

Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA)



The 2021 Evaluation Report to the U.S. Congress on the Effectiveness of Coastal Wetlands Planning, Protection and Restoration Act Projects

Louisiana Coastal Wetlands Conservation and Restoration Task Force. 2021. The 2021 Evaluation Report to the U.S. Congress on the Effectiveness of Coastal Wetlands, Planning, Protection and Restoration Act Projects.

Map images provided by the U.S. Geological Survey Wetland and Aquatic Research Center.

Cover image by U.S. Fish and Wildlife Service - CWPPRA South Lake Lery Shoreline and Marsh Restoration (BS-16) Project

CWPPRA Mission Statement

Louisiana continues to face an unprecedented collapse of its entire coastal ecosystem and the vital economic activity and unique culture that it supports. Over the past 30 years, the Louisiana Coastal Wetlands Conservation and Restoration Task Force (Task Force) has fulfilled its role under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) by implementing a science and engineering based program that extensively engages stakeholders and the public and serves as the Nation's model for effective and efficient coastal restoration. To secure the future of Louisiana's coast, the Task Force and stakeholders must share a common vision, one that aligns with State and national priorities.



Documentation

This report is submitted by the Task Force in accordance with CWPPRA, Title III of Public Law 101-646. This report fulfills the CWPPRA mandate, which requires a report to the U.S. Congress every 3 years on the effectiveness of Louisiana's coastal wetland restoration projects.

Acknowledgements

The Task Force wishes to thank Governor of Louisiana, John Bel Edwards, the Louisiana Legislature, the Federal Louisiana Delegation, and the U.S. Congress for their support of this crucial program.



CWPPRA at work. Members of the CWPPRA workgroups set out on their annual visits in the field to collect valuable data necessary to develop successful wetland restoration projects.

Table of Contents

<i>Introduction</i>	2
<i>Benefits to Fish and Wildlife</i>	4
<i>Coastal Resiliency</i>	5
<i>Calcasieu-Sabine Basin</i>	7
<i>Mermentau Basin</i>	8
<i>Teche-Vermilion Basin</i>	9
<i>Atchafalaya Basin</i>	10
<i>Terrebonne Basin</i>	11
<i>Barataria Basin</i>	12
<i>Mississippi River Delta</i>	13
<i>Breton Sound Basin</i>	14
<i>Pontchartrain Basin</i>	15
<i>Demonstration</i>	16
<i>Coastwide</i>	17
<i>Conclusion</i>	18
<i>References</i>	19
<i>Appendices</i>	20

Introduction

Louisiana’s coastal zone is home to approximately 37 percent of all coastal marshes and 45 percent of all intertidal coastal marshes in the lower 48 States, but annually, Louisiana is losing 80 percent of the entire nation’s coastal wetlands. Since the 1930s, coastal Louisiana has lost more than 1,860 square miles (1.2 million acres), an area more than 25 times larger than Washington, D.C (Couvillion and others, 2017).

The dire need to restore and protect Louisiana’s coastal wetlands has been clearly established and our ability to sustain the ecological and economic health of the Louisiana coastal zone is largely dependent upon coastal restoration and protection activities. Louisiana’s wetlands provide a variety of benefits that serve the Nation across an array of economic sectors. Because of these benefits, the coastal wetland loss crisis in Louisiana is considered a matter of national concern.

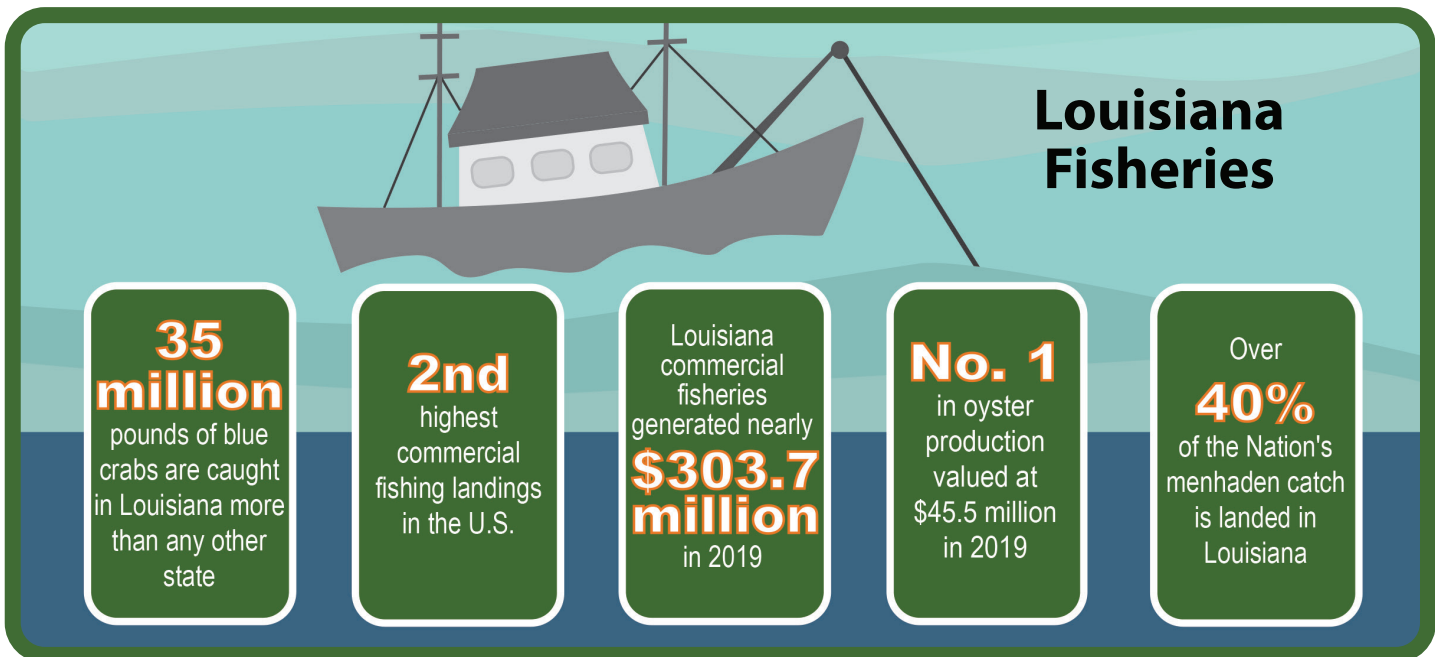
Congress recognized the ongoing severe coastal wetland losses in Louisiana and the increasing impacts on locally, regionally, and nationally important resources when it established the CWPPRA in 1990 (Public Law 101-646, Title III). As part of CWPPRA, Congress established and directed the Task Force to prepare, annually update, and implement a list of Louisiana coastal wetland restoration projects. Consistent with Louisiana’s Comprehensive Coastal Master Plan, which charts Louisiana’s coastal restoration over 50 years, these projects provide for the long-term conservation of wetlands and dependent fish and wildlife populations.

Between 1990 and 2021, CWPPRA has constructed, or funded for construction, projects to protect and restore close to 101,438 net acres (158 square miles) of Louisiana’s coastal wetlands. As of

August 2021, 114 projects have been constructed, 17 are currently under construction, and 29 are in engineering and design. Between 2019 and 2021, the Task Force approved 11 new projects for Phase 1 – Engineering and Design. During that same period, the Task Force authorized six projects for Phase 2 – Construction, which are expected to result in 2,643 net acres of wetlands. Several projects have also completed construction during that time frame, restoring and creating 2,115 net acres of wetlands in total (Table 1, page 3).

