Breaking New Ground in Louisiana:

The 2003 Evaluation Report to the U.S. Congress on the Effectiveness of Coastal Wetlands Planning, Protection and Restoration Act Projects

Submitted by the Louisiana Coastal Wetlands Conservation and Restoration Task Force in accordance with the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), Public Law 101-646, Title III, commonly referred to as the "Breaux Act." This report fulfills the Breaux Act mandate, which requires a report to the U.S. Congress every three years on the effectiveness of Louisiana's coastal wetland restoration projects.

Breaux Act Task Force Member Agencies

- U.S. Army Corps of Engineers Planning, Programs, and Project Management Division: 504-862-2204 or www.mvn.usace.army.mil
- U.S. Department of the Interior: 337-291-3100 or www.fws.gov
- U.S. Department of Agriculture: 318-473-7690 or www.nrcs.usda.gov
- U.S. Department of Commerce: 225-389-0508 or www.noaa.gov
- U.S. Environmental Protection Agency: 225-389-0735 or www.epa.gov.earth1r6/6wq/ecopro/em/cwppra/index.htm
- Louisiana Governor's Office: 225-342-3968 or www.goca.state.la.us

Acknowledgements

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Text written by Amy Clipp.
Layout, design, and illustrations by Lisa Boe.
Map images provided by the USGS National Wetlands Research Center.
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A Letter from Governor Foster

September 26, 2003

Louisiana is quietly being invaded, not by a conventional army, but by the constant encroachment of Gulf waters into our coastal communities. Every half hour, a parcel of land nearly the size of a football field washes away, robbing our state not just of land, but of the resources on which our economy and quality of life depend.

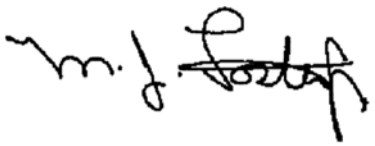
In the face of this emergency, the Breaux Act program has been a steady source of constructive action. Since 1990, the program has provided resources for coastal restoration projects, and it has fostered partnerships among local and state government officials, citizens, and leaders in Washington.

When the Breaux Act program began 13 years ago, the scope of Louisiana's land loss problem was still coming into focus, and we had not yet formulated a plan of action. We have come a long way from those uncertain times. We now know what it will take to sustain our coast, and although many important problems remain to be solved, we continue to apply increasingly sophisticated science and engineering to the problem.

The Breaux Act program has been at the forefront of the state's evolving response to the land loss crisis. The annual allocation of funds has been used to construct restoration projects while consistently improving project quality, effectively learning as we go how best to approach the nuts and bolts of sustaining the coast. In addition, the program's collaborative structure has helped create a constituency for coastal restoration among key interest groups.

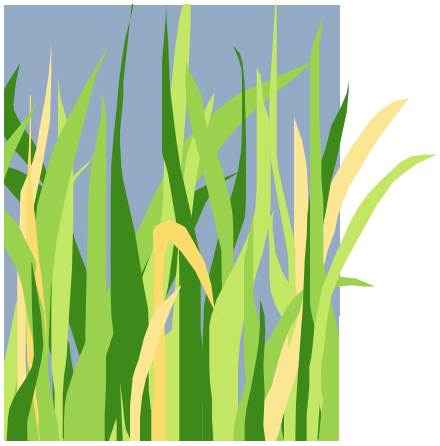
As Louisiana moves toward a greatly expanded coastal restoration program in the coming years, the Breaux Act program's role remains important. We depend on the program to field test innovative restoration techniques. We count on the coalitions developed by the program to guide our restoration activities, and we rely on the program's ability to respond to land loss emergencies that arise throughout south Louisiana. For all of these reasons, the Breaux Act program has been and will continue to be an essential part of our state's fight to sustain our coast for ourselves and future generations.

Sincerely,



M.J. “Mike” Foster, Jr.
Governor of Louisiana

Breaking New Ground



Louisiana's wetlands are truly a wonder of nature; the ecosystem includes nearly 3.4 million acres of swamp and marsh that stretch east of New Orleans to the Texas border. The coastal zone also harbors thousands of animal and plant species, as well as human communities and vast industrial holdings. But for all their bounty, the wetlands are disappearing at a shocking rate. Every 38 minutes, a football field sized parcel of Louisiana's wetlands turns to water. The U.S. Geological Survey estimates that if present trends continue, the state will have lost 2,400 square miles of land between 1932 and 2050 (USGS, 2003). Life is being lived differently every day in south Louisiana because of coastal land loss. Across the region, communities are being threatened, jobs are being lost, and habitats are vanishing.

Although most of the immediate effects of land loss are felt in south Louisiana, the problem impacts the rest of the nation as well. Louisiana's coast is the scene of intense economic activity. The region's ports, inland navigation routes, and oil and gas infrastructure influence the flow of energy and other essential resources throughout the United States. Without the wetlands, all of these assets—and the national security they provide—would be located in the open water of the Gulf of Mexico and at high risk from storms. Halting Louisiana's rate of wetland loss, therefore, is about more than saving a world-renowned ecosystem. It's about preventing a national catastrophe with associated liabilities that could well exceed $100 billion.

In a situation that demands action and innovation, the Louisiana Coastal Wetlands Planning, Protection and Restoration Act, commonly known as the Breaux Act, has served as a catalyst for breaking new ground. The Breaux Act includes several important features: it stipulates that a coalition of five federal agencies work with the state to address the problem, it recognizes that a coast-wide approach is required, and it provides approximately $50 million each year for coastal restoration projects. Together, these measures are designed to support the development of a comprehensive coastal restoration program. Since 1990 when Congress passed the act, the state and its partners have fulfilled this mandate, using the Breaux Act framework as Louisiana's front line response to coastal land loss. Like the two previous Breaux Act reports to Congress published in 1997 and 2000, this document describes results achieved by the program. These results include restoration projects built with designated funds and long-term policy initiatives that implementation of the act has fostered.

Building Coalitions

The Breaux Act established a new template for partnership building on coastal issues. The Departments of the Army, Agriculture, Commerce, and Interior as well as the Environmental Protection Agency, together with the governor's designee comprise the Breaux Act Task Force. Each year, this team is responsible for working with the public to:

- create a prioritized list of coastal restoration projects, and
- allocate the approximately $50 million provided by the Breaux Act each year.

The Task Force meets quarterly, and its committees meet regularly as well. The public is invited to all Breaux Act meetings. Citizens are encouraged to provide comments on issues discussed, including project selection and programmatic matters. The program also conducts teacher workshops, makes presentations at national symposiums, and produces an electronic newsletter, among other outreach initiatives. The program's collaborative structure encourages a blending of perspectives and brings a collective expertise to the task of addressing coastal land loss.

Evolution of the Breaux Act program

1990. U.S. Congress passes the Breaux Act, which dedicates $50 million on average each year for restoration projects in Louisiana.

