Statewide Summary for Louisiana

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Background

The State of Louisiana (Figure 1) has approximately 3,780,000 hectares (9,344,000 acres) in coastal area and 1,450,400 hectares (3,584,000 acres) in coastal land area (CPRA, 2011). The coastline is nearly 650 km (400 miles) long with approximately 12,400 km (7,700 miles) of tidal shoreline (CPRA, 2011). Coastal Louisiana is part of the Outer Coastal Plain Mixed Forest Province and Lower Mississippi Riverine Forest Province in the Subtropical Division (Bailey, 1995). The Subtropical Division is characterized by high humidity, the absence of cold winters, ample rainfall, and tropical storms. The Outer Coastal Plain Mixed Forest Province is further characterized by temperate rainforest with epiphyte accumulation, marshes, and swamps. The Lower Mississippi Riverine Forest Province is also characterized by swamps and, encompassing the lower Mississippi River, consists largely of alluvial bottomland soils. Coastal Louisiana contained approximately 1.6 million hectares (over 4 million acres) of wetlands at the turn of the 20th century (DOI, 1994). Louisiana now contains approximately 40 percent of the conterminous United States' coastal wetlands and accounts for 90 percent of its coastal wetland loss (Couvillion and others, 2011). The State lost nearly 518,000 hectares (1,280,000 acres) between 1932 and 2010.

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In 2010, the population of coastal Louisiana was greater than 2 million people—47 percent of the State's population (U.S. Census Bureau, 2011). Louisiana ranks first in crude oil production and second in natural gas production, including Outer Continental Shelf production (LDNR, 2011). Approximately 450 million tons of waterborne commerce, 20 percent of the Nation's waterborne commerce, passes through Louisiana's ports (USACE, 2010). Five of the country's fifteen largest ports (South Louisiana, New Orleans, Baton Rouge, Plaquemines Parish, and Lake Charles) are located in Louisiana. Commercial fish landings exceed 400 million kilograms (900 million pounds) with a value of nearly $300 million—approximately one quarter of the conterminous United States' total catch by weight (NOAA, 2010). Recreational fishing employs approximately 20,000 people and generates $1.7 billion annually (NOAA, 2011). Tourism in coastal Louisiana generates nearly $10 billion per year (LDCRT, 2010/2011).

Several National Wildlife Refuges can be found in coastal Louisiana. The State of Louisiana boasts a bountiful assemblage of wildlife species, including several commercial and recreational species of fish such as shrimp, crabs, oysters, and various finfish. Coastal Louisiana provides extensive habitat for waterbirds, including several duck species, egrets, herons, ibises, spoonbills, and pelicans, as well as dozens of shorebird and songbird species. The State also provides important stopover habitat for migratory species in the Mississippi Flyway, and coastal wetlands provide habitat for over 5 million migratory waterfowl (LDWF, 2011). Hunting generates nearly $1 billion, wildlife-watching generates over $500 million, fur harvest generates nearly $2 million, and alligator harvest generates nearly $110 million per year (LDWF, 2008).

Statewide Status and Trends

Monitoring during 1955, 1979, and 1988 confirms the loss and decline of emergent wetland habitat in coastal Louisiana (Table 1, Figures 2-4). Louisiana lost 284,256 hectares (702,412 acres), or 21.6 percent, of its emergent wetlands between 1955 and 1979; and an additional 15,178 hectares (37,506 acres), or 1.2 percent, between 1979 and 1988. During the complete 34-yr time period this study encompasses, coastal Louisiana lost 299,434 hectares (739,918 acres), or 22.8 percent, of the emergent wetlands present in the mid-1950's.

Table 1. Emergent wetland coverage in Louisiana for 1955, 1979, and 1988.

