Effectiveness of Louisiana Coastal Wetland Restoration Projects

Louisiana Coastal Wetlands Conservation and Restoration Task Force
The 2000 Evaluation Report to the U.S. Congress

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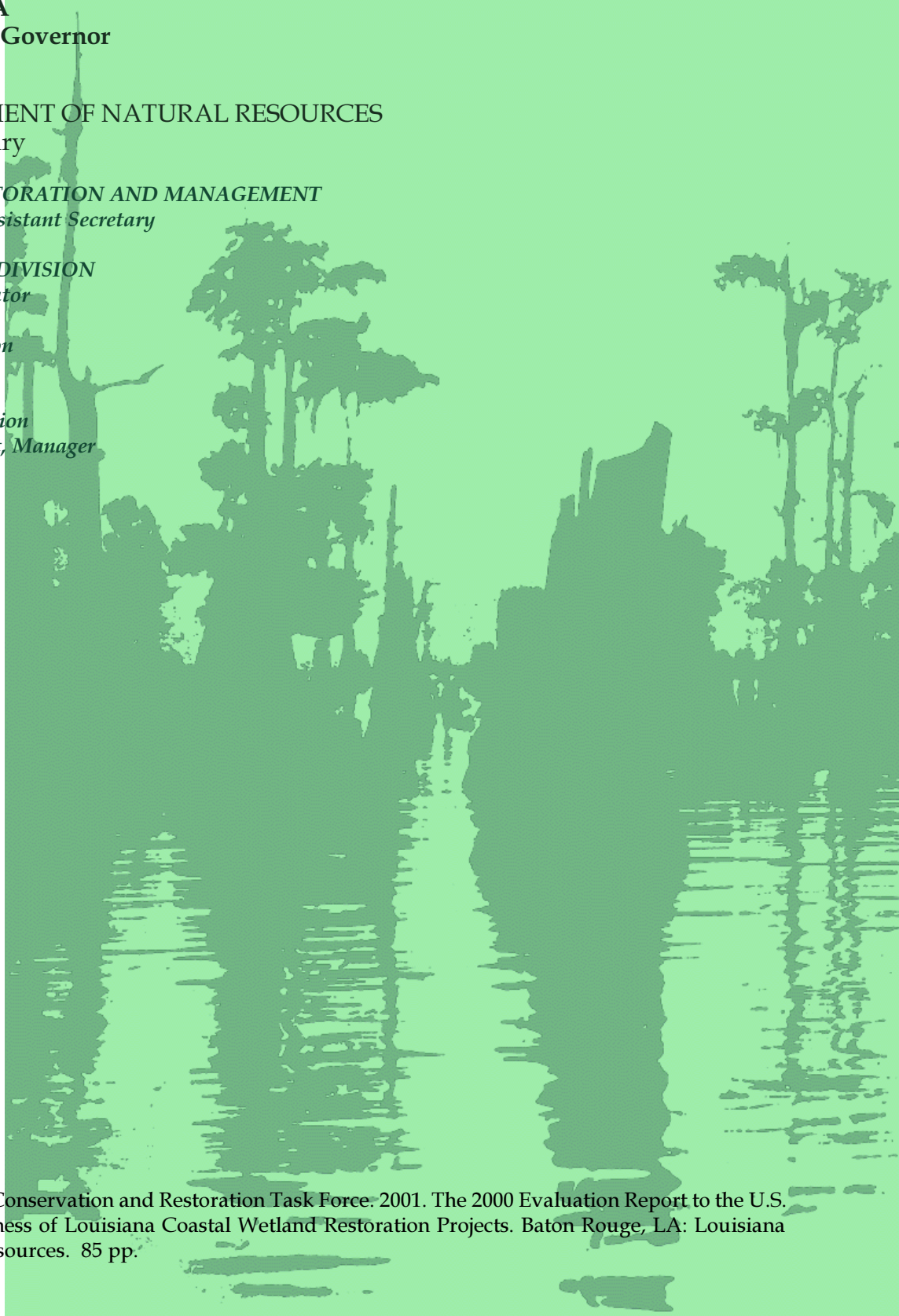