CWPPRA projects are typically planned and designed for a 20-year lifespan following construction completion. During that timeframe, the project will be operated and maintained to ensure effectiveness and overall success and will be monitored for environmental parameters, such as land change and emergent vegetation, and inform future operation and maintenance activities.

CWPPRA monitoring data provide vital information to evaluate not only the CWPPRA projects, but also other restoration programs and the state of the coast in general. The monitoring data collected through the CWPPRA Program are used to select, prioritize, and design nearly all coastal restoration projects. Since 2007, the Coastwide Reference Monitoring System (CRMS), primarily funded by CWPPRA and the State of Louisiana, has provided critical baseline ecological data to inform coastal restoration and disaster response activities throughout Louisiana’s four ecologic basins: Calcasieu-Sabine, Mermentau, Teche-Vermilion, Atchafalaya, Terrebonne, Barataria, Mississippi River Delta, Breton Sound, and Pontchartrain. The following sections provide net acres benefitted and an example of a constructed project in these basins, demonstrating the effectiveness of CWPPRA to address land loss in Louisiana’s coastal wetlands.



2019 Statistics NOAA Fisheries, Fisheries Statistics Division Accessed 02-08-21

Table 1. Total net acres projected to be created, protected, or restored for projects in engineering and design, construction, and projects constructed from 2019 to 2021*. Total net acres for engineering and design: 3,617; construction: 2,643; constructed: 2,115. (CWPPRA Environmental Workgroup, 2021)

Project Name	Project Number	Priority Project List	Acres
Breton Landbridge Marsh Creation (West)	BS -38	28	372
East Delacroix Marsh Creation and Terracing	BS-37	28	314
Grand Bayou Ridge and Marsh Restoration	BA-217	28	336
Long Point Bayou Marsh Creation	CS-85	28	332
Bay Raccourci Marsh Creation and Ridge Restoration	TE-156	29	343
East Catfish Lake Marsh Creation and Shoreline Protection	TE-157	29	248
Phoenix Marsh Creation - East Increment	BS-42	29	297
North Delacroix Marsh Creation and Terracing	BS-41	29	294
Reggio Marsh Creation and Hydrologic Restoration	BS-43	30	484
Bay Raccourci Marsh Creation Increment II	TE-146	30	290
Phoenix Marsh Creation – West Increment	BS-44	30	307
New Orleans Landbridge Shoreline Stabilization and Marsh Creation	PO-169	24	167
Bayou Decade Ridge Restoration and Marsh Creation	TE-138	26	378
Labranche East Marsh Creation	PO-75	19	715
West Fourchon Marsh Creation and Nourishment	TE-134	24	304
Labranche Central Marsh Creation	PO-133	21	668
Mid Breton Landbridge Marsh Creation and Terracing	BS-32	27	411
Lost Lake Marsh Creation and Hydrologic Restoration	TE-72	19	452
Cameron Creole Watershed- Grand Bayou Marsh Creation	CS-54	20	476
Oyster Bayou Marsh Restoration	CS-59	21	433
Cole's Bayou Marsh Restoration	TV-63	21	340
Rockefeller Refuge Gulf Shoreline Stabilization	ME-20	11	414

Projects authorized for Phase 1 Engineering and Design from 2019-2021

Projects authorized for Phase 2 Construction from 2019-2021

Projects constructed from 2019-2021

*The CWPPRA Environmental Workgroup uses Wetland Value Assessments (WVA) to analyze and determine potential benefit acres for a CWPPRA project over the length of its 20-year life span. It is important to distinguish between WVAs acres of benefit, which can include multiple types of benefit, and reported land area benefit acreages. The land change dynamics acreage numbers for each basin in this report are derived from a comparison between pre-construction and post-construction land change rates assessed via satellite imagery.

CWPPRA Benefits to Fish and Wildlife

Benefits analyses developed by the CWPPRA Environmental Workgroup estimate that 101,438 acres of protected and created coastal wetlands can be attributed to CWPPRA in its first 30 years. Those restored swamps, marshes, and barrier islands/headlands and associated open-water habitats provide foraging, nesting, breeding, wintering, refuge, and nursery habitat for a myriad of coastal fish and wildlife. This includes threatened and endangered, at-risk, and rare species, as well as commercially and recreationally valuable species and State and national fish and wildlife trust resources.

Habitats restored through CWPPRA have aided in the delisting of our national symbol, the bald eagle, and the Louisiana State bird, the brown pelican, from the endangered species list. Located along the Mississippi and Central Flyways, coastal Louisiana provides wintering habitat for more than 5 million waterfowl and habitat for Neotropical migrant birds. Appendix 2 lists some of the threatened and endangered, and at-risk/rare species found in the Louisiana coastal zone. The appendix also contains the waterfowl, mammals, reptiles, amphibians, and commercially and recreationally important fisheries benefitted by CWPPRA projects.

Many economically important saltwater fishes and crustaceans spawn in nearshore and offshore waters of the Gulf of Mexico (e.g., blue crab, red drum, Gulf menhaden, shrimp, and spotted seatrout) but post-larval species and juveniles depend on natural and restored estuarine habitats in Louisiana for foraging and nursery areas. The estuarine-dependent, post-larval, and juvenile fisheries species contribute to the estuarine food web and some serve as prey for predators and highly migratory species (such as jacks, tuna, billfishes and sharks).

Louisiana's coastal wetlands also provide habitat for the commercial trapping of the American alligator and furbearers (e.g., muskrat, mink, and otter) and natural areas for tourist activities, such as bird watching, boating, swimming, and hiking.



CWPPRA



CWPPRA

Saving Wetlands *Helps Threatened & Endangered Species*

CWPPRA is rebuilding wetlands to protect these species. Beach and marsh habitat are created with dredged material. New plants in these wetlands take root and provide food and shelter for fish and wildlife.



Louisiana is home to **32** threatened or endangered species.

16 species reside in coastal zone habitats.

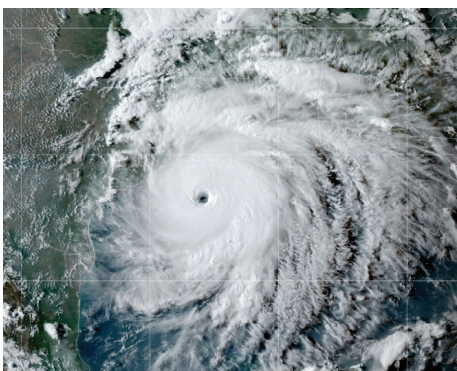
101,438 acres of wetlands are projected to be protected, created, or restored. More than 351,000 acres are projected to be enhanced by CWPPRA projects.

CWPPRA Supports Coastal Resiliency

Our national economy benefits greatly from Louisiana's coastal wetlands. Economic activity in Louisiana's coastal zone includes oil and gas production, shipping commerce, commercial fisheries, oyster production, and fur harvesting. Coastal Louisiana employs 939,000 people annually, earning almost \$46 billion (NOAA OCM 2018). This equates to over \$120 billion on gross domestic product (NOAA OCM 2018). Due to wetland loss, however, coastal Louisiana and the economic activity it produces is vulnerable to subsidence, sea level rise, and storm impacts.