1993. Breaux Act Task Force submits the state's first comprehensive wetland restoration plan to Congress.

1994. Completion of the first Breaux Act-funded project.

1998. Coast 2050 report completed. The Breaux Act Task Force and State Wetlands Authority jointly adopt the study as their official restoration plan.

1999. Breaux Act Task Force adopts a cash flow management system.

2000. Coordination with Coast 2050 plan used as a criterion for Breaux Act project selection.

2002. The Breaux Act conducts the first cycle of Adaptive Management Review, a structured quality control process for integrating lessons learned into the objectives and designs of new projects.

2002. The Corps of Engineers and state begin work on the Louisiana Coastal Area-Comprehensive Coastwide Ecosystem Restoration Study. Representatives from Breaux Act Task Force member agencies participate on the report writing team.

2003. The Breaux Act program adopts the Coastwide Reference Monitoring System, which uses a coastal ecosystem approach to evaluate project effectiveness.

Building Plans

This stakeholder-based structure also helps the Breaux Act Task Force mobilize large constituencies. For example, the key themes of the America's Wetland: Campaign to Save Coastal Louisiana were honed by interviewing many of the citizens and local government officials affiliated with the Breaux Act program. The Breaux Act's Outreach Committee also provides technical support to the America's Wetland campaign, which is sponsored by the Governor's Office and privately funded.

The Coast 2050 planning initiative is another effort that began with the Breaux Act Task Force. Coast 2050 was designed to build on prior restoration plans while providing a more strategic, ecosystem-wide approach. The Breaux Act Task Force encouraged many groups to participate in the plan's development, including citizens, local government representatives, non-profit representatives, researchers, and agency personnel. In a process that included 65 public meetings, a blueprint was developed for reestablishing a sustainable estuarine system along Louisiana's coast.

The Coast 2050 team divided the coast into four planning regions, offered strategies for restoring the health of each region, and established a preliminary estimate of how much the overall program would cost. The resulting plan called for an integrated restoration effort involving large-scale river diversions, barrier shoreline restoration projects, and other activities estimated to cost approximately $14 billion. The plan

was adopted by the 20 parishes in the coastal system, the State Wetlands Authority, and the Breaux Act Task Force. This unified vision is a direct outgrowth of the technical expertise and partnership building engendered by the Breaux Act.

With the Coast 2050 strategies in hand, the next step is to move toward implementation. The Army Corps of Engineers and the state are now developing the Louisiana Coastal Area-Comprehensive Coastwide Ecosystem Restoration Study (LCA Report), which will provide the scientific and technical analyses needed to more fully describe the Coast 2050 strategies. A request for LCA authorization will be sent to Congress in 2004. If the LCA plan is authorized, it will operate in tandem with existing restoration programs, providing funds for large restoration projects that are beyond the current scope of the Breaux Act.

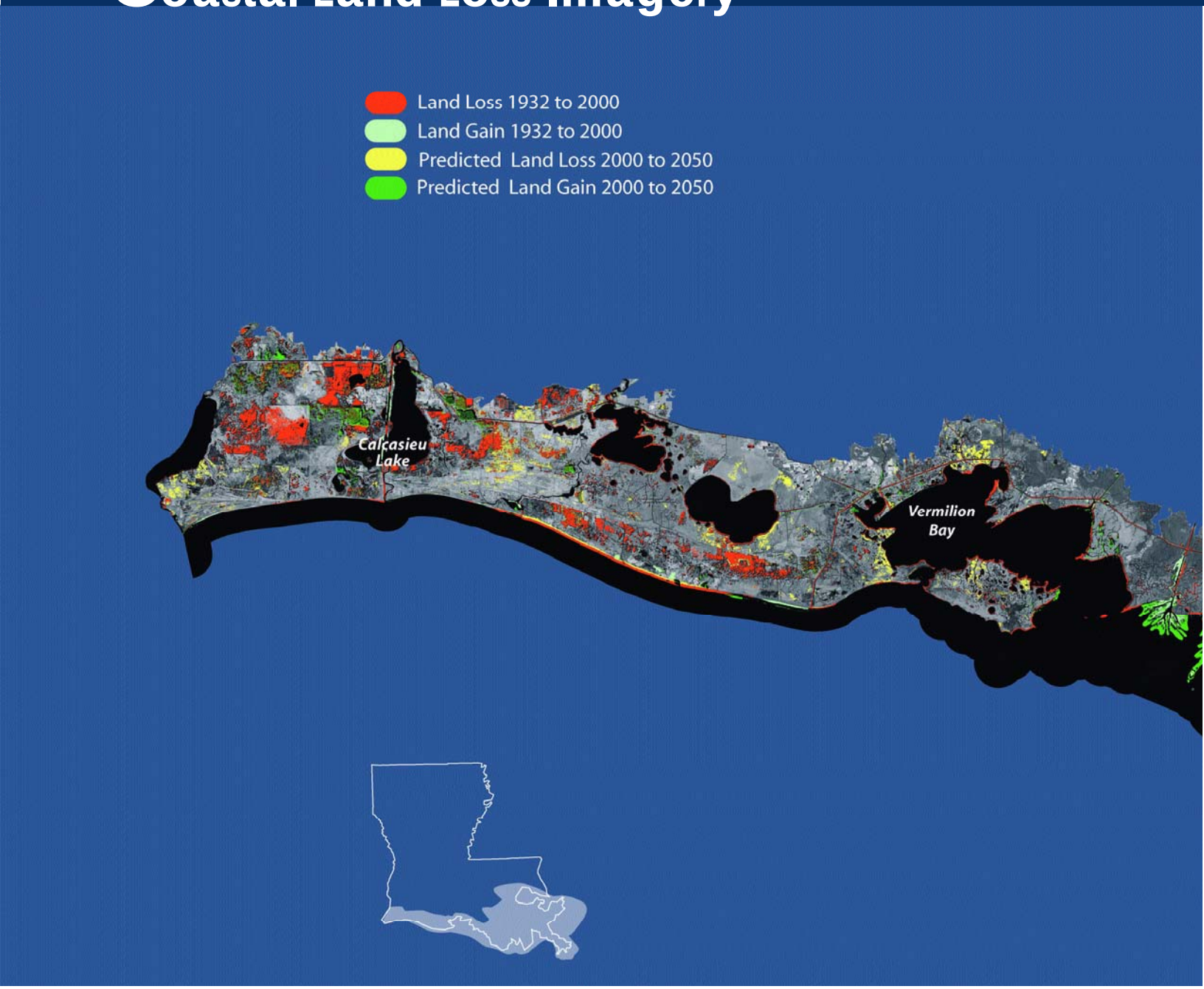
The planning and preliminary engineering performed for Breaux Act projects have provided invaluable support to the teams writing the LCA Report. Adaptive Management Review and the Coastwide Reference Monitoring System—two Breaux Act measures that are designed to enhance project effectiveness—will also supply data to the LCA effort. As a further demonstration of the link between the two programs, representatives from the Breaux Act Task Force member agencies are helping to write the LCA Report. Coordination between the Breaux Act program and the projects built as part of the LCA effort will continue as the two programs evolve. For example, project ideas may be designed and field tested under the Breaux Act program umbrella and subsequently built with appropriations secured through the process initiated by the LCA Report.