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THE 2000 EVALUATION REPORT

Photo by Rex Caffey

TO THE U.S. CONGRESS ON THE

Effectiveness of Louisiana

Coastal Wetland Restoration Projects

Submitted by the Louisiana Coastal Wetlands Conservation and Restoration Task Force, which consists of the Secretary of the Army, Honorable Louis Caldera, who serves as chairman; the Administrator of the Environmental Protection Agency, Carol M. Browner; the Governor of Louisiana, M.J. "Mike" Foster, Jr.; the Secretary of the Interior, Bruce Babbitt; the Secretary of Agriculture, Dan Glickman; and the Secretary of Commerce, William M. Daley.

in accordance with

THE COASTAL WETLANDS PLANNING, PROTECTION AND RESTORATION ACT
PUBLIC LAW 101-646, TITLE III OR "BREAUX ACT"

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Photo by Rex Caffey

Photo by Rex Caffey

Recreational activities such as fishing, and the shrimping industry are significant to the economy of Louisiana.

Executive Summary

Louisiana has lost over 768,000 acres of coastal wetlands in the past 50 years. It is estimated that over $100 billion in natural resources, including the largest commercial fish and shellfish harvests in the contiguous United States, could be lost over the next 50 years if Louisiana's coastal wetlands continue to disappear. Wetland loss in Louisiana has been attributed to a combination of natural and human-induced causes primarily resulting from alterations in hydrology; these alterations lead to changes in salinity and soil inundation characteristics. Subsidence, sea-level rise, shoreline erosion, freshwater and sediment deprivation, saltwater intrusion, the dredging of oil and gas canals, navigation channels, and nutria herbivory are all contributors to wetland loss in coastal Louisiana. The protection that these wetlands provide to coastal towns and cities, such as New Orleans, is critical to minimize loss of life and property from tropical storms and hurricanes. The infrastructure that these wetlands support is critical to the nation for the continued transport of over 16% of the nation's foreign waterborne commerce, the largest tonnage of any ports in the world, and logistical support to 75% of the deep water oil and gas drilling prospects in the Gulf of Mexico.

Beginning in 1990, this loss was federally addressed by the Coastal Wetlands Planning, Protection and Restoration Act (PL 101-646; CWPPRA). The Act is commonly called the "Breaux Act," referring to its major author U.S. Senator John Breaux of Louisiana. Since the Act was passed, tremendous advances have been made in the understanding of wetland loss as well as what needs to be done to stop it and sustain the current level of coastal wetland resources. The Breaux Act has been a catalyst and a major contributor to this effort and has been instrumental in establishing partnerships between federal, state, and local governments, academia, and private interests to meet coastal restoration objectives in Louisiana. This report serves as a status report and is the second such official report on the coastal restoration efforts in Louisiana resulting from the enactment of the Breaux Act.

In total, 91 Breaux Act projects were authorized for Breaux Act funding through the first eight annual priority project lists. Additionally, 19 projects (17 full-scale, and 2 demonstration projects) were authorized on the ninth list in January 2000 for construction funding consideration after preliminary feasibility studies are complete. As of April 2000, 36 projects were constructed and are in the monitoring, operation, and maintenance phase. The remaining projects are in various phases of design and construction.

These restoration projects were selected to address restoration objectives identified within each of the nine hydrologic basins in coastal Louisiana. As the Breaux Act has evolved, these basins have been combined into four regions, and the restoration objectives have been

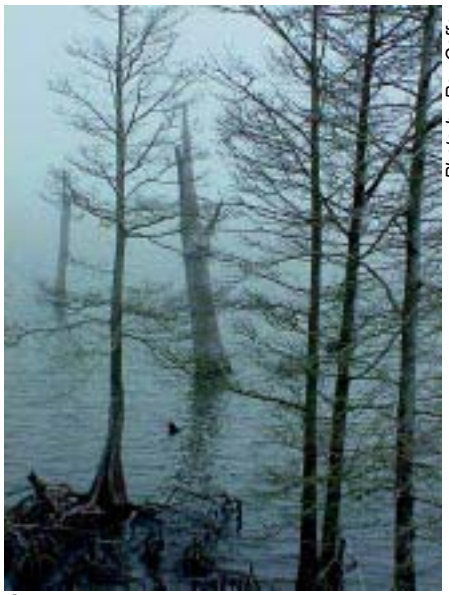


Photo by Rex Caffey

A cypress swamp.

incorporated into regional ecosystem management strategies. This evolution began with the Breaux Act-funded Coast 2050 Initiative, which aligned efforts of the Breaux Act with other restoration efforts in Louisiana to develop a unified plan with the goal of establishing a sustainable coastal wetland ecosystem in Louisiana.