Emergent Wetland Type	**1955**		**1979**		**1988**		**Total Change 1955-1988**	
	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres
Estuarine	718,989	1,776,658	732,398	1,809,794	686,298	1,695,878	-32,691	-80,781
Palustrine	594,627	1,469,354	296,962	733,807	327,884	810,217	-266,743	-659,137
Total	1,313,616	3,246,013	1,029,360	2,543,601	1,014,181	2,506,095	-299,434	-739,918

Between 1955 and 1979, Louisiana gained 13,409 hectares (33,135 acres), or 1.9 percent, of its salt marshes. A loss of 46,100 hectares (113,916 acres), or 6.4 percent, of salt marsh occurred between 1979 and 1988. A total of 32,691 hectares (80,781 acres), or 4.5 percent, of salt marsh was lost during the entire 34-yr study period.

Louisiana lost 297,665 hectares (735,547 acres), or 50.1 percent, of coastal fresh marsh between 1955 and 1979. It gained 30,922 hectares (76,410 acres), or 5.2 percent, of fresh marsh between 1979 and 1988. A total of 266,743 hectares (659,137 acres), or

44.9 percent, of fresh marsh was lost in coastal Louisiana throughout the entire 34-yr study period.

Causes of Change

Although wetland loss rates in Louisiana have decreased from 7,770 hectares (19,200 acres) per year between 1956 and 1978 to 4,338 hectares (10,720 acres) per year from 1985 to 2010 (Couvillion and others, 2011), the State still faces an unsustainable amount of land loss. On average, Louisiana is currently losing its coastal wetlands at a rate equivalent to losing an area the size of a football field every hour. There are a multitude of factors contributing to this loss, including subsidence, erosion, sea-level rise, storms, an extensive canal and spoil bank system, geologic factors, agriculture, invasive species such as nutria, and urban development (DOI, 1994).

An extensive system of manmade, dredged channels for navigation and oil-exploration and spoil banks that has changed wetland hydrology has caused dramatic land losses (Turner, 1997). An expansive levee system along the Mississippi River has reduced the frequency and duration of flooding, which has allowed for agricultural, industrial, commercial, and residential development in places where it would otherwise not be possible (DOI, 1994). However, this has also decreased freshwater input and nutrient-rich sediment deposition to estuaries, which are necessary for land accretion in an environment that will otherwise experience excessive erosion and subsidence. Channelization creates paths for high-salinity water to intrude inland, killing freshwater vegetation and altering wildlife habitats and species presence.

Hurricanes and other extreme storms have also contributed significantly to land loss, causing immediate losses from direct physical impacts and future losses from excessive plant stress (Steyer and others, 2010; Couvillion and others, 2011). Storm surge and damage causes erosion, vegetation damage, and salt water intrusion. Between 2004 and 2008, Louisiana lost 85,000 hectares (209,920 acres) of marsh to open water from hurricanes Katrina, Rita, Gustav, and Ike. This amount exceeded total land loss for the entire preceding 25 years (Barras and others, 2008; Barras and others, 2009). Sea-level rise, development, and invasive species further contribute to the causes and threats of wetland loss.

Overview of Emergent Wetland Restoration Efforts

Restoration of emergent wetlands has a long history and a long list of participants that include Federal, State, and local governments, as well as private entities. However, the Coastal Wetland Planning, Protection and Restoration Act (CWPPRA) Task Force established in 1990 has been the largest contributor to emergent wetland restoration in the State of Louisiana. Other programs that have contributed include: Water Resources Development Act (WRDA), Coastal Impact Assistance Program (CIAP), the State restoration program, and the Barataria-Terrebonne National Estuary Program. Private entities, such as Ducks Unlimited, The Nature Conservancy, National Audubon Society, Coalition to Restore Coastal Louisiana, and the Lake Pontchartrain Basin Foundation have contributed many restoration projects. In addition, individual landowners, including public landowners such as State and National Wildlife Refuges, have recognized the need for restoration and have partnered on Federal, State, or local efforts or constructed projects of their own. It is expected that the Louisiana Coastal Protection and Restoration

Authority (CPRA) will surpass these efforts as the State Master Plan for Coastal Protection and Restoration (a $5 billion plan) is implemented. The Master Plan will guide all state government spending on coastal restoration and protection.