Building Projects

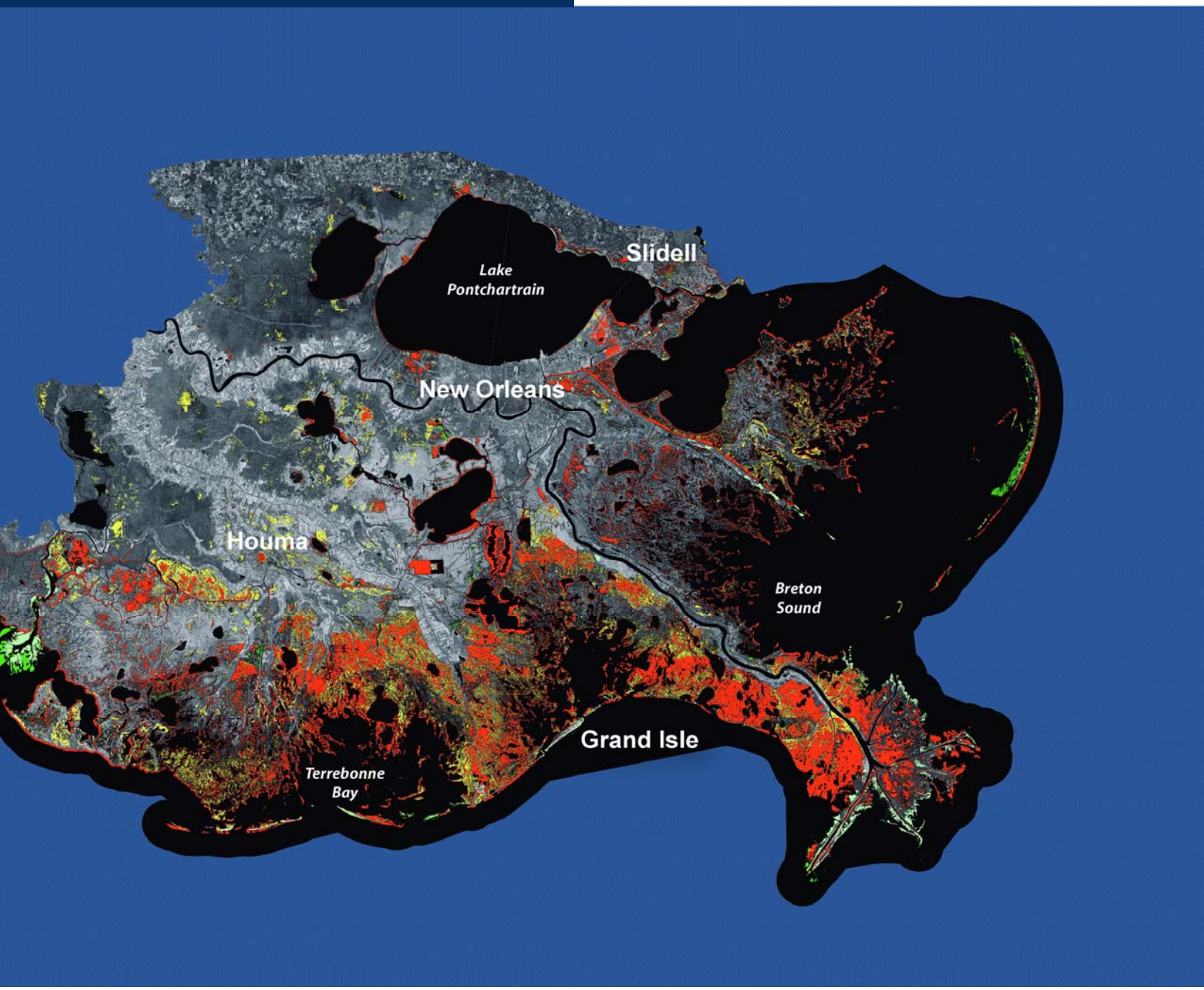
From 1990 through November 2003, the Breaux Act program has constructed 68 projects. These projects will create, restore, or protect approximately 71,000 acres of wetlands. Breaux Act projects are typically built on a smaller scale than the landscape altering river diversions and shoreline restoration efforts called for in the Coast 2050 report. But regardless of size, Breaux Act projects have a vital role to play in Louisiana's restoration program.

In the early 1990s when the state had not yet formulated a comprehensive coastal restoration plan, the Breaux Act represented a stable source of funding that allowed the state to begin building projects and experimenting with innovative restoration techniques. Since the mid-1990s when the first Breaux Act projects were completed, the state has been gathering hands-on experience about which methods work and which do not. This experience provided critical information during the development of the Coast 2050 strategies. Now that the state is moving toward a new phase in the restoration process, the field verification function provided by the Breaux Act projects is no less important. As projects are built using the Coast 2050 blueprint, the state will continue learning how specific strategies must be revised for optimal results.

Coastal Land Loss Imagery



In addition, because project priority lists are developed each year, the Breaux Act program can respond to short-term ecosystem needs and opportunities. This flexibility is especially helpful given the changing nature of the coast. For example, the 2002 hurricane season was particularly hard on many of Louisiana's barrier islands. In the aftermath of the storm season, scientists and engineers from government agencies and academia assessed damage to the barrier islands. In the course of this investigation, various methods were found to improve the durability of several Breaux Act funded projects. These refinements are being integrated into other Breaux Act barrier island projects still in the design phase, thereby insuring that future projects are built using the best available science and engineering.



Although the Breaux Act program does build large projects, it is best known for its ability to respond when a localized area has a land loss emergency that must be addressed. The program's structure allows relatively small projects to be designed and built within two to four years, in most cases. This quick turnaround capability on projects of limited scope will complement the longer timelines of river diversions and other landscape-sized projects now being considered as part of the LCA process. As mentioned above, the Breaux Act program offers an ideal vehicle for fine tuning restoration techniques before they are implemented on a larger scale.

The Crisis Hits Home

"The effects of wetland loss will not be limited to Louisiana. Citizens throughout the nation will see the results as shipments of energy and goods are disrupted and industrial operations are curtailed. Taxpayers will be required to spend billions to rebuild and move infrastructure. For all of these reasons, restoring the coast to a sustainable level is an investment that makes sense—both now and for future generations."

Every year, Louisiana's coast provides billions of dollars in national resources and services—assets that greatly enhance our nation's security and well-being. Because the health of this region so directly affects the daily life of our nation's citizens, it is referred to as "America's Wetland."