Louisiana experienced a record-breaking hurricane season in 2020. Five named storms made landfall in the State, of which, three were hurricanes. Hurricanes Laura and Delta arrived in southwestern Louisiana six weeks apart. Laura, the strongest category four hurricane to make landfall in Louisiana since 1956, is one of the strongest hurricanes on record to make landfall in the U.S. At category two strength, Hurricane Delta made landfall in nearly the same location as Hurricane Laura. Hurricane Zeta then impacted southeastern Louisiana less than three weeks later as a category two hurricane. Collectively, over \$20 billion in estimated damages resulted due to the impacts of the five named storms (NOAA NCEI 2021). According to post-storm assessments, CWPPRA marsh creation sites, terraces, and shoreline protection features fared well, while some water control features sustained some storm damage.

Coastal restoration projects, such as those constructed through the CWPPRA Program, provide a buffer to coastal communities and critical infrastructure that are of national economic importance. Continued wetland loss without further action will impact the Louisiana coastal region's ability to recover quickly after future devastating storm events. The CWPPRA Program not only restores the coast but strengthens and supports economic and coastal resiliency by identifying coastal areas with increasing land loss rates and executing land building projects in those areas.



GOES-16 geocolor visible image of Hurricane Laura nearing peak intensity on August 26, 2020.

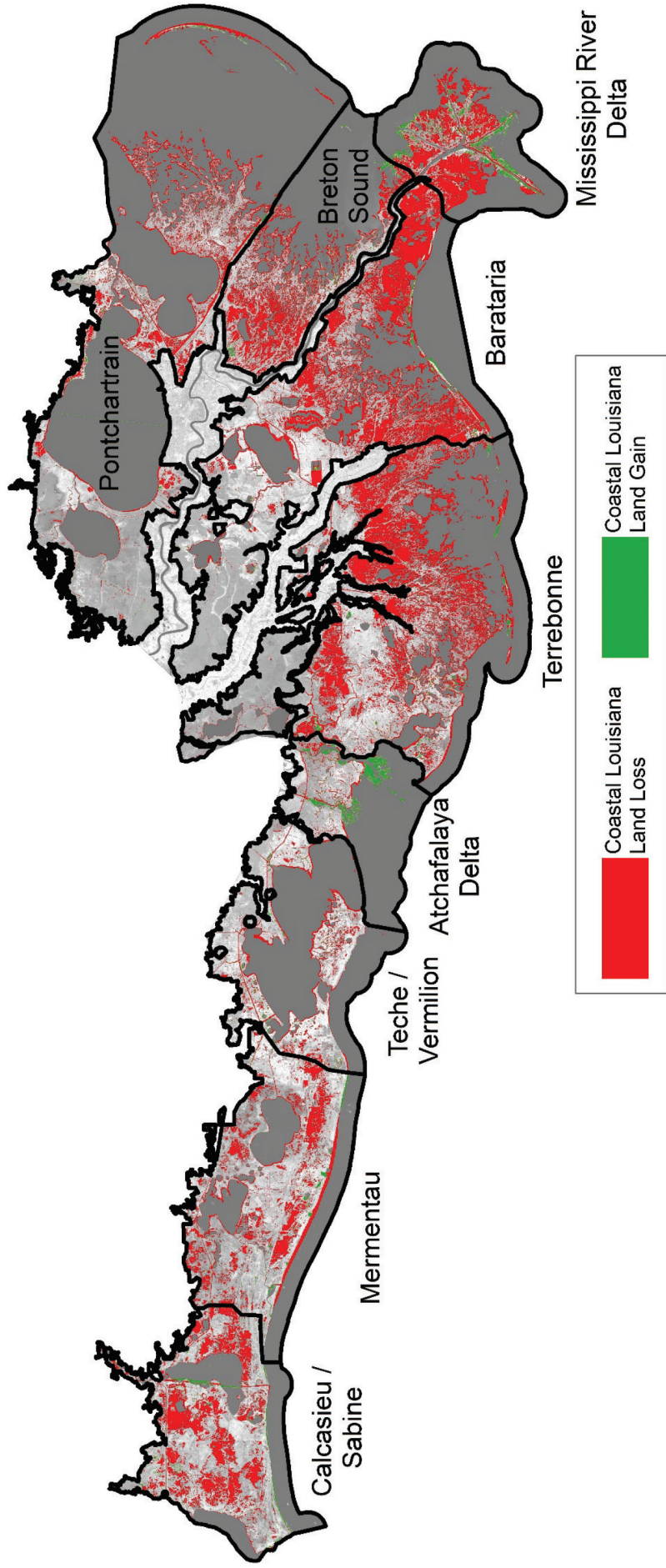


CWPPRA projects provide protection to critical infrastructure. LaBranche Central Marsh Creation (PO-133) was recently combined with LaBranche East Marsh Creation (PO-75) and approved for construction in early 2020. The combined project will provide a protective buffer to Interstate 10, the region's primary hurricane evacuation route.



CWPPRA projects provide protection to coastal communities. The Northwest Turtle Bay Marsh Creation (BA-125) project consists of approximately 700 acres of marsh created with dredged material from Turtle Bay or Little Lake. Roughly six to seven miles to the northeast are the towns of Lafitte and Jean Lafitte, fishing communities rich in culture and located in the middle of the Barataria estuary.

Coastal Louisiana Land Loss



Couvillion et al. 2017



CALCASIEU-SABINE BASIN

Land Change Dynamics

Calcasieu-Sabine Basin is the western most basin in Louisiana. It is bordered on the west by Texas and extends eastward to Grand Lake. It contains vast expanses of coastal marshes spanning from saline to freshwater environments. Major water bodies include Calcasieu and Sabine Lakes and navigation channels important to the local economy, such as the Calcasieu Ship Channel and the Gulf Intracoastal Waterway (GIWW).

The Calcasieu-Sabine Basin experienced the highest rates of wetland loss prior to the 1970s (average -2,348 acres/year, -9.5 km²/year); however, rates have slowly decreased since that time, except for hurricane-induced losses in 2005 and 2008. Rates of wetland loss have ranged from a net loss of 2,470 acres/year (~10 km²/year) at the peak of wetland loss rates, to an estimate of 494 acres/year (~2 km²/year) most recently (Couvillion et al. 2017). The major causes of land loss in this basin are saltwater intrusion, subsidence, and storms. Calcasieu-Sabine Basin was in the direct path of two hurricanes in 2020. The wetland impacts of land change and wetland health are still under investigation.

In the Calcasieu-Sabine Basin, constructed marsh creation, terracing, and shoreline protection features, similar to the project highlighted below, have contributed approximately 7,788 acres (+/- 1230 acres) of net land area benefit, either from new land built or land sustained from project inception through 2020. The land area benefits from CWPBRA projects in this basin have continued to increase through time. This increasing benefit includes land building as additional projects have been constructed, but the land sustaining effects of CWPBRA projects in this basin have been significant. Land sustained (land that would have been lost in the absence of restoration activities), accounts for approximately half of the land area benefit in this basin (Figure 1).

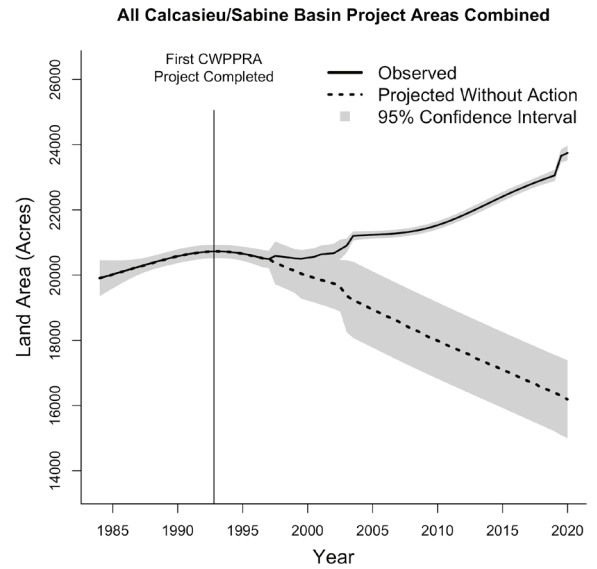


Figure 1. Cumulative land area change analyses for all constructed CWPBRA projects in Calcasieu-Sabine basin.