As of July 2014, the CWPPRA program has 150 active projects, with 84 projects constructed, 18 demonstration projects constructed, 17 authorized for construction (phase II) and 31 in engineering and design (phase I). Between 1990 and 2014, the CWPPRA program has received $1.5 billion in funding. CWPRA uses a wide variety of approaches to coastal wetland restoration (Figure 5). During the project development phase, the Environmental Working Group conducts a Wetland Value Assessment. One variable estimates the net area benefitted by the project by comparing the difference in land area at the end of the 20 year project life between the future without project implementation and a future with project implementation. The most common project type used by CWPPRA is hydrologic restoration with 89 km^2 (21,992 acres) benefitted through 24 projects (Figure 6). The second largest area (61 km^2 [15,073 acres]) is benefitted through nutria control. This project consists of an incentive payment paid to licensed hunters and trappers for any nutria tail brought to a collection agency (LDWF, 2014). The goal is to remove 400,000 animals each year to reduce grazing pressure. Shoreline protection has benefitted 55 km^2 (13,591 acres) through 20 projects. Most of these projects consist of rock revetments or foreshore dikes along major navigation channels and lake or bay shorelines. Because wetland soils in many parts of the Louisiana coast do not support rock dikes, several demonstration projects, as well as regular projects, have evaluated alternative shoreline protection methods, such as artificial oyster reefs, polyvinyl chloride (PVC) and concrete sheet pilings or bulk heads. Three sediment diversion projects in the

Mississippi River delta benefit 53 km^2 (13,097 acres), the largest area (39 km^2 [9,637 acres]) contributed by the West Bay (MR-03) diversion constructed in 2003 (CWPPRA 2012). Seventeen constructed marsh creation projects benefit 26 km^2 (6,425 acres). Most of these consist of sediments pumped from adjacent open water areas. The Bayou Dupont (BA-39) constructed in 2011 was the first project that used sediments from the Mississippi River to benefit 1.3 km^2. Twenty km^2 of barrier islands are affected through 11 projects. Most of these projects consist of placement of sand dredged near the island and placed to increase the height and width of the dune system as well as back barrier marsh creation. Two projects on Raccoon Island (TE- 29 and TE-48) use rock breakwaters to stabilize the island, which is an important wadingbird and seabird rookery. Two delta optimization projects (AT-02 and AT-03) that are designed to increase the flow to the outer edges of the Atchafalaya Delta benefit 15 km^2 (CWPPRA, 2012).

Two major freshwater diversions were constructed through the WRDA program: Caernarvon (1991) and Davis Pond (2002) (CWPPRA, 2012). The CIAP Program has constructed eight shoreline protection projects benefitting 28.9 km^2, two marsh creation projects benefitting 1.2 km^2, and one barrier shoreline project benefiting 2.8 km^2. The US Army Corps of Engineers has benefitted habitat of at least 5.3 km^2 with the beneficial placement of dredged sediments in 12 projects, of which 3 projects affected barrier island habitat (CWPPRA, 2012).

Overview of Monitoring, Restoration, and Enhancement Opportunities

Since 2005, the CWPPRA Program uses the Coastwide Reference Monitoring System (CRMS) to monitor the effectiveness of individual wetland restoration and

protection projects as well as cumulative effects. CRMS is a network of 390 stations that are randomly distributed in swamp forests as well as fresh, oligohaline, mesohaline, and polyhaline marshes. Each station consists of a 1 km^2 area that is used to assess land change. Within the station, a 200 m^2 area is used for field measurements of water level, salinity, and temperature (hourly); surface elevation and accretion (twice a year); vegetation composition (yearly in marshes); basal area and ground cover (every third year in swamp forests). CRMS data are used to assess the effectiveness of restoration efforts and are also used in other restoration assessment, modelling, and future planning. CRMS data and reports are available for public download at http://www.lacoast.gov/crms2/Home.aspx.