Louisiana's Wetlands: A Valuable Resource

Industrial Infrastructure. More than 80% of the nation's offshore oil and gas is produced off Louisiana's coast, and 25% of the nation's foreign and domestic oil comes ashore on Louisiana roads and waterways. The coastal zone also contains the Louisiana Offshore Oil Port; over 43,000 oil and gas wells; two storage sites for the Strategic Petroleum Reserve; and the Henry Hub, one of the nation's major natural gas distribution centers. Louisiana has 3,819 vendors and

equipment suppliers in 165 different communities to service this array of infrastructure. These suppliers received an estimated $2.4 billion in oil and gas related business in 1992 (Waldemar S. Nelson & Company, 2002).

Transportation Infrastructure. Louisiana's coast is a national hub for navigation. Nearly 3,000 miles of deep and shallow-draft channels are located in the wetlands (Waldemar S. Nelson & Company, 2002). Five of the nation's 15 largest ports are located in south Louisiana, and these facilities carry 21% of all waterborne commerce by tonnage in the United States each year (USACE, 2001).

Water Quality. The Mississippi River Basin terminates in Louisiana's coastal zone, bringing with it nutrient rich runoff from 31 states and two Canadian provinces. Today, levees channel most of this runoff into the Gulf of Mexico. Before the levees were built, however, Louisiana's wetlands filtered many of these sediments and nutrients, converting them into biologically useful materials. This purification function has an estimated mean value of $325 per acre per year (Waldemar S. Nelson & Company, 2002).

Fisheries. Each year, Louisiana's commercial and recreational fishing industries contribute $3.5 billion and over 40,000 jobs to the state's economy (Southwick Associates, 1997). Almost one-third of the fish harvested by weight in the lower 48 states comes from Louisiana's coastal zone (USDOC, 2001). The annual economic impact of recreational fishing is approximately $944 million (Southwick Associates, 1997).

Coastal Communities. Over two million people live in Louisiana's coastal zone, and the wetlands are an integral part of life for many residents. The wetlands provide the setting for the region's primary economic activities, such as navigation and oil and gas production. In addition, the cultural impact of the ecosystem can be traced to traditions of music, food, and living off the land that continue to this day. Much of what gives Louisiana its unique heritage finds its roots in the coast.

Storm Protection. Every 2.7 miles of wetlands may absorb an average of one foot of storm surge (USACE, 1963). Louisiana's wetlands thus create a natural buffer zone on which all of the infrastructure and communities located in the coastal zone depend. Using one estimate, the coast's 2.5 million acres of wetlands have annual storm protection values of between $520 million and $2.2 billion (Costanza, Farber, and Maxwell, 1989).

Habitats. Louisiana's wetlands provide habitats for thousands of plant and animal species. The intrinsic value of these lands as a haven for wildlife is felt by all who visit, and as such, the wetlands represent a precious aspect of our nation's natural heritage. In addition, hiking, bird watching, photography, and camping in south Louisiana contribute more than $220 million annually to Louisiana's economy (Coreil, 1994).

An Ecosystem in Peril

The coast's seemingly endless productivity belies its weakened condition. The natural processes that created the wetlands have been altered, and the region is quickly approaching a point of no return. Before the Mississippi River was confined by levees, the river's annual floods deposited vast amounts of sediment across the region. The thick layers of sediment laid down by the river nourished the wetlands and compensated for the natural subsidence to which the land is naturally prone. Today, most of that sediment is channeled directly into the Gulf of Mexico. As a result, when the wetlands sink, there is no regenerative material available to rebuild them. As the land sinks and sea level continues to rise, more saltwater is able to invade coastal areas.

Canals dug throughout the coastal zone intensify the problem. The canals widen dramatically over time, further encouraging the breakup of marsh. Canals cut from north to south create pathways directly from the Gulf into freshwater marshes, allowing saltwater to enter the ecosystem. Canals cut from east to west disrupt the natural hydrology that keeps the wetlands healthy. The end result in either case is further stress on an already endangered ecosystem. The coast loses about 24 square miles of land each year, and Louisiana is projected to lose an additional 500 square miles of land by the year 2050 (Barras et al., 2003).

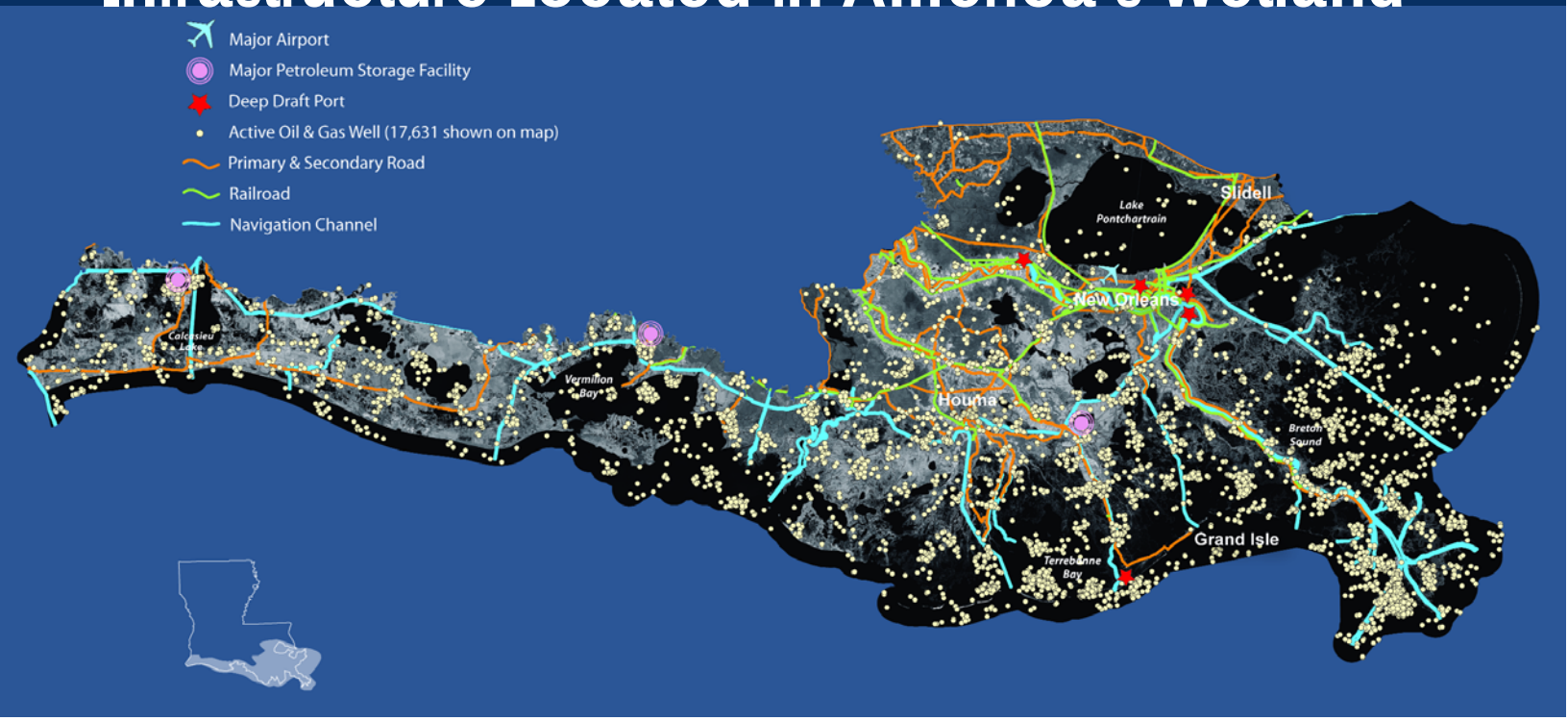
The Price of Land Loss

The loss of this one of a kind habitat would be reason enough to take decisive action. But the effects of continued wetland loss on human communities could very likely be catastrophic.

