations for and response to storm events among all the federal, state and local agencies responsible for coastal protection and restoration. Consequently, the state of Louisiana created the Office of Coastal Protection and Restoration (OCPR). Using a team approach, OCPR organized the functions and roles of offices and agencies that assist districts and municipalities during storms. Operational just a month or so before Gustav and Ike hit, OCPR was able to communicate, provide assistance and coordinate relief efforts quickly.

Watermarks: How did this make a difference to coastal residents?

Zeringue: When your home or community floods, you want the water out of there as fast as possible. In some areas after Rita, it took eight days to get the first pump up and running. In 2008, our coordinated response greatly expedited relief. Working with local levee districts and other agencies, we utilized available equipment and strived to acquire things we knew we would need — pumps, sand bags, gabion baskets and fuel. In several locations pumps were fully operational within two days after the storms hit.

Watermarks: Destruction from Gustav and Ike was not nearly as catastrophic as from Katrina and Rita. Were there other measures that limited damage in 2008?

Zeringue: There's no doubt we improved our maintenance practices and construction standards based on what we learned from Katrina and Rita. Strengthening New Orleans' levees reduced the threat of flooding in the city. Encouraging adherence to new, stricter codes limited damage to structures rebuilt after Katrina and Rita.

Our environmental restoration projects continued to moderate storm effects. While Gustav and Ike damaged both restoration and protection projects, the harm to our landscape and communities would have been much greater without these projects in place.

Watermarks: Many experts think that levees are largely to blame for the plight of Louisiana's wetlands. Isn't it contradictory to build levees while investing in environmental restoration?

Zeringue: I think there are more opportunities than contradictions — each component has a better chance of success with the other in place. Wetlands

and other natural features reinforce and strengthen protective structures; putting both natural and manmade protection in place can significantly reduce storm surge in vulnerable coastal areas. When we construct projects, we have the capability to minimize adverse impacts to sensitive ecosystems. If protection techniques can offset ecological damage, improve the environmental condition of coastal areas, and protect coastal communities, then I think we can justify building flood control levees.

Watermarks: What is the synergy between environmental restoration and hurricane protection?

Zeringue: Fundamentally, an environment restored to health and functionality diminishes degradation from natural forces. For example, wetlands adjoining levees reduce daily wear from wind, waves and tides. While providing essential habitat for both resident and migratory species, ridges and coastal forests also dampen storm surge. During Gustav and Ike, restored barrier islands protected interior marshes. Barrier islands took a hard hit, but if we had not rehabilitated some of them after 2005, they and the marshes that lie behind them would now be in much worse shape.

We're learning how to use activities serving economic and social purposes to benefit the environment also. For instance, we can use material dredged during maintenance of shipping channels to create wetlands. Or we can operate locks to mitigate saltwater intrusion as well as to accommodate navigation. In addition to providing flood protection, levees can be designed to enhance and sustain wetlands. As we expand and improve our levees, we first look to build on alignments that avoid impounding new areas of wetlands. Then we look to locate reaches where we can reestablish hydrologic exchanges and facilitate delivery of nutrients and sediments to wetlands already enclosed.

As we move forward with the state's master plan for coastal protection and restoration, synergy between the two approaches is critical. To be consistent with the master plan, each new flood control project must minimize its impact on the environment and endeavor to maintain a functional, sustainable ecosystem.

Watermarks: What do you say to the argument that flood protection encourages development in sensitive coastal areas?

Zeringue: It's important to realize that we are providing protection to existing development, to communities and infrastructure critical not only to our region but to the nation. It is not that we are migrating to the coast; the coast is migrating toward us. Many unprotected communities are still miles from the gulf, but Louisianans who were not exposed and vulnerable in the past become more exposed and more vulnerable every day and after every storm. There are communities and critical infrastructure that require a coastal presence, that are essential to the safety and well-being of our region, and we must work aggressively to protect and sustain them. There is no single solution to providing protection; we must develop and implement a full range of options.

Watermarks: With so much need and limited funding, how do you prioritize projects?

Zeringue: It's hard to nail down priorities without specific options to choose from. For hurricane protection we can estimate the worth of assets shielded per mile of levee, but you can't put a value on the people it protects. For restoration we look at the long-term benefit to the ecosystem, but the monetary worth of that is not well defined.

The state's master plan is an excellent tool in terms of a conceptual approach. As funding becomes available, we will continue to implement projects within that framework to achieve the greatest benefits for the state's people and its resources.

Watermarks: If storms increase in intensity and frequency as many climatologists predict, how does that influence our approach to hurricane protection?