The Coast 2050 Ecosystem Management Plan (hereafter Coast 2050 Plan) was a cooperative effort between the Louisiana Coastal Wetlands Conservation and Restoration (Breaux Act) Task Force, Louisiana's State Wetlands Conservation and Restoration Authority, local governments, academia, and public and private participants, and it has been unanimously supported by all 20 coastal parishes in Louisiana. This plan is providing guidance for the implementation of future restoration efforts in Louisiana with a common vision of the long-term needs to reach a sustainable state to support existing resources well into the 21st century.

Photo by LDNR

A Louisiana bayou.

Without restoration efforts, Louisiana is projected to lose nearly 515,000 acres of marsh over the next 50 years. The Breaux Act projects authorized on the first eight priority lists are anticipated to create, restore, or protect about 70,000 acres of marsh during their 20-year life spans, at a total cost of nearly $320 million. When combined with the Water Resources Development Act's (WRDA) Caernarvon and Davis Pond Freshwater Diversion projects, 23% of the projected 50-year marsh loss (120,000 acres) may be prevented. The ecosystem management strategies outlined in the Coast 2050 Plan carry a price tag of nearly $14 billion in current dollars over the next 30 years. However, the benefits that Louisiana's wetlands provide to the nation through energy resources, recreation, industry, and local infrastructure is more than $100 billion, a sizeable return for the cost of implementing these strategies (LCWCRTF 1993).

It is therefore critical that the ecosystem management strategies outlined by the Coast 2050 Plan be implemented in conjunction with the current smaller-scale Breaux Act projects and with state, federal, and local cooperation. The Breaux Act has been a catalyst for the coastal restoration effort and will continue as the leader for coastal restoration efforts by ensuring that future endeavors in Louisiana continue to address immediate needs and also focus on long-term goals to preserve and protect the nationally significant resources that are Louisiana's coastal wetlands. Only through an integrated, unified effort can this national treasure be sustained.

Photo by Jessica Wallace

A Louisiana coastal marsh.

Photo by Rex Caffey

Erosion takes its toll on shorelines.

Photo by Rex Carney

*The spotted seatrout (*Cynoscion nebulosus*), which is locally known as speckled trout, is just one species of fish that depends on wetlands.*

I–Introduction

In the early 20th century, Louisiana's coastal wetlands were renowned for their bountiful resources, from fish and shellfish, to waterfowl and furbearers. Countless communities supported themselves on these harvests. Louisianians built roads and levees to protect their homes from seasonal flooding, and they were encouraged to drain and levee areas for agriculture in an attempt to live and work in these wet areas. In the mid-1900's, oil and natural gas reserves discovered beneath the wetlands were exploited, making coastal Louisiana even more valuable not only to the local residents, but also to the entire nation.

In the effort to harvest from the coastal wetlands, human activity has dramatically altered the landscape. These changes together with natural geologic, hydrologic, and climatic processes, such as subsidence, sea-level rise, and storms, have resulted in massive losses of Louisiana's coastal wetlands. Louisiana accounts for 80% of the coastal marsh loss in the continental United States (figure 1.1; LCWCRTF 1993). Additionally, Louisiana has 44% of the U.S. coastline along the Gulf of Mexico (figure 1.2) and ranks third (behind Alaska and Florida) for miles of coastline in the entire United States (NOAA 1975). Many national resources are linked to Louisiana's coastal wetlands, making the problem of vital importance to the nation.

Enacted and signed into law by President George Bush on November 29, 1990, the Coastal Wetlands Planning, Protection and Restoration Act (Public Law 101-646, Title III–CWPPRA) provides federal funding for coastal restoration projects. The Act is commonly called "The Breaux Act," referring to its major author, U.S. Senator John Breaux of Louisiana. The Act directs a task force consisting of representatives of five federal agencies—U.S. Department of the Army, U.S. Department of the Interior (USDOI), U.S. Department of Agriculture (USDA), U.S. Department of Commerce (USDOC), and U.S. Environmental Protection Agency—and the state of Louisiana to develop a "comprehensive approach to restore and prevent the loss of coastal wetlands in Louisiana" (section 303b, subsection 2). Though it was not the first legislation to recognize the importance of coastal wetlands and the potential consequences of losing these valuable resources, the Breaux Act is unprecedented in its role of developing partnerships among local, state, and federal entities.