Without the wetlands to offer protection from flooding and storm surge, Louisiana's fisheries, coastal communities, and infrastructure are at risk. One recent study showed an increase in combined storm surge and wave height of 8 to 10 feet between 1960 and 1990. The study projects that this increase could grow to between 10 and 12 feet between 1990 and 2020 if present trends continue (Stone et al., 2003). The effects of these conditions are already being felt. Oil and gas equipment that was designed for inland conditions is now exposed to open water, and may ultimately have to be abandoned or replaced. Highways, bridges, and navigation channels are also being buffeted by more frequent flooding and higher storm surges. These conditions not only pose immediate monetary costs, they threaten national security and the long-term stability of economic markets.

Homes and businesses in the coastal zone are also in danger. Flood protection levees were designed to work alongside the sheltering wetlands. But if the wetlands continue to wash away, the state's coastal flood protection system will be seriously

Infrastructure Located in America's Wetland



compromised. Fortifying the levee system against storms will require billions of dollars. And even if new levees are built and maintained, the mounting risk of storm damage will limit the availability of basic insurance in south Louisiana.

Water quality has been affected by wetland loss. The Mississippi River's outflow is no longer filtered by swamps and marshes. As a result, the nutrient load pouring into the Gulf of Mexico has increased substantially. This increase has created a "dead zone" of fluctuating size, which has spanned up to 8,500 square miles of Gulf waters in recent years. The nutrient levels in this area are so high that they severely reduce available oxygen, killing fish and other aquatic life.

Wetland loss endangers freshwater supplies as well. Saltwater from the Gulf now creeps further and further inland each year, degrading the quality of water allocated for drinking supplies, agriculture, and other commercial uses.

As these examples illustrate, the consequences of wetland loss have far-reaching effects. Besides the loss of cultures and ecosystems that can never be replaced, a vanishing coast will cripple Louisiana's economy. The vital infrastructure at risk is valued at $90 to 100 billion (Waldemar S. Nelson & Company, 2003). Economic losses from damaged fisheries alone could top $500 million annually (CRCL, 2000). The effects of wetland loss will not be limited to Louisiana. Citizens throughout the nation will see the results as shipments of energy and goods are disrupted and industrial operations are curtailed. Taxpayers will be required to spend billions to rebuild and move infrastructure. For all of these reasons, restoring the coast to a sustainable level is an investment that makes sense—both now and for future generations.

Building a Program That Delivers Results

"All Breaux Act projects operate in a rapidly changing environment. To accommodate both the dynamic nature of the coast and emerging program goals, the Task Force continues to build new levels of flexibility into its evaluation procedures."

Since its creation in 1990, the Breaux Act program has served as a catalyst for Louisiana's coastal restoration efforts.

In the program's first years, projects focused on providing relief to targeted areas along Louisiana's coast. The program continues to allocate a portion of its funds to localized projects, but in recent years, it has also begun to support an ecosystem-wide restoration approach. Balancing these contrasting priorities is the job of the Breaux Act Task Force, which invites the public, local government officials, and other agency partners to take part in a yearly process for deciding how program funds are spent.

How the Breaux Act program Selects Projects

The selection process begins with the nomination of candidate projects at public meetings held each year between January and March. The Breaux Act Task Force committees then assess the proposed project concepts. Several criteria are used for this assessment, including cost, feasibility, and coordination with the Coast 2050 plan.

The projected effectiveness of candidate projects is one of the most important selection criteria. In order to gain a rough estimate of the environmental benefits a proposed project could be expected to provide, the Task Force uses Wetland Value Assessment (WVA) models. By providing a quantitative basis for comparing diverse projects, WVA models have been helpful decision making tools, particularly in the Breaux Act program's early years. In a parallel effort, scientists who designed the WVA models are working with the LCA Report team to more accurately assess wetland benefits gained from restoration activities. When these conceptual models have been refined, the Breaux Act Task Force may integrate them into program decision making.

After the projects have been assessed, those found to be the most beneficial are placed on the Breaux Act priority list for that year. Each selected project is assigned to one of the federal agencies that sit on the Breaux Act Task Force. This lead agency then partners with the local sponsor, the Louisiana Department of Natural Resources (LDNR), to design the project, acquire land rights, and resolve user conflicts. Once these issues have been dealt with, the project is built. Bringing a project from nomination to completed construction typically requires at least two to four years. Some projects are finished more quickly, and some are built in phases over several years.

Ensuring Project Quality

After a project is built, the Task Force must ensure that it is operating efficiently. To meet this need, the LDNR works with the Breaux Act Task Force to monitor all

How Breaux Act Projects Move from Concept to Reality

Step 1: Projects are named as candidates for funding.
Step 2: Breaux Act committees and partners choose annual priority list.
Step 3: Lead agencies are assigned to each priority project.
Step 4: Site analysis, engineering, and design are conducted for each project.
Step 5: Construction and initial monitoring are performed for each project.
Step 6: Completed projects are maintained and monitored for 20 years.

constructed projects. Environmental monitoring usually begins at the project site before construction in order to establish baseline conditions. Over the 20 year monitoring period for each project, the LDNR collects data on hydrography, vegetation, sedimentation, and soil properties.

The Breaux Act program requires evaluations not just of individual project results, but also of the program's ability to restore entire hydrologic basins and ecosystems. In order to meet these requirements, the Breaux Act Task Force formally adopted the Coastwide Reference Monitoring System (CRMS) in August 2003. CRMS is designed to provide a pool of sites to serve as monitoring reference areas. Even more important, the system allows examination of project results at both the watershed level and at smaller, regional levels. By allowing micro and macro analyses, CRMS will support rigorous examinations of how constructed projects create, restore, and protect Louisiana's coastal wetlands.

All Breaux Act projects operate in a rapidly changing environment. To accommodate both the dynamic nature of the coast and emerging program goals, the Task Force continues to build new levels of flexibility into its evaluation procedures. The latest innovation, Adaptive Management Review, involves both a comprehensive review process and mechanisms for revising new project designs and objectives as data about constructed projects are received. The first adaptive management review was conducted in 2002 and resulted in a series of 35 recommendations for improved operations in all aspects of the Breaux Act program. These recommendations are being implemented by the Breaux Act member agencies. Annual status reports will be developed to ensure continued upgrades in project quality.