Before implementation of the nutria control program (1998-2002), greater than 325 km^2 were damaged by nutria, while recently (2010-2013) less than 25 km^2 have been damaged (Manuel and Mouton, 2013). That means that approximately 300 km^2 are protected from nutria damage. Since land loss rates in areas not damaged by nutria are substantially lower than in areas of nutria damage (Thompson, 2014), the 60 km^2 estimated as benefitted area from this project during the planning stage is probably an underestimate.

The Louisiana State Master Plan for Coastal Restoration is an ambitious plan to restore Louisiana's coastal wetlands and protect its coastal communities in the next 50 years. The plan involves both restoration and protection projects (CPRA, 2012), but only restoration projects are summarized here: The plan contains 28 marsh creation projects with a total cost of $22,101M, 11 sediment diversions with a total cost of $4,098M, 13 shoreline protection projects with a total cost of $1,808M, five barrier island and

shoreline restoration projects with a total cost of $1,731M, 15 hydrologic restoration projects at a total cost of $713M, 15 ridge restoration projects with a total cost of $448M, five bank stabilization projects at $186M, and three oyster reef projects with a total cost of $125M (Figure 7). Eighty-one of these restoration projects are expected to be constructed by 2032 with a total cost of $16,750M, and the remaining 14 projects are expected to be constructed after 2032 (CPRA, 2012).

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Figure 1. Louisiana state map.

Figure 2. Distribution of emergent wetlands in Louisiana, 1956.