The first several project lists authorized for Breaux Act funding were small-scale projects originally proposed in the state's Coastal Wetlands Conservation and Restoration Plan and were designed to address local problems. As we have learned more about why some projects have worked and why others have not, the Breaux Act has evolved to recognize the importance of larger, ecosystem-level restoration activities. However, a need still exists for critical smaller scale projects to address localized problems. The Coast 2050 Initiative that started in May 1997 solicited the public, industries, local governments, and academia to find out at the grass-roots level what resources are important in terms of sustainability and what coastal Louisiana needs in terms of ecosystem management to sustain these resources into the mid-21st century.

Since the original authorization of the Breaux Act, 110 projects of various size and scope have been selected that address a myriad of land-loss problems. Some of these projects are quick-stop projects to halt continued erosion in selected areas (such as shoreline erosion along navigation canals). Some of the projects are aimed at repairing and restoring hydrology in areas where altered water flow patterns

Web-users please NOTE: the Figure 1.1 map, which in the published version spanned across pages 2 and 3, has been rescaled and repositioned from the original published version to make the files easier to access.

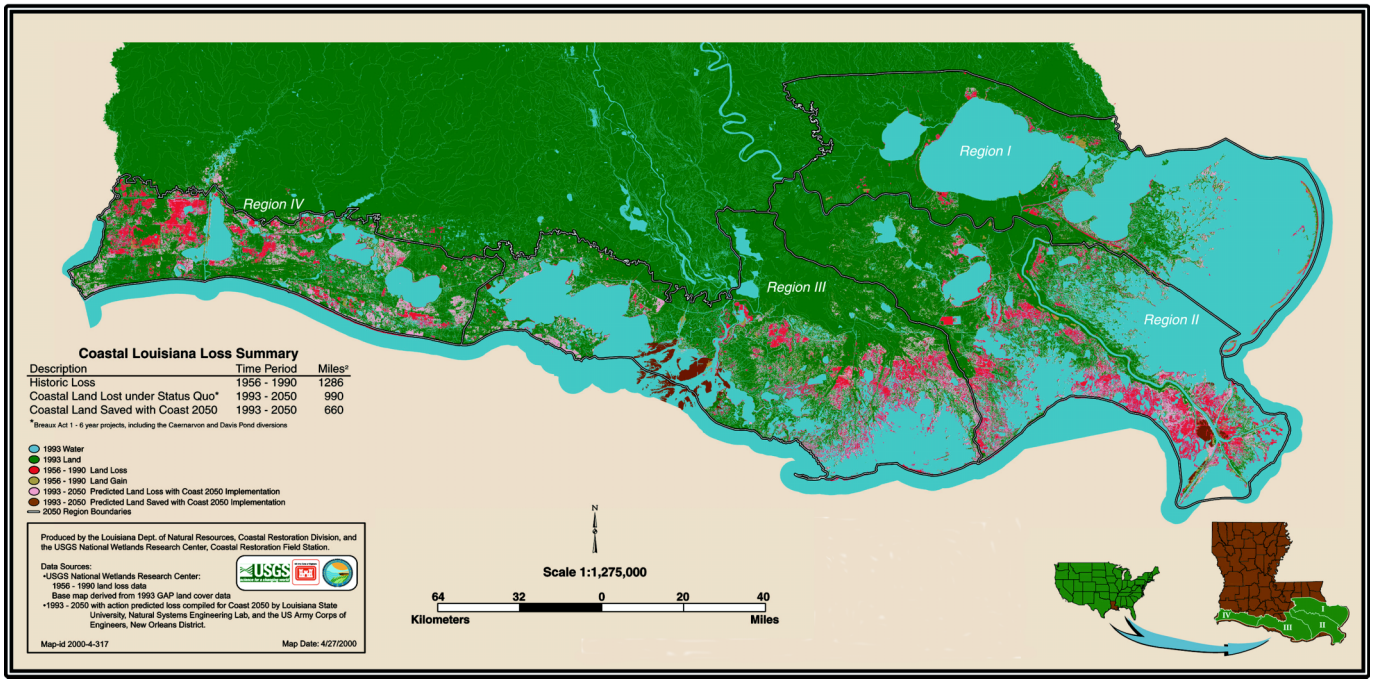


Figure 1.1 *Marsh loss in coastal Louisiana from 1956 to 1990 and projected marsh loss through the year 2050 with Breaux Act (priority project lists 1-6) and Water Resources Development Act's Caernarvon and Davis Pond Freshwater Diversion projects.*