\$149 Million Expended
21 Projects Constructed

4 Projects in Engineering & Design
3 Projects in Construction



Figure 2. An aerial image of the CS-22 project along the GIWW

Clear Marais Bank Protection (CS-22) Project

Constructed in 1997, the CS-22 project extends along the north bank of the GIWW between the Alkali Ditch and Goose Lake (Figure 2). The freshwater marshes of the project area are threatened by saltwater intrusion and marsh loss from breaches in the GIWW shoreline due to increased tidal action and boat wakes. Approximately 35,375 linear feet of rock dike was constructed along the north bank of the GIWW as a shoreline protection feature to protect and hydrologically isolate the Clear Marais freshwater wetlands north of the GIWW.

Overall, from 1997-2015, the project shoreline gained an average of 3.97 feet/year (Miller and Guidry 2016). The reference area, in comparison, was losing an average of -1.13 feet/year prior to 2013 when Calcasieu Parish constructed a rock dike using Coastal Impact Assistance Program funding that tied into the western end of the CS-22 project. Visual

observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline, especially where the vegetation has grown contiguous with the rock dike.

Land/water analysis data shows the project is gaining land in recent years after remaining stable from 2000 to 2010. The project has been gaining land at a rate of nearly three acres/year, on average, since construction. Prior to construction, the trend was negative, reflecting the loss of shoreline without the protection of the rock dike.

MERMENTAU BASIN

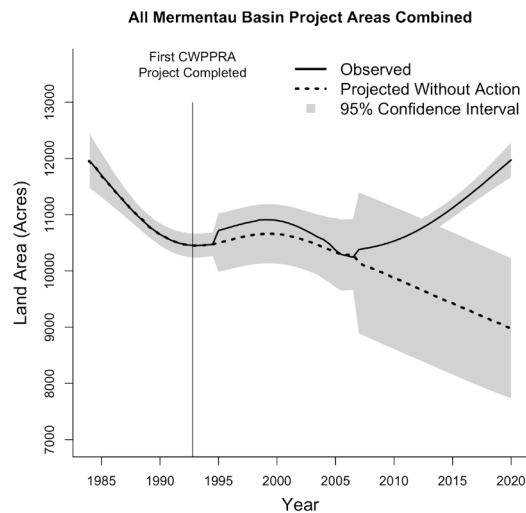


Figure 3. Cumulative land area change analyses for all constructed CWPPRA projects in Mermentau basin.

Land Change Dynamics

Mermentau Basin is located in the eastern portion of the Chenier Plain between Calcasieu-Sabine and Teche-Vermilion Basins. The Mermentau Basin can be divided into two sub-basins. The Lakes sub-basin is between two transportation features - the GIWW to the north and Louisiana Highway (LA Hwy) 82 to the south. LA Hwy 82 runs atop and between the Grand Chenier-Pecan Island ridge complex. The Chenier sub-basin lies between this ridge complex and the Gulf of Mexico. About 18 percent (128,200 acres) of the basin lands are publicly owned as Federal refuges and State wildlife management areas (Mouledous and Sharp 2016).

In terms of total area, Mermentau Basin experienced approximately 120,000 acres (~488 km²) of wetland loss from 1932 to 2016, and a change rate averaging -1,470 acres/year (-5.95 km²/year) (Couvillion et al. 2017). The two sub-basins suffer from distinctly different hydrologic problems. The most critical wetland problem in the Lakes sub-basin is excessive flooding due to numerous blockages of drainage outlets that increase water levels and prolong flooding. The higher water levels may also be responsible for shoreline erosion in this area (Mouledous and Sharp 2016). The same blockages to the north also reduce freshwater inputs into the Chenier sub-basin in the south, facilitating saltwater intrusion.

Shoreline protection features, like those in the project highlighted below, have effectively reduced or halted shoreline erosion in their project locations. Shoreline protection and terracing projects in Mermentau Basin have attributed to approximately 3,166 acres (+/- 1319 acres) of net land area benefit via new land built or land sustained from project

inception through 2020. In this basin, much of the land area benefits attained prior to 2005 were, at least ephemerally, lost due to Hurricane Rita. However, many of those project areas recovered, and as new projects were built, land area benefit has continued to increase. Additionally, land sustained accounts for a large portion of the land area benefit in this basin (Figure 3).

\$74 Million Expended
10 Projects Constructed

2 Projects in Engineering & Design
1 Project in Construction

Freshwater Bayou Canal Bank Stabilization (ME-13) Project

The ME-13 project area encompasses 1,169 acres of intermediate and brackish marsh along the west bank of Freshwater Bayou Canal (FBC) between its confluence with North Prong Belle Isle Bayou Canal and Six-mile Canal in Vermilion Parish, Louisiana. The marshes of the project area are adversely affected from the west by the influence of prolonged periods of elevated water levels from the Grand/White Lake system, and from the east by tidal scour and saltwater intrusion associated with erosion of the spoil banks along the west bank of FBC. In 1998, approximately 23,193 linear feet of rock dike was constructed as a shoreline protection feature to protect surrounding marshes.

The shoreline protection provided by the rock dike in the project area has been effective in reducing shoreline erosion where crown elevation is maintained. While there is evidence of erosion in the project area, the rates are very low. Overall from 1998-2014, the project shoreline erosion rates were around -0.61 feet/year (Barrilleaux and Guidry 2010). The unprotected reference area, in comparison, lost an average of -9.03 feet/year of shoreline. The ME-13 project area has increased in overall land acreage since construction.



Figure 4. The shoreline protection provided by the rock dike in the ME-13 project area has been effective in reducing shoreline erosion and has increased overall land acreage since construction.

TECHE-VERMILION BASIN

Land Change Dynamics

The Teche-Vermilion Basin contains roughly 300,000 acres (1,214.1 km²) of wetlands and is located in the central coastal zone. East Cote Blanche Bay, West Cote Blanche Bay, and Vermilion Bay are dominant features in the basin that influence the hydrology of the area. Marsh Island, another important feature on the landscape, serves as a barrier to reduce the influence of the more saline waters of the gulf on the marshes to the north. This barrier helps maintain the marshes in Teche-Vermilion as mostly fresh, intermediate, and brackish, with few saline marshes near the gulf.

The Teche-Vermilion Basin experienced one of the smaller net wetland area losses of the nine coastal basins with approximately 36,800 acres (149 km²) lost between 1932 and 2016 (Couvillion et al. 2017). Factors affecting wetland change in this basin include shoreline erosion, change in hydrologic conditions, storm impacts, and herbivory. Teche-Vermilion Basin follows a similar pattern to that of the coastwide trend of loss rates increasing to a peak in the late 1970s, followed by a reduction in loss rates since that time. The most recently published analyses indicate the wetland area change rate in Teche-Vermilion has turned positive in recent years. However, the impacts of the 2020 hurricane season may impact these trends.