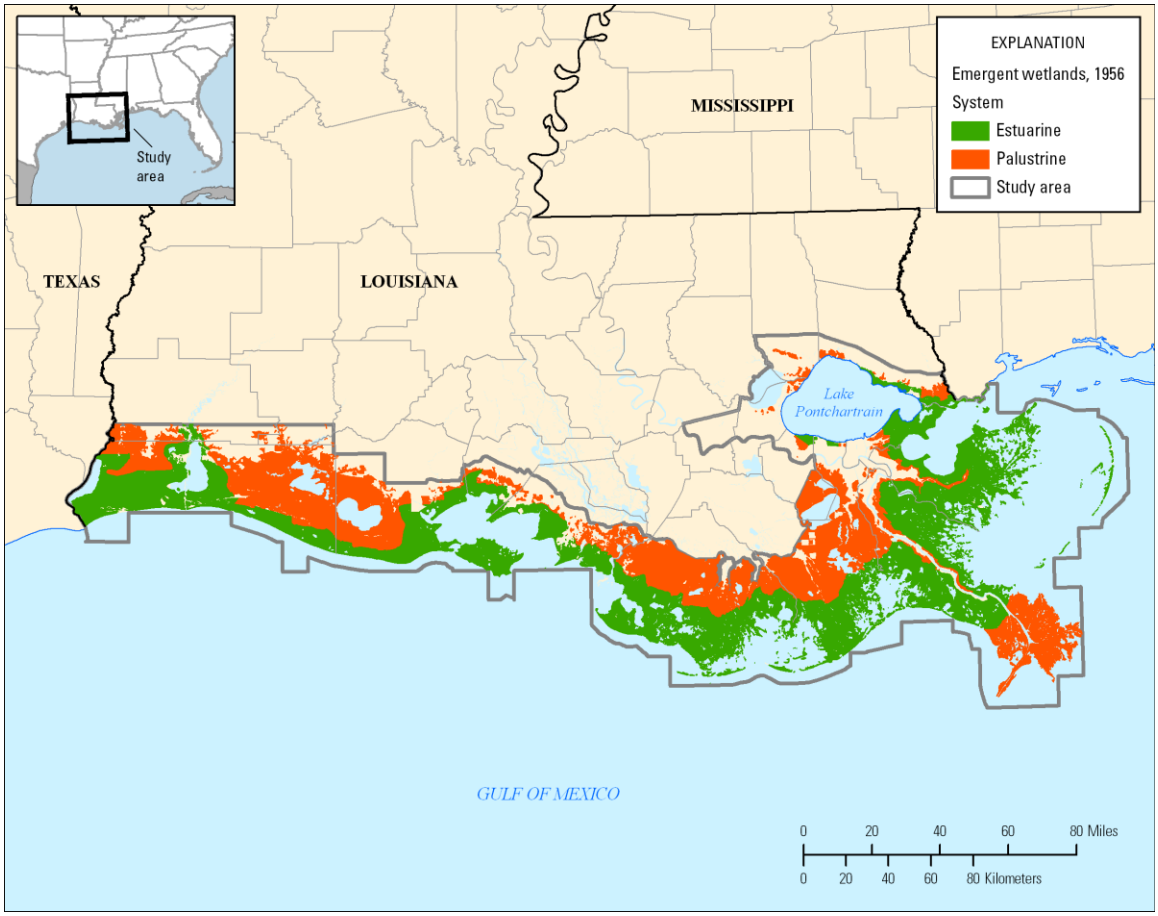

Figure 3. Distribution of emergent wetlands in Louisiana, 1978.