have resulted in increased salinity and water level fluctuation. Still other projects were selected to actually rebuild wetlands in open water areas where marshes once stood. These projects address various problems at various scales, but they are all directed at obtaining a sustainable coastal wetland ecosystem for the 20 year life of the project as identified by the Breaux Act.

Individual restoration projects are merely pieces to the puzzle that must all fit together if coastal Louisiana is to survive. The latest vision initiated by the Breaux Act is "Coast 2050: Toward a Sustainable Coastal Louisiana" (hereafter Coast 2050 Plan). This effort refocused the restoration efforts toward larger, ecosystem-level restoration activities. The projects constructed to date, implemented as part of the original CWPPRA restoration plan, also fit into the more encompassing ecosystem-level strategy of the Coast 2050 Plan and have illustrated our ability to reverse some wetland loss and protect fragile areas on a small scale. We are learning more each day about the interactions of large-scale processes such as subsidence, water level fluctuations, salinity, and other parameters that dictate the condition of wetlands. We are learning how these projects can have collective and synergistic effects on a hydrologic basin or ecosystem level. We are moving towards implementing future projects with this new knowledge in mind, which will facilitate and further enhance our abilities to significantly reverse wetland loss in Louisiana.

The Breaux Act restoration projects on the first eight priority

project lists and the WRDA freshwater diversions at Davis Pond and Caernarvon are anticipated to create, restore, or protect about 120,000 acres of marsh over the next 50 years. It is estimated that even with this level of effort, Louisiana will still lose 395,000 acres of marsh and over 230,000 acres of swamp by the year 2050 (LCWCRTF and WCRA 1998). The Coast 2050 Plan estimates that it will take large-scale, ecosystem-level efforts with a price tag of nearly $14 billion in current dollars over the next 30 years to return coastal Louisiana to a sustainable condition. While this price may sound like a high one to pay, it is eclipsed by the benefits that Louisiana's wetlands provide, estimated well over $100 billion, to local and national economies, infrastructure, fisheries, wildlife, and oil and gas revenues that would be felt by Louisiana and the nation if coastal wetlands continue to disappear (LCWRTF 1993). As knowledge and experience in coastal wetland restoration continue to improve, so does the ability to address these wetland losses.

Web-users please NOTE: the Figure 1.1 map, which in the published version spanned across pages 2 and 3, has been rescaled and repositioned from the original published version to make the files easier to access.

Photo by Paul Coreil

*Waterfowl such as this wood duck (*Aix sponsa*) rely on wetlands for feeding and resting during migration.*

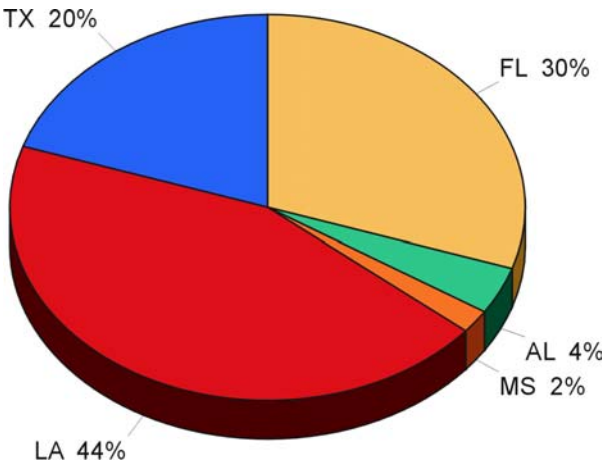


Figure 1.2 *Percent of U.S. shoreline bordering the Gulf of Mexico by state. (NOAA 1975).*

Photo by Rex Caffey

*Extremely rare diamondback terrapin (*Malaclemys terrapin*).*

Photo by Louisiana Department of Tourism

Parades at Mardi Gras are world famous. Millions of tourists from around the world come to participate in Louisiana's spectacular festivals.