Terracing, hydrologic restoration, marsh creation, and shoreline protection projects have had positive impacts on the landscape of the Teche-Vermilion Basin. Excluding hydrologic restorations, CWPPRA projects in this basin have collectively contributed approximately 1,388 acres (+/- 435 acres) of net land area benefit via new land built or land sustained from project inception through 2020. Though land area in the collective project areas in Teche-Vermilion Basin is relatively unchanged from the construction of the first CWPPRA project, the land sustaining effect of CWPPRA projects is evident (Figure 5). In the absence of these projects, projections indicate substantially more wetland loss would have been observed in these portions of Teche-Vermilion Basin.

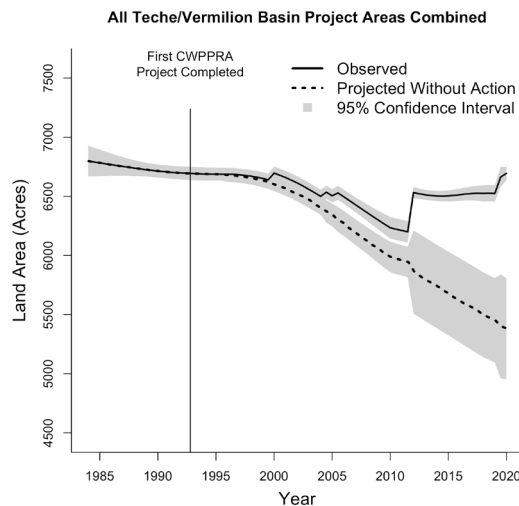
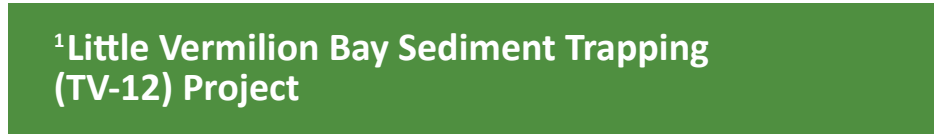


Figure 5. Cumulative land area change analyses for all constructed CWPPRA projects in Teche-Vermilion basin.

\$52.7 Million Expended

11 Projects Constructed

¹Little Vermilion Bay Sediment Trapping (TV-12) Project



Constructed in 1999, this project was designed to enhance the amount of wetlands created by natural deposition of sediments being carried by the GIWW and FBC into Little Vermilion Bay. The objectives were to enhance the amount of wetlands created by natural sediment deposition through the dredging of distributary channels, protect the existing wetlands by reducing wave energy by the creation of terraces, create emergent marsh on terrace and on newly deposited soils, and to encourage colonization by submerged aquatic vegetation between and around terraces.

The constructed terraces were very effective at creating emergent marsh habitat, starting below 20 acres in 1998 and nearing or surpassing 200 acres as of 2020 with continued growth expected (Figure 6). The terraces quickly vegetated, through plantings and natural recruitment, and the rate of sedimentation increased post construction. Most of the inter-terrace areas transitioned from distributary channels and shallow bay bottom (≤ -6 ft to -2 ft NAVD) to intermittently exposed tidal flat soon after construction (Wood et al 2016). Leveraging synergies, tidal flats created by sediments trapped by the terrace field were planted by CWPPRA's Coastwide Vegetation Planting Project (LA-39) and since transitioned to marsh. As of 2020, the combined efforts of both projects in the one location have resulted in an emergent marsh area that is double the original area of terrace construction.

TV 12 Land Area (acres)

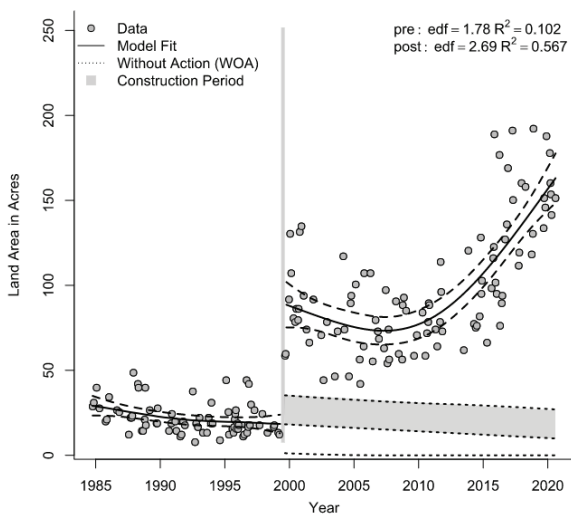


Figure 6. TV-12 land area change analyses.

¹Data points in Figure 6 and other similar graphs through this report represent observed land area on specific dates. In the figure, construction completion is shown with a vertical grey bar. The model fit represents a pre-and post-construction period of land area change with a 95 percent confidence interval shown by dashed lines. In the case of Figure 6, if TV-12 wasn't constructed, the projected conditions of land area change would have followed a negative trend, as shown by the dotted line with grey shading.

ATCHAFALAYA BASIN

All Atchafalaya Basin Project Areas Combined

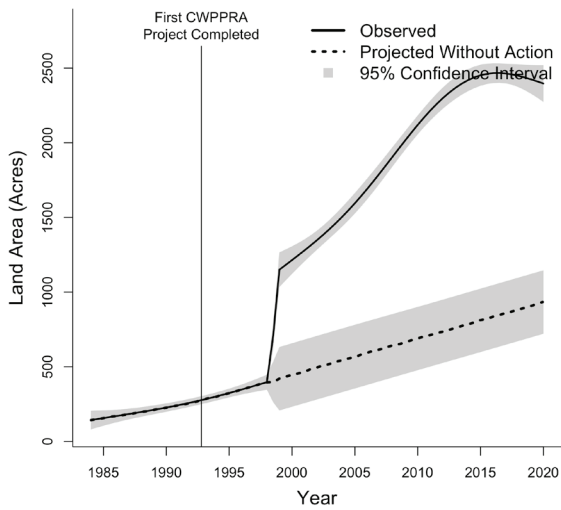


Figure 7. Cumulative land area change analyses for all constructed CWPPRA projects in Atchafalaya basin.

Land Change Dynamics

The Atchafalaya Basin is located in the central part of the coastal zone, west of the Terrebonne Basin (Figure 7). Major water features in the basin include the Lower Atchafalaya River, Wax Lake Outlet, and Atchafalaya Bay. Fresh marsh, wetland scrub-shrub, and forested wetlands are the dominant wetland habitats. The most distinct geomorphologic feature of the Atchafalaya Basin are the two rapidly prograding deltas - the Atchafalaya River Delta and the Wax Lake Outlet Delta. Subaerial delta growth in the Atchafalaya Bay began in the early 1970s and subsequent spring floods have supported continued delta expansion (Falcini et al. 2012, Carle et al. 2015, Gasparini and Yuill 2020).

The Atchafalaya Basin is unique among the coastal basins because it has a growing delta system with nearly stable wetlands. Wetland loss is minor in the areas north of Atchafalaya Bay when compared to the other basins. According to Couvillion et al. (2017), the basin experienced more than 4,000 acres (~16 km²) of net wetland gain since 1932. Annual land change rates early in the study period showed a negative trajectory. However, following the opening of the Wax Lake Outlet in 1942, sediment deposition increased, and a subaerial active delta emerged after the flood of 1973. These factors positively influenced the Atchafalaya Basin's land change rates. Atchafalaya Basin wetlands are likely to be sustainable into the future due to the high rates of river sedimentation that they receive during flooding events.