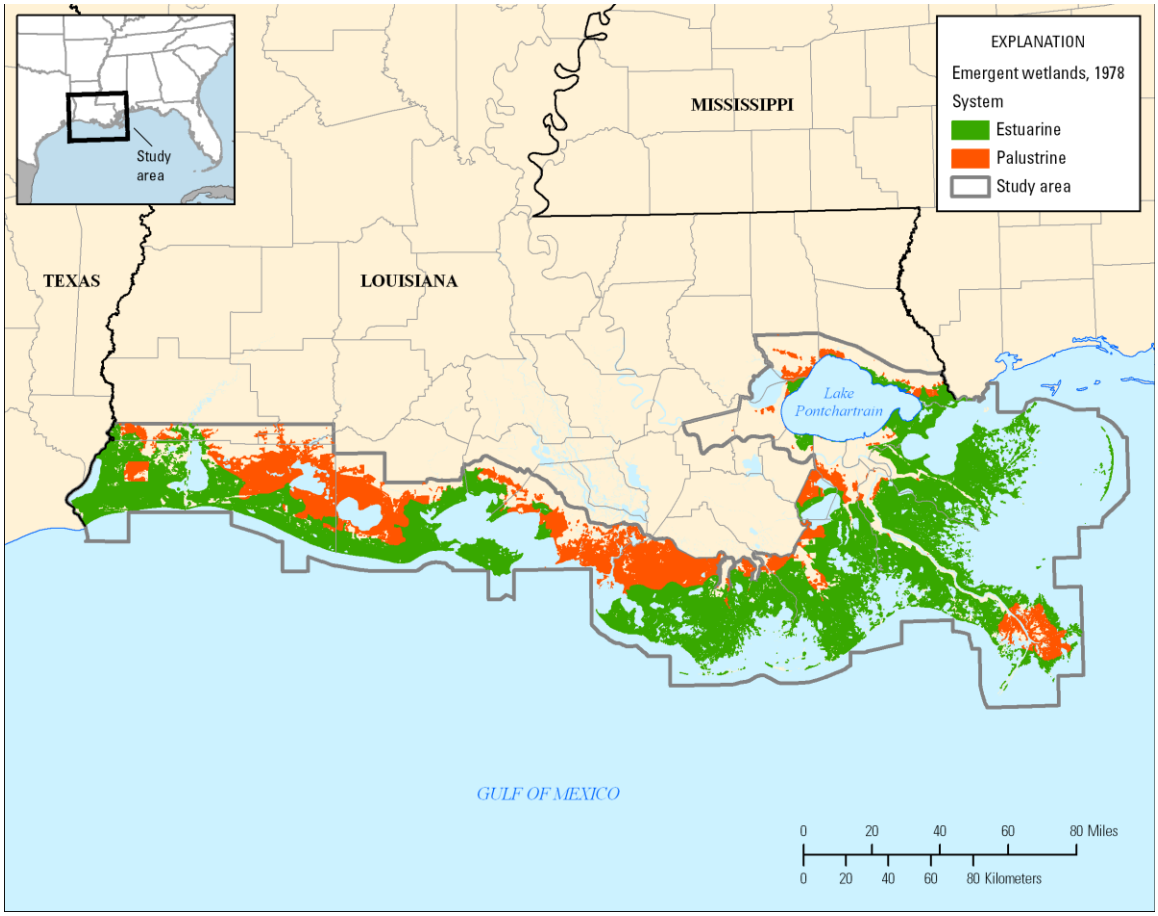

Figure 4. Distribution of emergent wetlands in Louisiana, 1988.

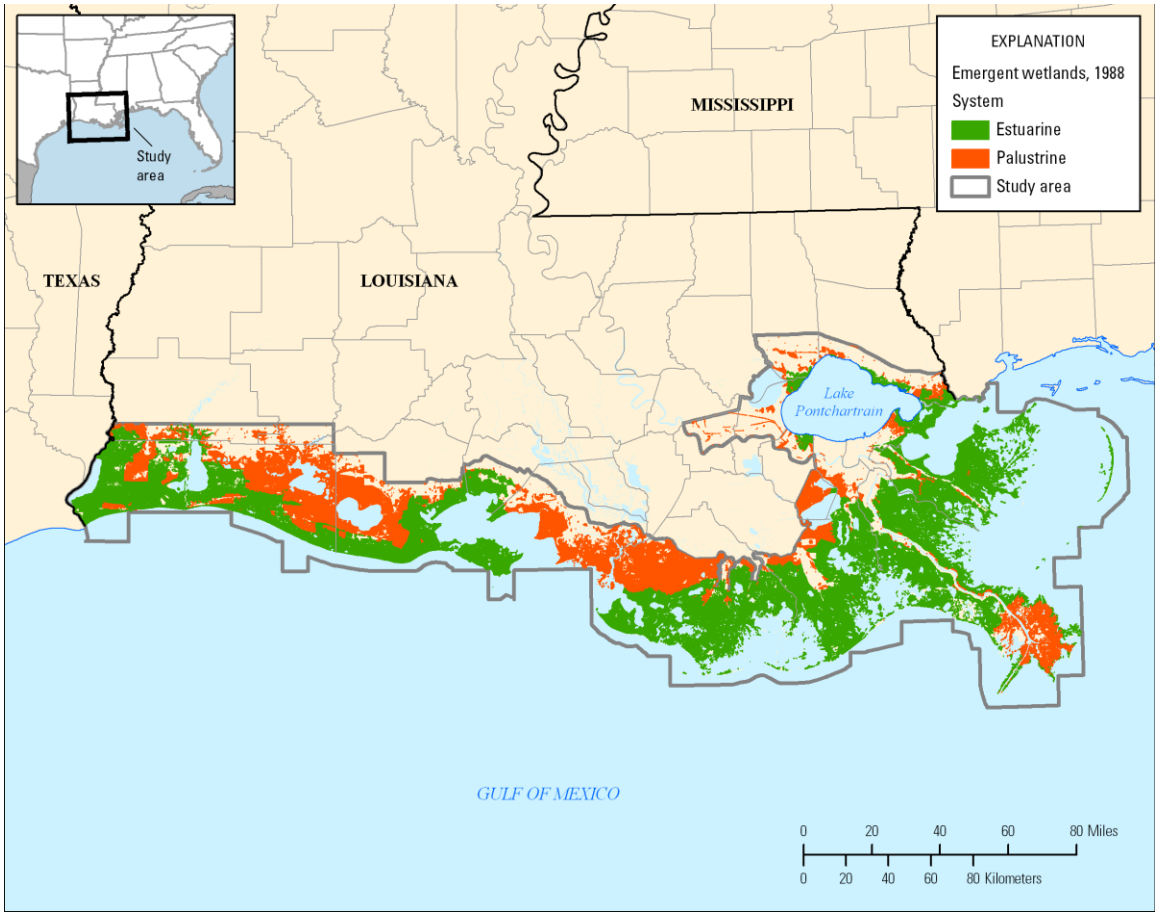

Figure 5. Number of CWPPRA projects constructed from 1994 through 2014 by restoration method (does not include demonstration projects). Data obtained from lacoast.gov.