Occasionally, the conditions at a project site change radically, particular project design goals are found to be unattainable, or project costs increase unexpectedly. When these unforeseen circumstances occur, the Task Force may decide to deauthorize the project and reallocate unused funds. Deauthorized projects provide valuable lessons learned, and are an expected result of the program's emphasis on field testing new restoration techniques.

Other Areas of Innovation

Feasibility Studies. The Breaux Act program has conducted three feasibility studies, each focusing on a different restoration challenge: a barrier shoreline study was completed in 1999, a study examining options for Mississippi River diversions was completed in 2000, and an investigation of the hydrology of the Louisiana Chenier Plain was completed in 2002. Data collected in the three studies helped jumpstart research being undertaken as part of the LCA Report preparation. Other studies from Breaux Act projects, such as the National Marine Fisheries Service Barrier Island Complex initiatives, offer cutting edge information of use to natural resource planners, scientists, and engineers.

Oyster Program. The state, in consultation with fishermen and other interested members of the public, has developed a program to help resolve conflicts between its objectives and citizens holding oyster leases. The program, which went into effect in April 2003, gives the state a mechanism for acquiring active oyster leases in areas that will be affected by Breaux Act projects. The oyster program will help ensure that potential effects on leases are identified early in the project design phase, so that recommendations for compensating lease holders can be proactively developed. The program will operate in tandem with other state initiatives designed to resolve user conflicts that could impede the overall coastal restoration program.

Cash Flow Management System. In 1999, the Breaux Act program revised its procedures for funding projects. Formerly, the total budget for each project was placed in escrow once the project was selected, and funds were drawn down as needed. This approach was intended to provide a dedicated source of capital for individual projects. In practice, however, this procedure encumbered hundreds of millions of dollars—sometimes for projects that were later deauthorized. To ensure both stable funding sources and programmatic flexibility, the Breaux Act program has begun using a cash flow management policy to govern fiscal operations. The new policy, which follows state guidelines for other public works programs, employs a “pay as you go” approach. Cash flow management allocates program funds only when they are needed, thereby encouraging an efficient and targeted use of program dollars, particularly for the initial phases of project design. This, in turn, helps ensure that projects have a solid scientific grounding before they are built.

Building Projects That Restore Wetlands

"Halting Louisiana's rate of wetland loss is about more than saving a world-renowned ecosystem. It's about preventing a national catastrophe with associated liabilities that could well exceed $100 billion."

Since 1990, the Breaux Act has authorized 142 projects and constructed 68, for a total cost of approximately $504 million.

These 142 projects are projected to create, restore, or protect approximately 140,000 acres of coastal wetlands over the next 20 to 30 years. Project size ranges from 9 acres to 36,121 acres, illustrating the diverse objectives and methods being employed by program initiatives.

The Breaux Act Task Force uses the Coast 2050 framework to guide the selection and implementation of restoration projects. The Coast 2050 plan divided south Louisiana

into four regions, according to the unique geology and hydrologic regimes found along the coast. Strategies for sustaining each region were then developed. To be selected for funding, all Breaux Act projects must incorporate at least one of these strategies. When the projects are built and monitored, therefore, they provide valuable information about how well the Coast 2050 strategies actually work on the ground. These lessons learned are then integrated into the planning and design of projects still on the drawing board. In this way, the program helps spur constant improvements in the state's coastal restoration efforts.

Table 1: Projected Results of Breaux Act Initiatives (As of 11/03)

	Breaux Act Projects Authorized	Breaux Act Projects Constructed	Expected Wetland Benefits in Acres* (Authorized Projects)	Total Cost Estimates (Authorized Projects)
Region 1 Basins	**17**	**7**	**11,856**	**$25,475,934**
Pontchartrain	17	7	11,856	25,475,934
Region 2 Basins	**42**	**14**	**66,018**	**$171,267,903**
Breton Sound	6	1	3,542	10,742,032
Mississippi River	9	4	43,046	33,082,303
Barataria	27	9	19,430	127,443,568
Region 3 Basins	**47**	**23**	**20,328**	**$191,813,675**
Terrebonne	32	14	9,296	150,471,719
Atchafalaya	3	2	4,381	11,965,718
Teche/Vermilion	12	7	6,651	29,376,238
Region 4 Basins	**33**	**22**	**26,745**	**$99,246,747**
Mermentau	14	7	6,381	27,369,914
Calcasieu/Sabine	19	15	20,364	71,876,833
Coastwide	**3**	**2**	**14,963**	**$16,233,889**
Total	**142**	**68**	**139,910**	**$504,038,148**

* Expected wetland benefits are defined as the number of wetland acres created, restored, or protected over the 20 year project life.

Protect Shoreline
Keep shoreline in place in critical areas.

Maintain Shoreline Integrity
Let shore roll back, but prevent interior marsh erosion.

Maintain Sabine River Inflow

Maintain Atchafalaya Mudstream
Continue shoreline accretion along Chenier Plain.

Improve Hydrology/Drainage
Lower water levels in swamps. Allow more natural flow of water. Provide flood protection if necessary.

Reduce Sedimentation in Cote Blanche Bays and Vermilion Bay and Maintain as Brackish

Lower Water Levels
Modify flow patterns to tidal marshes to the south.

Move Fresh Water South into Tidal Marshes
Move Atchafalaya waters into tidal marshes. In Chenier Plain, use water from lakes to freshen southern brackish marshes.

Beneficial Use of Dredged Material or Dedicated Dredging
Create marsh in various sites along the coast.

Maximize Land Building in Atchafalaya Delta
Separate navigation from delta. Train lobe toward Fourleague Bay.

Maintain Land Bridges
Preserve the three land bridges to prevent marine forces from moving inland and large lakes from joining.

Coast 2050 Ecosystem Strategies

Small Diversions from Mississippi River (<5,000 cfs)
Allow river water and nutrients to nourish swamps and marshes. Flood protection where needed. Provide outfall management.

Optimize Atchafalaya Flow to West and East
Use Atchafalaya sediments and nutrients to preserve marshes.

Conveyance Channel from Mississippi River to Build Deltas
Build marsh and nourish adjacent wetlands in area of highest land loss.

Solve the Mississippi River Gulf Outlet Problem
Close MRGO when deep-draft container facilities are available on river. In interim, stabilize north bank, purchase oyster leases, create marsh in southern lobes of Lake Borgne.

Delta-building Diversions from Mississippi River (15,000-100,000 cfs)
Build marsh and nourish adjacent marsh. Address oyster issues.

Multi-purpose Control of Navigation Channels
Prevent saline waters from continuing to damage marshes.

Restore/Maintain Barrier Islands, Headlands, Shorelands
Use most cost-effective means to preserve these first lines of defense from storms.

Prevent Loss of Sediments into Deep Gulf
Separate navigation from riverine processes. Build sediment trap and pump out to create marsh.