Because this basin has experienced net wetland gain for the last 50 years, it has not been a major focus for wetland restoration projects. However, two CWPPRA projects in this basin (AT-02 and AT-03) have contributed approximately 1,421 acres (+/- 258 acres) of wetlands to the area collectively via new land built or land sustained from project inception through 2020. These projects consist of beneficial use of dredge material (BUDMAT). In these restoration projects, the material from dredging to maintain navigation in the Atchafalaya River channel was used to create wetlands in the Atchafalaya Delta. Project benefits have continued to increase through time as a result of recurring BUDMAT activities, as well as natural sedimentation contributing to the land building effects of these projects.

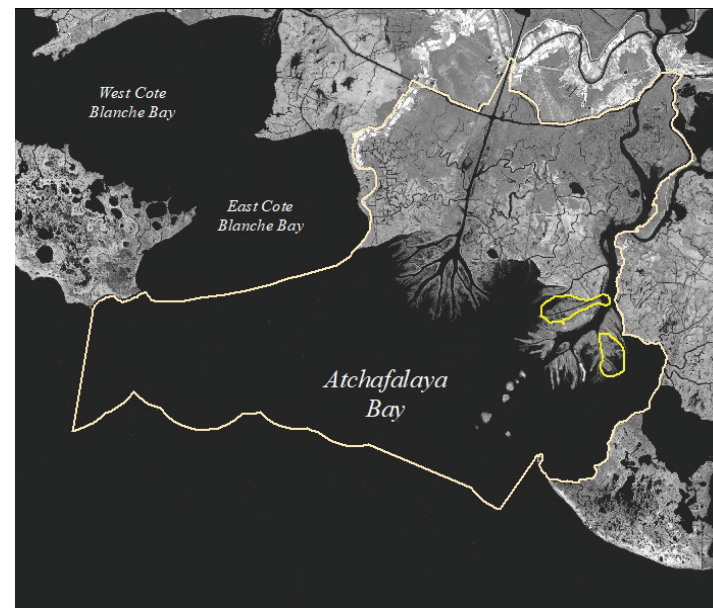


Figure 8. Atchafalaya Sediment Delivery (AT-02) and the Big Island Mining (AT-03) Projects.



Figure 9. Fresh marsh, wetland scrub-shrub, and forested wetlands are the dominant wetland habitats in the Atchafalaya Basin.

\$10.9 Million Expended

2 Projects Constructed

TERREBONNE BASIN

Land Change Dynamics

The Terrebonne Basin consists of marshes and a network of old distributary ridges left by an abandoned delta complex. It experiences high subsidence due to the unconsolidated sediments that are dewatering and compacting. The basin is also known for the series of narrow, low-lying barrier islands at its border with the Gulf of Mexico. These islands serve as the first line of defense against tropical storms. The Terrebonne Basin is dominated by marsh (approximately 574,000 acres; 2,322.9 km²), but also supports swamp habitat (approximately 155,000 acres; 627.3 km²).

Terrebonne Basin has experienced the greatest decrease in wetland area, with approximately 321,730 acres (1,302 km²) of net loss since 1932 (Couvillion et al. 2017). The basin experienced higher annual change rates in the late 1970s to early 1980s, with gradually decreasing loss rates since that time. Land change in the Terrebonne Basin is attributed to subsidence, sediment deficit, saltwater intrusion along navigation canals, historic oil and gas activity, habitat switching due to prolonged high water levels (swamp/fresh marshes) and natural deterioration of barrier islands.

Restoration activities in the Terrebonne Basin include marsh creation, shoreline protection, hydrologic restoration and barrier island restoration. Excluding hydrologic restorations, CWPPRA projects in the Terrebonne Basin have collectively contributed approximately 5,494 acres (+/- 1636 acres) of net land area benefit via new land built or land sustained from project inception through 2020. Both land building and land sustaining effects of CWPPRA projects in this basin have continued to increase through time (Figure 10).

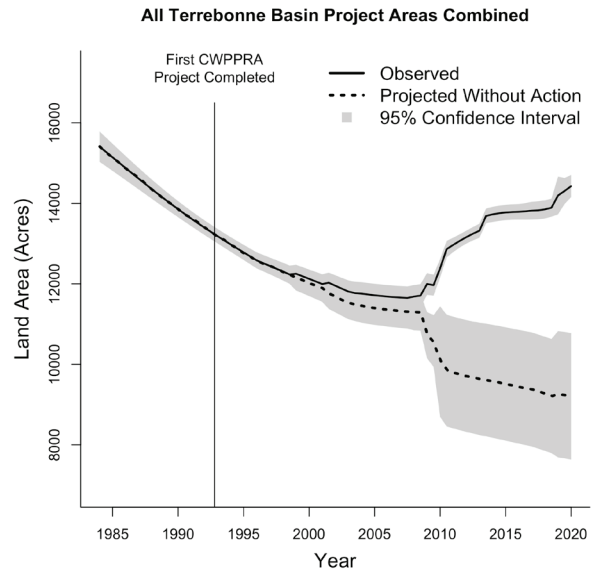


Figure 10. Cumulative land area change analyses for all constructed CWPPRA projects in Terrebonne basin.

\$301 Million Expended
26 Projects Constructed

5 Projects in Engineering & Design
2 Projects in Construction

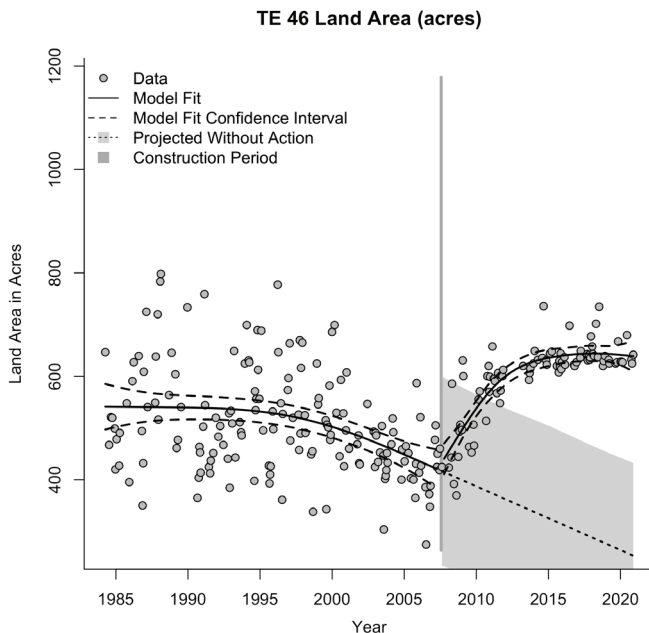


Figure 11. TE-46 land area change analyses.

land inside the project boundary, while the creation cells contained a total of 215 acres of land (USGS/NWRC 2013). The decreasing land area between 2005 and 2008 is likely due to the impacts from several powerful tropical systems. A marked upward trend occurred when project construction was completed in 2009. Since 2011, the land area within the project has been relatively stable.

West Lake Boudreaux Shoreline Protection and Marsh Creation (TE-46) Project

The TE-46 project was completed in fall 2009. The project consists of three segments of foreshore rock dike with corresponding marsh creation areas that parallel the northwestern rim of Lake Boudreaux. Land loss in this area is due to a combination of natural processes and anthropogenic alterations, including sediment starvation from the construction of a dam across the head of Bayou Lafourche at Donaldsonville in 1904, subsidence, saltwater intrusion, and shoreline exposure to wind-generated wave energy, most notably from major hurricanes.