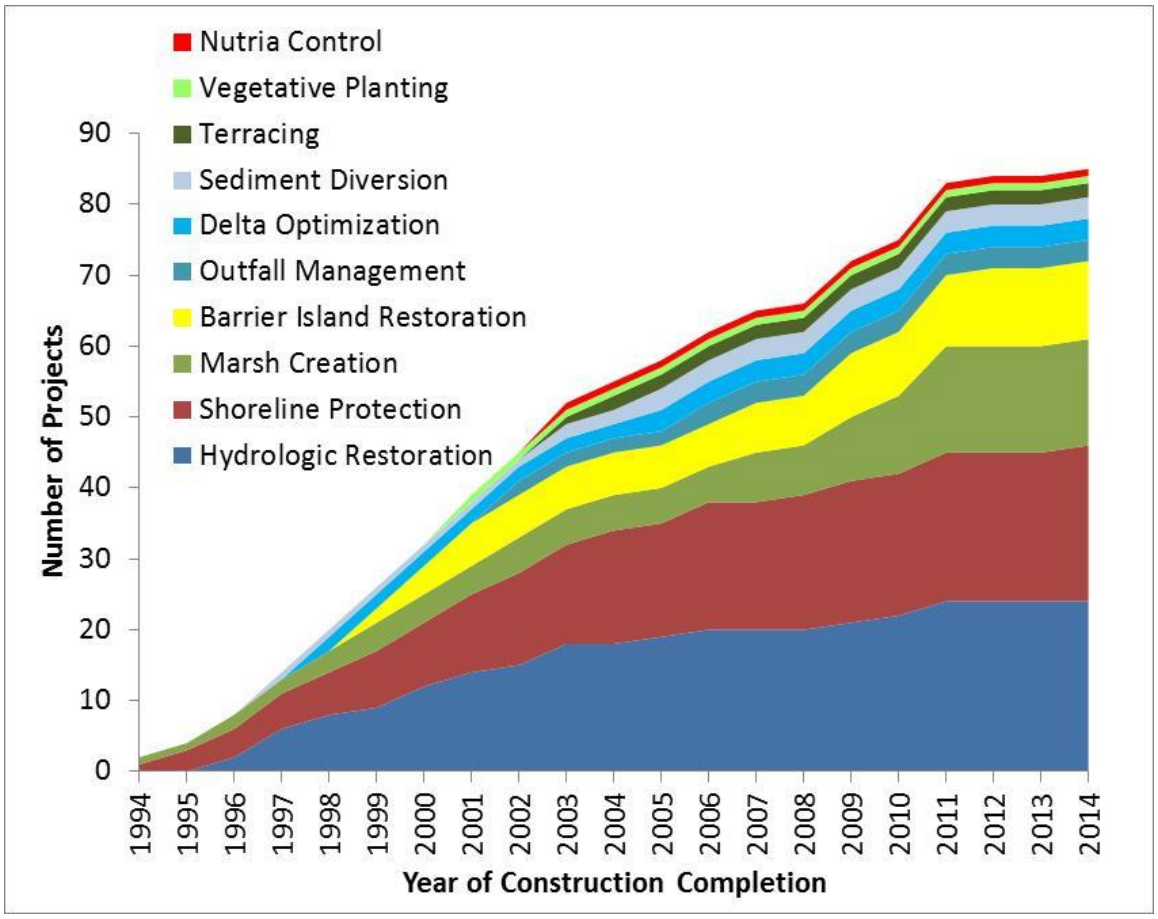

Figure 6. Estimated area of wetlands created or restored by CWPPRA projects constructed from 1994 through 2014 by restoration method (does not include demonstration projects). Data obtained from lacoast.gov.