Zeringue: No matter what the future trend proves to be, our plan is still to do everything we can, as quickly as we can, to protect critical areas of our coast and to restore sensitive ecosystems. We know we must maximize the synergy between protection and restoration to achieve optimal benefits. But we can achieve a functional, sustainable ecosystem in the coastal region where both natural resources and the human communities survive. **WM**

State, Parish Offices Manage Coastal Programs

Administered through the Louisiana Department of Natural Resources (LDNR), the state's coastal zone management program (CZM) provides assistance to parishes in developing and implementing local coastal programs. Inquiries about coastal issues may be addressed to offices of LDNR and the nineteen coastal parishes listed below.

LDNR Coastal Management Division
Toll-free phone: 1-800-267-4019
General e-mail inquiries:
crdinfo@dnr.state.la.us
http://dnr.louisiana.gov/crm/coastmgt/interagencyaff/lcp/lcp.asp

Assumption Parish
Assumption Parish Police Jury
P.O. Box 520
Napoleonville, LA 70390
Phone: (985) 369-7435
Fax: (985) 369-2972

Calcasieu Parish
Calcasieu Parish Police Jury
P. O. Drawer 3287
Lake Charles, LA 70602
Phone: (337) 721-3600
Fax: (337) 437-3586

Cameron Parish
Cameron Parish Police Jury
P. O. Box 1280
Cameron, LA 70631
Phone: (337) 775-5718, ext. 117
Fax: (337) 775-5389
cppjury@camtel.net

Iberia Parish
Emergency Management
Iberia Parish Government
Courthouse Bldg., Suite B-130
300 Iberia Street
New Iberia, LA 70560-4587
Phone: (337) 369-4427
Fax: (337) 369-9956

Jefferson Parish
Coastal Zone Management Program
4901 Jefferson Highway, Suite E
Jefferson, LA 70121
Phone, (504) 736-6440
Fax, (504) 731-4607
JPEnvironmental@jeffparish.net

Lafourche Parish
Director of Coastal Zone, Energy & Environment
101 West 112th Street
Cut Off, LA 70345
Phone: (985) 632-4666
Fax: (985) 632-8653
czm@lafourchegov.org

Livingston Parish
Planning and Development
P.O. Box 427
Livingston, LA 70754
Phone: (225) 686-3062
Fax: (225) 686-3061

Orleans Parish
CZM Administrator
Local Coastal Program
Office of Environmental Affairs
City of New Orleans
1340 Poydras Street, 10th Floor
New Orleans, LA 70112
Phone: (504) 658-4074
Fax: (504) 565-6589

Plaquemines Parish
Local Coastal Program Manager
138 Edna LaFrante Road
Braithwaite, LA 70040
Office: 504-682-3903
Cell: 504-912-5973
Fax: 504-682-4270

St. Bernard Parish
Coastal Zone Administrator
St. Bernard Parish
8201 W. Judge Perez Dr.
Chalmette, LA 70043
504-278-4200
Fax 504-278-4264

St. Charles Parish
15045 Highway 18
P.O. Box 302
Hahnville, LA 70057
Phone: 985-783-5000
Fax: 985-783-2067

St. James Parish
St. James Parish Council
P. O. Box 106
Convent, LA 70723
Phone: (225) 562-2262
Fax: (225) 562-2279

St. John The Baptist Parish
Chief Administrative Officer
1801 W. Airline Hwy.
LaPlace, LA 70068
Phone: 985-652-9569
Fax: 985-652-4131
chiefadmin@sjbparish.com

St. Martin Parish
Parish President
P. O. Box 9
St. Martinville, LA 70582
Phone: (337) 394-2200
Fax: (337) 394-2203

St. Mary Parish
Planning Director
St. Mary Parish Council
Courthouse Building, 5th Floor
Franklin, LA 70538
Phone: (337) 828-4100, ext. 508
Fax: (337) 828-4092

St. Tammany Parish
Department of Engineering
P.O. Box 628
Covington, LA 70434
Phone: (985) 898-2552
Fax: (985) 898-5205

Tangipahoa Parish
Tangipahoa Parish Engineer
P.O. Box 215
Amite, LA 70422
Phone: (985) 748-3211
Fax: (985) 748-7576

Terrebonne Parish
Department of Coastal Restoration and Preservation
8026 W. Main Street, 7th floor
Houma, Louisiana 70360
Phone: (985) 873-6889
Fax: (985) 873-6795

Vermilion Parish
Vermilion Parish Police Jury
100 North State St., Suite 200
Abbeville, LA 70510
Phone: (337) 898-4300
Fax: (337) 898-4310
vermilionppj@yahoo.com

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