Region 1: The Pontchartrain Basin

Overview: Region 1 encompasses the New Orleans metro area, which includes Lakes Pontchartrain, Maurepas and Borgne. There are an estimated 576,570 acres of coastal wetlands in this urban estuary. Between 1932 and 1990, 74,800 wetland acres were lost, an average of 1,290 acres per year. Because this region includes an urban center, the area's wetland habitats are particularly vulnerable to human impacts. As a result, the primary challenges in this region center on preserving habitat and maintaining current levels of productivity.

The Coast 2050 plan identified a total of 20 ecosystem restoration strategies for this region.

Table 2: Breaux Act Project Types

Freshwater Diversion. Freshwater is channeled from a nearby river or waterbody into surrounding wetlands. This infusion of water, sediment, and nutrients helps slow saltwater intrusion and promotes the growth of new marsh.

Outfall Management. A variety of techniques are used to regulate the flow of freshwater diversions to ensure that water and sediment reach needed areas. These techniques maximize the benefits of freshwater diversions.

Sediment Diversion. A gap (called a crevasse) is cut into a river levee, allowing river water and sediment to flow into nearby wetlands and mimic natural land-building processes.

Dredged Material/Marsh Creation. Dredged sediment is placed at specified elevations in a deteriorating marsh to encourage plant recolonization.

Shoreline Protection. Eroding shorelines are protected by buttressing the land with rock berms, or by diffusing wave energy in front of the shore using breakwaters and fences.

Sediment and Nutrient Trapping. Brush fences and low land ridges are built to slow water flow and promote sediment accumulation.

Hydrologic Restoration. Natural drainage patterns are restored as much as possible, either on a large scale by gating navigation channels and rebuilding natural ridges, or on a smaller scale by blocking dredged canals and cutting gaps in artificial levees.

Marsh Management. The water level and salinity in a contained marsh area are controlled to promote the regrowth of desired vegetation and wildlife habitat.

Barrier Island Restoration. Several methods are used to stabilize and protect islands, including shoring up dunes with fences and vegetative plantings, rebuilding islands with dredged material, and using breakwaters to protect islands from waves.

Vegetation Planting. Flood and salinity-tolerant marsh plants are established in project areas to hold sediment together and stabilize the soil.

Breaux Act Constructed Projects

These strategies are designed to restore and sustain swamp and marsh as well as protect the integrity of shorelines and critical landforms, such as the Chandeleur Islands.

As of November 2003, the Breaux Act program had authorized 17 projects in Region 1 and constructed 7. Over their 20 year lifetimes, these authorized projects are expected to benefit approximately 11,856 acres of wetlands at a cost of $25,475,934.

Constructed Projects in Region 1 as of 11/03:

- Fritchie Marsh Restoration
- Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 1
- Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 2
- Bayou LaBranche Wetland Creation
- MRGO Disposal Area Marsh Protection
- Bayou Chevee Shoreline Protection
- Chandeleur Islands Marsh Restoration

Examples of Projects Constructed in Region 1:

Bayou Sauvage National Wildlife Refuge Hydrologic Restoration, Phase 2. Completed in 1997 by the U.S. Fish and Wildlife Service, this project is anticipated to benefit approximately 1,280 acres of wetlands. Excess water was removed from the project area to promote the growth of fresh marsh vegetation.

Chandeleur Islands Marsh Restoration. Sponsored by the National Marine Fisheries Service and completed in 2002, this project will help a barrier island recover from the effects of hurricane storm surge. Vegetation plantings established as part of this project are expected to benefit approximately 220 acres of wetlands.

Region 2: Breton Sound, Mississippi River, and Barataria Basins

Overview: This region encompasses the coastal area east of the Mississippi River to Bayou Lafourche and includes 894,700 acres of wetlands. This area has experienced one of the highest rates of land loss in coastal Louisiana, a total of 360,000 acres of wetlands between 1932 and 1990, or 6,207 acres per year. Between 1978 and 1990, the loss rates spiked to an average of 8,960 acres per year. Restoring wetlands and barrier shorelines is thus a critical priority for this region.

The Coast 2050 plan identified a total of 27 ecosystem restoration strategies for this region. In addition to restoring swamp and marsh habitats, these strategies are intended to protect bay, lake, and barrier island shorelines, and maintain critical landforms on the Central Basin Land Bridge.

As of November 2003, the Breaux Act program had authorized 42 projects in Region 2 and constructed 14. Over their 20 year lifetimes, these authorized projects are expected to benefit approximately 66,018 acres of wetlands at a cost of $171,267,903.

Constructed Projects in Region 2 as of 11/03:

- Caernarvon Diversion Outfall Management
- Channel Armor Gap Crevasse
- Delta Wide Crevasses
- GIWW to Clovelly Hydrologic Restoration
- Naomi Outfall Management
- Barataria Bay Waterway Wetland Restoration
- Jonathan Davis Wetland Protection
- Barataria Bay Waterway West Side Shoreline Protection
- Barataria Bay Waterway East Side Shoreline Protection
- Barataria Basin Landbridge Shoreline Protection (Construction Units 1 and 2)
- Vegetative Plantings of a Dredged Material Disposal Site on Grand Terre Island
- West Bay Sediment Diversion
- Dustpan Maintenance Dredging Operations for Marsh Creation in the Mississippi River Delta Demonstration
- Lake Salvador Shore Protection Demonstration

Examples of Projects Constructed in Region 2:

Delta Wide Crevasses. This National Marine Fisheries-sponsored project was completed in 1999 and is designed to encourage the formation of new marsh. The project involves maintaining existing crevasses (openings cut in levees) and maintaining and constructing new crevasses in the Pass-a-Loutre Wildlife Management Area and the Delta National Wildlife Refuge. The project is expected to benefit 2,386 acres of marsh over its 20 year lifetime.

Dustpan Maintenance Dredging Operations (Demonstration Project). The U.S. Army Corps of Engineers is the lead agency for this project, which uses dredged material from the Mississippi River Navigation Channel to create and restore adjacent

marsh. This technique will restore approximately 273 acres of marsh between 2002 and 2005.

Region 3: Terrebonne, Atchafalaya and Teche/Vermilion Basins

Overview: This region includes coastal land between Bayou Lafourche to the east and Freshwater Bayou to the west. The region covers 1,078,800 acres of wetlands. Between 1932 and 1990, a total of 247,650 acres of wetlands were lost, an average of 4,270 acres per year. Between 1978 and 1990, the land loss rates climbed to 6,912 acres per year. Severe shoreline erosion, altered hydrology, and high subsidence rates are the principal causes of this region's land loss.

The Coast 2050 plan identified a total of 18 ecosystem restoration strategies for this region. These strategies are designed to restore and sustain swamp and marsh habitats and protect bay, lake, and barrier shorelines. The strategies also focus on maximizing land building in Atchafalaya Bay, and maintaining brackish conditions in the Vermilion, West Cote Blanche, East Cote Blanche Bay complex while reducing turbidity and sedimentation.