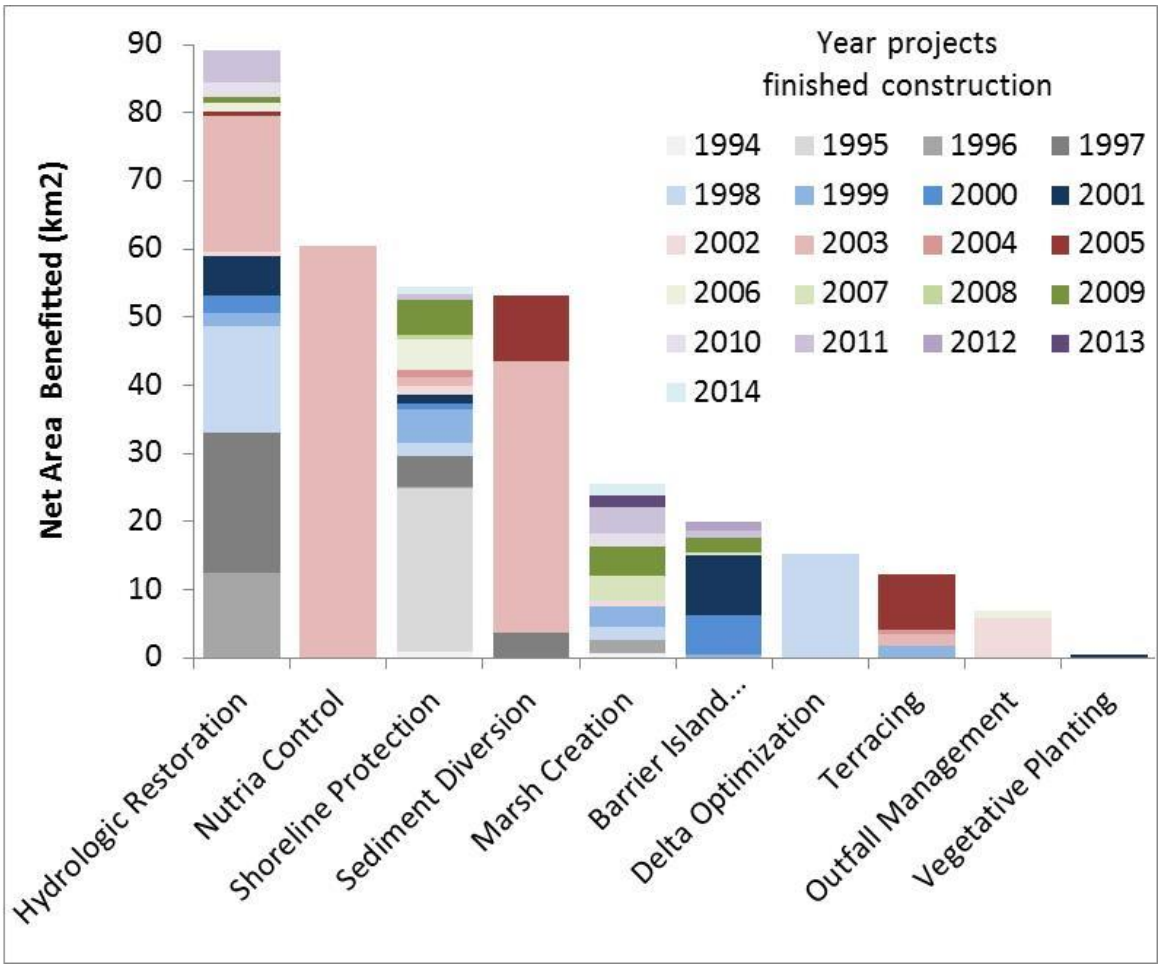

Figure 7. Planned expenditures in Louisiana's coastal master plan are shown by project type. Data obtained from 2012 State Master Plan.