II–Louisiana Coastal Wetland Functions and Values

Louisiana's economy, coastal communities, and culture all developed from and are dependent on the state's unique coastal wetlands for survival. Healthy wetlands renew and replenish living resources like fish and wildlife and also have direct impacts on daily life, culture, and the economy of the people living in south Louisiana. Commercial fisheries, fur harvest, outdoor recreation, and ecotourism generate billions of dollars every year. Billions more are invested in communities and infrastructure along the coast. Homes, highways, bridges, pipelines, and navigable waterways are built on and through wetlands and depend on those wetlands for protection from storms, floods, and encroaching seas. The industry and infrastructure in Louisiana's coastal zone are of critical importance to the nation. Pipelines originating in Louisiana's coast supply 30% of the nation's refining capacity (CRCL 1999). Louisiana is second only to Alaska in the amount and value of commercial fisheries landings (USDOC 1999). Four of the 10 largest ports in the nation are in Louisiana (USACE 1998). Based on Costanza et al. (1997), the economic value of Louisiana's coastal wetlands is about $17.9 billion per year in terms of resources that the wetlands provide.

Less tangible are the aesthetic and cultural values of Louisiana's coast. Flocks of ibises, herons, and egrets fish in the shallow waters of marshes and swamps. Bald eagles nest in the tops of cypress trees. The Louisiana black bear roams coastal forests adjacent to the Atchafalaya basin. Coastal wetlands are at the core of historic Acadian, Creole, and other cultures. Today, Louisiana's coastal wetlands support diverse populations represented by cultures from around the world. The lifestyles of many coastal residents are centered around the use of wetland resources, and the lifestyles have been preserved through time partly because of the quantity and quality of Louisiana's coastal wetlands. The loss of Louisiana's coastal wetlands results in the loss of the valuable economic, environmental, and cultural functions they serve.

Living Resources

The commercial fishing industry is of national economic significance. Greater than 1.1 billion pounds of fish and shellfish, nearly twice as much as any other state in the conterminous United States, are harvested annually (USDOC 1999) (figure 2.1). In 1998, Louisiana's fisheries harvest, including shrimp, crabs, crawfish, and oysters, had a dockside value of $292 million (USDOC 1999). Coastal wetlands provide valuable spawning, feeding, and/or nursery grounds for 75% of Louisiana's commercially harvested coastal fish and shellfish species (Smith 1993).

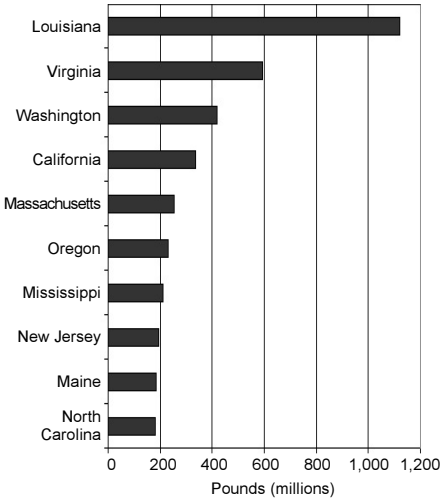


Figure 2.1 *Commercial fishery landings for the top 10 states of the conterminous United States (USDOC 1999).*