The project features were designed to reduce shoreline erosion and to create additional marsh along the northwest shoreline of Lake Boudreaux while protecting shallow aquatic grass beds adjacent to the shoreline. Approximately 12,447 linear feet of rock dike, 220 acres of marsh creation, one 150 linear foot choke-down structure, and 24,553 linear feet of earthen containment were constructed.

Land/water analysis using aerial imagery indicates that the project has been successful at reducing shoreline erosion and increasing land area. The shoreline behind the foreshore rock dike slightly prograded one-year post-construction at a rate of 0.03 feet/year (0.01 m/year). Based upon the 2012 post-construction land/water analysis, there were 484 acres of

BARATARIA BASIN

Land Change Dynamics

Barataria Basin is located to the south-southwest of New Orleans. The eastern border of the basin is the Mississippi River and the western border is near Bayou LaFourche. It contains vast expanses of forested and herbaceous wetlands spanning from saline to freshwater environments.

Barataria Basin has experienced the second greatest land loss of the nine basins in coastal Louisiana, with a net loss of approximately 277,000 acres (1,120.0 km²) of wetlands since 1932. Rates of wetland loss have ranged from a net loss of approximately 6,178 acres/year (25.0 km²/year) at the peak of wetland loss rates, to a loss of 210 acres/year (0.8 km²/year) most recently (Couvillion et al. 2017). Wetland loss within the basin is attributed to a combination of natural and anthropogenically-influenced factors, including sea level rise, subsidence, shoreline erosion, herbivory, and human development, such as channelization and levee construction. Tropical storm impacts are also a major contributor to wetland loss in the basin. The wetland impacts of the record breaking 2020 season are still under investigation.

Excluding hydrologic restorations, CWPPRA projects have collectively contributed to approximately 7,866 acres (+/- 914 acres) of net land area benefit via new land built or land sustained from project inception through 2020. Projects in Barataria consist of marsh creation, shoreline protection, and barrier island restoration projects. The benefits from these projects have continued to increase through time. This increasing benefit is the result of additional project construction and the land-sustaining effects of projects such as shoreline protections, which continue to reap rewards (Figure 12).

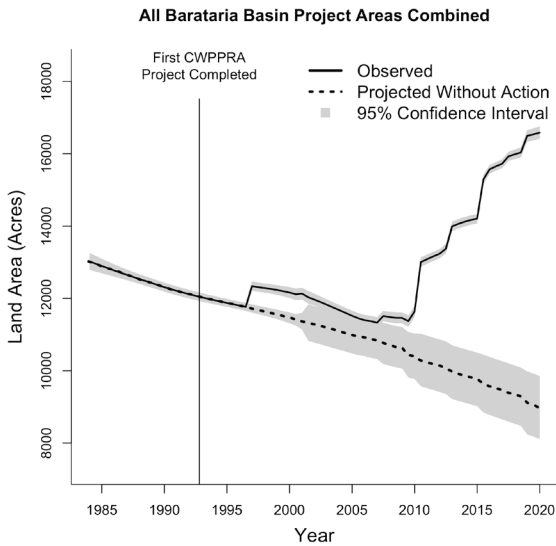


Figure 12. Cumulative land area change analyses for all constructed CWPPRA projects in Barataria basin.

\$444 Million Expended
21 Projects Constructed

4 Projects in Engineering & Design
2 Projects in Construction

Bayou Dupont Sediment Delivery Marsh Creation #3 and Terracing (BA-164) Project

The BA-164 project is the third in a series of neighboring marsh creation projects that are increasing coastal resiliency in a region that has suffered from significant marsh loss. The project is located on the west bank of the Mississippi River in the Barataria Basin; it is adjacent to the first CWPPRA Bayou Dupont project (BA-39) and also synergistic with the nearby hurricane protection levee system. Construction of the BA-39 project was completed in May 2010, and this project has since demonstrated how Mississippi River sediment can be used to create sustainable marsh habitat. The BA-164 project has two components, a 144-acre marsh creation area that was constructed using sediment dredged from the river and 14 terraces totaling 9,679 linear feet that were constructed using sediment dredged from within the project area (Figure 13). Successful construction of these components and development of an emergent, intermediate marsh habitat are the primary goals of the project. An additional 128 acres of marsh were constructed adjacent to the BA-164 marsh creation area using the Coastal Impact Assistance Program and state surplus contingency funds from the Long Distance Sediment Pipeline (LDSP) project (BA-0043-EB), (Figure 13). The LDSP was used to deliver sediment dredged from the Mississippi River to the shallow, primarily open water project sites for marsh construction. Construction of the marsh creation areas was completed in September 2016, while construction of the terraces was completed in June 2017.

Intermediate and freshwater emergent marsh and scrub-shrub vegetation species have rapidly colonized the BA-164 marsh creation area. While the marsh creation area was allowed to completely self-vegetate, the terraces were planted to enhance early natural stabilization and protection. While early in its project life, vegetation data indicate that BA-164 can be expected to continue development into a mature, stable marsh habitat that will provide ecological benefits well into the future.

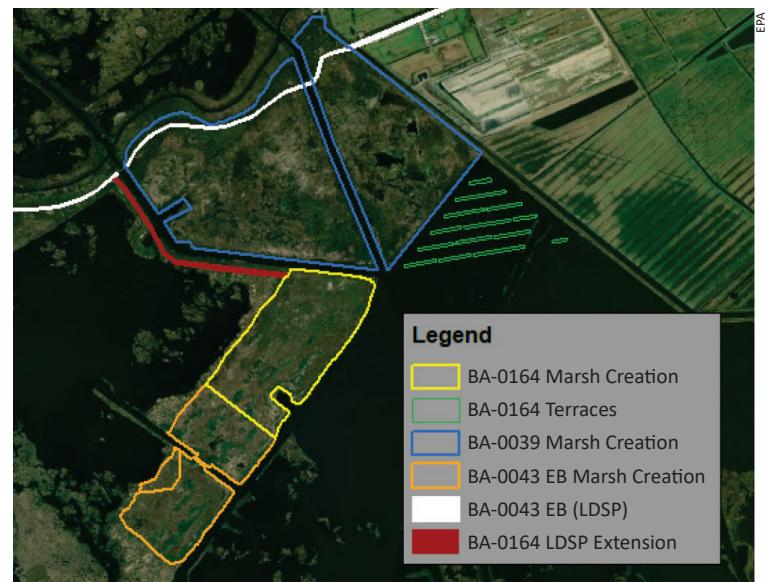


Figure 13. BA-164 Project Area.

MISSISSIPPI RIVER DELTA

Land Change Dynamics

The Mississippi River Delta Basin is located in the southeast of Louisiana's coastal zone on the edge of the Gulf of Mexico's continental shelf. Major water bodies include the mainstem Mississippi River, South Pass, and Pass a Loutre, all of which are directly connected to the Gulf of Mexico. Water and sediment from 32 states and 2 Canadian Provinces pass through the Mississippi River Delta. Its bird's foot configuration is characteristic of alluvial deposition in deep water. In this configuration large volumes of sediment are required to create land area; consequently, land is being lost in this delta more rapidly than it is being created. However, the basin contains expanses of fresh and intermediate marshes.