As of November 2003, the Breaux Act program had authorized 47 projects in Region 3 and constructed 23. Over their 20 year lifetimes, these authorized projects are expected to benefit approximately 20,328 acres of wetlands at a cost of $191,813,675.

Constructed Projects in Region 3 as of 11/03:

- Isles Dernieres Restoration East Island
- Point Au Fer Canal Plugs
- West Belle Pass Headland Restoration
- Isles Dernieres Restoration Trinity Island
- East Timbalier Island Sediment Restoration, Phase 1
- East Timbalier Island Sediment Restoration, Phase 2
- Lake Chapeau Sediment Input and Hydrologic Restoration, Point Au Fer Island
- Whiskey Island Restoration
- Brady Canal Hydrologic Restoration
- Atchafalaya Sediment Delivery
- Big Island Mining
- Vermilion River Cutoff Bank Protection
- Cote Blanche Hydrologic Restoration
- Boston Canal/Vermilion Bay Bank Protection
- Little Vermilion Bay Sediment Trapping
- Oaks/Avery Canal Hydrologic Restoration, Increment 1
- Marsh Island Hydrologic Restoration
- Falgout Canal Planting Demonstration
- Timbalier Island Planting Demonstration
- Raccoon Island Breakwaters Demonstration
- Cheniere Au Tigre Sediment Trapping Demonstration
- Thin Mat Floating Marsh Enhancement Demonstration
- Mandalay Bank Protection Demonstration

Examples of Projects Constructed in Region 3:

Cote Blanche Hydrologic Restoration. Completed in 1999, this Natural Resources Conservation Service-sponsored project used weirs to reduce water exchange between the marshes of Cote Blanche and East and West Cote Blanche Bays. Targeted shorelines were also armored. The project is expected to benefit approximately 2,223 acres of wetlands.

Whiskey Island Restoration. The Environmental Protection Agency sponsored this project, which involved dredging sand, building a retaining dune, and planting vegetation. Completed in 1999, this restoration project is expected to benefit 1,239 acres of wetlands on and around a barrier island in the Isles Dernieres chain. Models predicted that the island would have been lost by the year 2007 if no restoration activities had been undertaken.

Region 4: Mermentau and Calcasieu/Sabine Basins

Overview: This region covers the Louisiana Chenier Plain, from Freshwater Bayou in the east to the Louisiana/Texas border in the west. The region covers 768,210 acres of wetlands. Between 1932 and 1990 a total of 226,000 acres of wetlands were lost, an average of 3,897 acres per year. From 1978 to 1990, loss rates averaged 4,288 acres per year. Habitat objectives for this region focus on reducing the salinity of marsh habitats.

Constructed Projects in Region 4 as of 11/03:

- Cameron-Creole Maintenance
- Sweet Lake/Willow Lake Hydrologic Restoration
- Cameron Creole Plugs
- Sabine National Wildlife Refuge Erosion Protection
- West Hackberry Vegetative Planting Demonstration
- East Mud Lake Marsh Management
- Highway 384 Hydrologic Restoration
- Clear Marais Bank Protection
- Replace Sabine Refuge Water Control Structures at Headquarters Canal, West Cove Canal, and Hog Island Gully
- Perry Ridge Shore Protection
- Black Bayou Hydrologic Restoration
- Sabine Refuge Marsh Creation, Increment 1
- GIWW - Perry Ridge West Bank Stabilization
- Holly Beach Sand Management
- Freshwater Bayou Wetland Protection
- Dewitt-Rollover Vegetative Plantings Demonstration (Deauthorized)
- Cameron Prairie National Wildlife Refuge Shoreline Protection
- Humble Canal Hydrologic Restoration
- Freshwater Bayou Bank Stabilization
- Pecan Island Terracing
- Plowed Terraces Demonstration
- Southwest Shore White Lake Demonstration (Deauthorized)

The Coast 2050 plan identified a total of 23 ecosystem restoration strategies for this region. These strategies are designed to restore and sustain wetlands, control

salinity in the Calcasieu/Sabine Basin, protect bay and lake shorelines, restore and maintain barrier shorelines, and maintain critical landforms.

As of November 2003, the Breaux Act program had authorized 33 projects in Region 4 and constructed 22. Over their 20 year lifetimes, these authorized projects are expected to benefit approximately 26,745 acres of wetlands at a cost of $99,246,747.

Examples of Projects Constructed in Region 4:

Sabine Refuge Marsh Creation, Increment 1. Jointly sponsored by the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service, this project involved creating marsh in deteriorated wetlands of the Sabine National Wildlife Refuge. The project used materials that the Army Corps of Engineers has dredged from the nearby Calcasieu Ship Channel during routine channel maintenance. The project was completed in 2002 and is expected to benefit 993 acres of wetlands over its 20 year lifetime.

Gulf Intracoastal Waterway (GIWW) - Perry Ridge West Bank Stabilization. The Natural Resources Conservation Service sponsored this project, which was completed in 2002 and is expected to create, restore, or protect 83 acres of wetlands. The project involved installing rip-rap along the northern bank of the GIWW to protect interior marshes threatened by breaches in the waterway's bank. In addition, 22,952 linear feet of terraces were constructed in shallow open water north of the GIWW to reduce interior marsh erosion.

Conclusion

Louisiana has entered a new era in the effort to sustain its wetlands. The vision expressed in the Coast 2050 report is clear: only a landscape altering restoration program will preserve vital national infrastructure, sustain critical habitats, and protect the communities of over two million south Louisiana residents. In order to implement this vision, the state and its partners are examining options for constructing massive river diversions and barrier shoreline restoration projects. This comprehensive approach to coastal restoration is a first for Louisiana, and it is a product of the coalitions and technical foundation built by 13 years of Breaux Act program activity.

The Breaux Act program also has a crucial role to play as the state brings the Coast 2050 vision to fruition. In addition to serving as an incubator for testing project ideas, the program's collaborative decision making structure fosters ongoing partnerships at the local, state, and federal levels. These partnerships are essential if the state is to fund and construct a multi-billion dollar restoration program.

The Breaux Act program fulfills another important niche as well. Constructing large-scale restoration projects takes time—a decade or more in some cases. In the meantime, the coast will continue to change, and communities throughout the coast will continue to experience land loss emergencies. With its annual project authorization cycle and relatively quick project construction time, the Breaux Act provides a vehicle for responding to acute local wetland restoration needs.

For all of these reasons, the Breaux Act remains an essential element of Louisiana's response to the coastal crisis. The members of the Breaux Act Task Force are committed to continuing the program's tradition of innovation—a tradition focused on securing the state's coast and its future.

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Contacts for Additional Information

Breaux Act Home Page: www.lacoast.gov

Louisiana Department of Natural Resources, Coastal Restoration Division:
P.O. Box 44027, Baton Rouge, LA 70804, 888-459-6107, www.saveLAwetlands.org


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