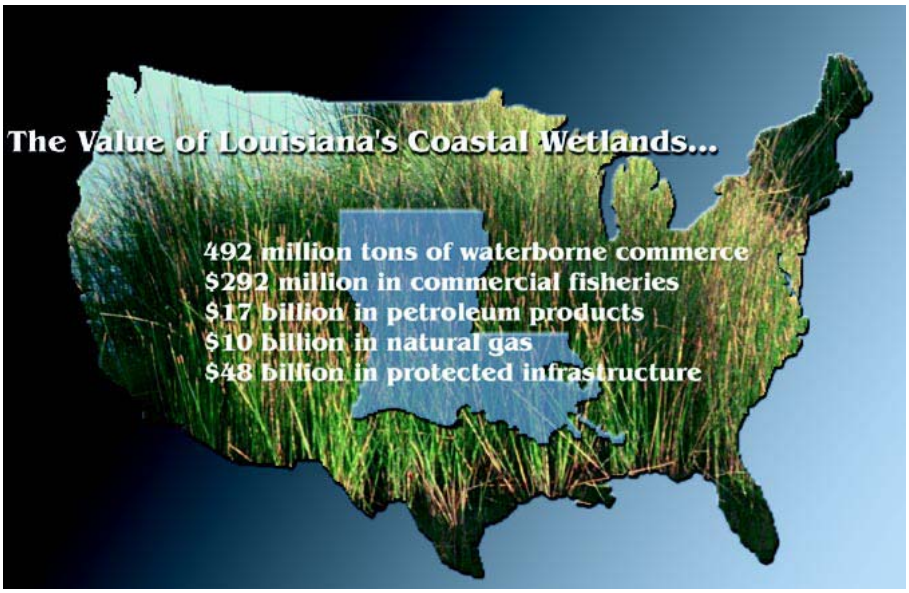
Photo by U.S. Army Corps of Engineers

Louisiana's coastal ports include four of the busiest ports in the world.

Known as a "Sportsman's Paradise," Louisiana holds true to that name as evidenced by the amount of money spent on recreation in the state's coastal wetlands each year. Vast numbers of fish and wildlife attract thousands of visitors from out of state, as well as Louisiana residents, to hunt and fish in the wetlands. There are nine national wildlife refuges in coastal Louisiana, encompassing over 280,000 acres.

Waterfowl hunting is legendary in Louisiana, yielding $53.5 million in trip expenditures in 1996 (USDOI and USDOC 1998). The state's wetlands provide habitat for over 5 million migratory waterfowl (LDWF 2000). At the terminus of the Mississippi Flyway, Louisiana's coastal wetlands host, on average, about 50% of the wintering waterfowl in that flyway, and about 20% of all the waterfowl that winter in the United States. In the past, Louisiana has wintered as much as 84% of the Mississippi Flyway's waterfowl. Without the habitat and resources provided by Louisiana's coastal wetlands, a substantial portion of North America's waterfowl population would return to their breeding grounds in less-than-optimum physical condition. Furthermore, the overwinter survival of waterfowl would be reduced. These effects could ultimately reduce the size of the following year's continental waterfowl population.

Louisiana is equally famous for great recreational fishing. Saltwater anglers in Louisiana spend approximately $245 million each year to fish for speckled trout, redfish, snapper, tuna, and many others. The ecotourism industry is growing in Louisiana as the nation's appreciation for the value and beauty of wetlands is increasing. Activities such as boating, water sports, hiking, bird watching, camping, and nature photography are enjoyed by many in Louisiana. Independent bed-and-breakfast inns and other support facilities are becoming increasingly popular as bird watchers and other nature enthusiasts are drawn to Louisiana to see the myriad shorebirds and Neotropical migrant bird species (Gomez 1996). In many rural communities, wetland-related ecotourism, including swamp tours, is an extremely important economic activity with great potential for growth.



Louisiana's coastal wetlands have significant value for the entire nation (data from LA Sea Grant College Program 1998; USACE 1998; USDOC 1999; LDNR Technology Assessment Division 2000).

Louisiana wetlands support the largest fur harvest in the United States, with over 40% of the national total. Nutria, muskrat, mink, raccoon, otter, bobcat, beaver, coyote, and opossum are trapped in the marshes and swamps, contributing approximately $1.3 million annually to the state's economy (LDWF 1997). Sales of wild alligator hides and meat contribute an additional $9.3 million annually (LDWF 1997). Farm-raised alligators, taken from the wild as eggs, generate $11.5 million (LDWF 1997). To ensure the health of the wild population, some farm-hatched alligators are released in the wild, demonstrating the vital link between economic growth and ecosystem resources.

Effects on Population and Culture

Louisiana's food, music, languages, and celebrations are famous all over the world. The beauty and bounty of the coast exhibited a powerful influence on those who settled here, yielding a unique way of life. Today, nearly half of Louisiana's population, more than 2 million people, live in Louisiana's coastal parishes. The coastal wetlands are an integral part of life for many of the people who live here, forming the basis of a unique diversity of cultures. Traditions of hunting, fishing, trapping, cooking, and music relate directly to coastal wetlands. Through these traditions, Louisiana's coastal wetlands shape the identity of natives, bringing them into contact with their histories and roots.

Protection of Industrial Infrastructure

The largest economic function of Louisiana's coastal wetlands is the protection of oil, gas, shipping, and transportation infrastructure. Coastal marshes and barrier islands serve as a buffer zone between the open sea and inland areas, protecting infrastructure from waves, wind, tides, and storm surge. The estimated value of public and private infrastructure along the coast, excluding public utilities and levees, exceeds $48 billion (LA Sea Grant

College Program 1998). Without the continued protection of wetlands, roads could be over washed, shipping channels degraded, and pipelines breached.

The ports of Louisiana carry more than 492 million tons of waterborne commerce annually, more than any other state (USACE 1998; figure 2.2), which is 16% of all waterborne commerce in the United States each year. The nation's only super port, the Louisiana Offshore Oil Port, receives 13% of the nation's daily crude imports and has pipeline connections to nearly a third of the country's refining capacity (CRCL 1999). These pipelines run through Louisiana's wetlands and rapidly eroding barrier island shorelines.

Underneath the coastal marshes and estuaries of Louisiana lie some of the richest mineral resources in the world. Including offshore production, Louisiana is the second largest energy producing state in the country. Louisiana's 19 refineries account for 15% of refining capacity in the United States, producing 22% of all domestic oil and gas (LMOGA 1995; EIA 1999). These refineries provide employment for nearly 97,000 people and spend $8 billion per year in Louisiana (LMOGA 1995). Annually, petroleum products produced in Louisiana are valued at $17 billion. Crude oil is estimated at $9.5 billion (DNR Technology Assessment Division). There are 43,285 oil and gas wells in coastal Louisiana, worth $4.5 billion in infrastructure (LDNR unpublished data). Louisiana supplies 27% of the nation's natural gas supply, valued at $10 billion per year (DNR Technology Assessment Division).

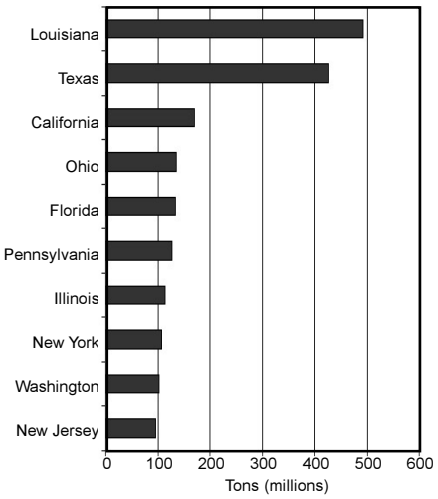


Figure 2.2 *The top 10 states of the conterminous United States in shipping of waterborne commerce (USACE 1998).*

Disaster Protection

One of the most valuable services that wetlands provide is protection of inland areas during storms and hurricanes. Barrier islands and coastal wetlands reduce the magnitude of hurricane storm surges and related flooding. Hurricane Andrew, a category 3 storm when it struck Louisiana in 1992, gave direct evidence that marshes help dampen storm surge. The storm surge in the Terrebonne marsh system was decreased from 9.3 ft in Cocodrie to 3.3 ft in the Houma Navigation Canal 23 miles north (Swenson 1994). Computer simulation modeling has indicated that the shape and size of barrier islands can greatly affect storm surge. As islands shrink and disappear, they provide mainland areas less protection from storm surge; however, if barrier islands were raised and widened, storm surges experienced inland would decrease (Suhayda 1997).

If nothing is done to stop wetland loss and to rebuild damaged or destroyed wetlands, Louisiana will be threatened physically and economically. Miles of hurricane levees and roads could be destroyed by storm surges, flooding towns as far inland as Lake Charles, New Orleans, and Houma. Coastal communities will have to spend billions of dollars building levees to restrain the water or communities will have to be abandoned. It is estimated that annual property damages increase by $186 per acre of coastal wetlands lost (IEI 1996), meaning a loss of 400,000 acres of marsh in the next 50 years would increase property damage by $74.4 million. As flooding occurs more frequently, flood insurance coverage will decrease and deductibles will increase, leaving many homeowners and businesses without a safety net and with no choice but to leave the coast.

In September of 1998, Hurricane Georges was expected to make landfall in Plaquemines Parish, Louisiana, as a category 3 storm and then continue north, passing just east of New Orleans. A 10-12 ft storm surge was expected in the Lake Pontchartrain-Lake Maurepas system accompanied by 20 inches of rain and winds of 115 mph. With I-10 and U.S. 90 as the only ways out of the city, evacuation of New Orleans would take 3 days of bumper-to-bumper traffic. Luckily

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