Similar to other hydrologic basins, the Mississippi River Basin has experienced a net decrease in wetland area from 1932 to 2016. The total wetland area of the basin has decreased by 92,665 acres (375.0 km²). As a percentage of the 1932 area, the basin has experienced the greatest percentage decrease in wetland area of approximately -55 percent of total area (Couvillion et al. 2017). The Mississippi River Delta Basin has experienced a reduction in wetland loss rate since the 1960s, reaching a point of wetland gain for portions of the 1990s, only to be followed by a negative trend due to the effects of Hurricane Katrina in 2005 (Barras, 2006). The major causes of land loss in this basin are subsidence and compaction. Unlike other areas of coastal Louisiana, the Mississippi River Delta has a relative abundance of inflowing fresh water and sediments. Despite the availability of these resources, the overall growth of emergent delta has been truncated. In the present position, the Mississippi River deposits sediments into much deeper water than has been the case historically. These unconsolidated sediments are highly susceptible to compaction, reducing the life span of emergent wetlands.

This basin contains three hydrologic restoration/crevasse management projects and one marsh creation demonstration project. Restoration projects in the Mississippi River Delta Basin are thought to have contributed to an estimate of approximately 4,971 acres (+/- 873 acres) of net land area benefit collectively via new land built or land sustained from project inception through 2020. Project areas were projected to remain relatively stable in the absence of project construction in this basin, due in large part to the sediment deposition provided by the Mississippi River. However, the crevasse management projects, which operate in some ways similar to sediment diversions, have led to increasing land building in these areas (Figure 14).

All Mississippi River Delta Basin Project Areas Combined

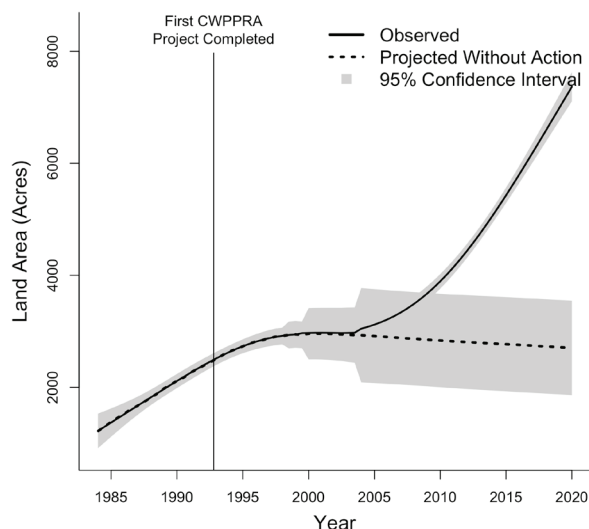


Figure 14. Cumulative land area change analyses for all constructed CWPPRA projects in Barataria basin.

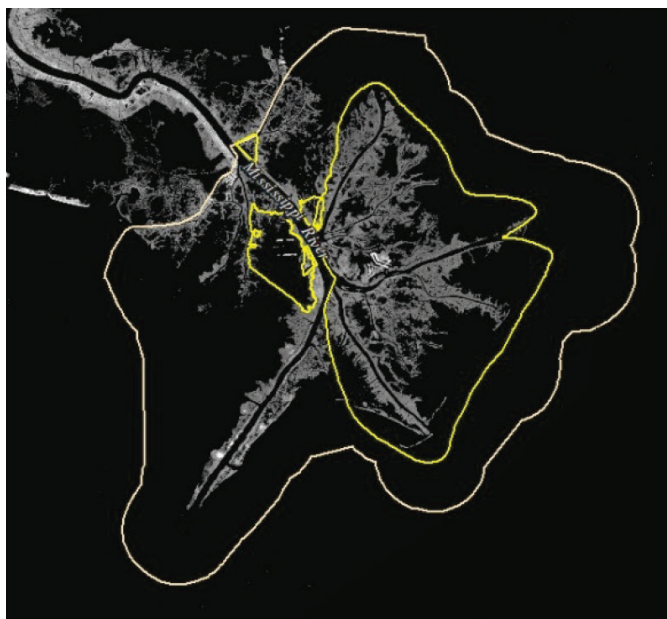


Figure 15. There are four CWPPRA projects in the Mississippi River Delta.



Figure 16. A view towards the southwest at the entrance of the West Bay Sediment Diversion (MR-03). A mature network of distributary channels weaves through naturally formed and engineered features in West Bay that are no longer distinguishable. Equipment staged at the diversion's entrance prepares to distribute dredged material to various parts of the system.

\$53.3 Million Expended

4 Projects Constructed

BRETON SOUND BASIN

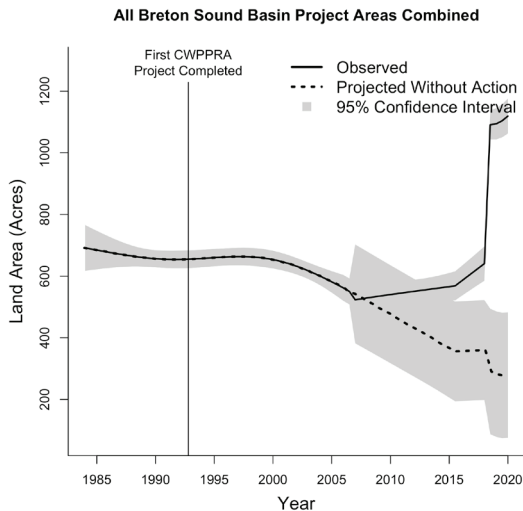


Figure 17. Cumulative land area change analyses for all constructed CWPPRA projects in Breton Sound basin.

Land Change Dynamics

Breton Sound Basin is located in the southeast of Louisiana’s coastal zone, east of New Orleans. Major water bodies that influence the Breton Sound are the Mississippi River, Bayou Terre aux Boeufs, and Lake Lery. The southern portion of the basin is directly connected to the Gulf of Mexico. The marshes in the basin transition from saline near the gulf, to fresh north of Lake Lery.

Breton Sound Basin experienced a net decrease of 105,267 acres (426.0 km²) in wetland area from 1932 to 2016. In the basin, loss rates have increased since the late 1970s, but in recent years, the rate of land loss is decreasing (Couvillion et al. 2017). The major causes of land loss in this basin are sediment deprivation, saltwater intrusion, and shoreline erosion. Hurricane Katrina, 2005, was a major source of land loss in the basin. However, excluding those hurricane effects, CWPPRA marsh creation and terracing projects have contributed to an estimated net land area benefit of approximately 860 acres (+/- 212 acres) either from new land built or land sustained, from project inception through 2020. This benefit is the result of two constructed projects, (1) Delta Management at Fort St. Philip (BS-11), which consists of terracing and crevasse management and (2) South Lake Lery Shoreline and Marsh Restoration (BS-16), a shoreline protection and marsh creation project. While land-area benefit was initially slow to be realized after the construction of BS-11 in 2006, the eventual land building and sustaining effects of the crevasse management and terraces has led to approximately 260 acres of benefit by 2020. The marsh creation benefits of BS-16, beginning in 2016, are much more evident as a dramatic spike in land area in Figure 17.

Recent planning efforts to address the basin’s wetland loss include the approval of seven marsh restoration projects that, once built, will create a land bridge across the upper basin. While these are still in engineering and design, they demonstrate the synergistic approach to restoration that CWPPRA strives to accomplish.

\$37.7 Million Expended
3 Projects Constructed

7 Projects in Engineering & Design
1 Project in Construction

South Lake Lery Shoreline and Marsh Restoration (BS-16) Project

Completed in 2017, the BS-16 project is located within the Breton Sound hydrologic basin. Prior to construction, the project area had experienced tremendous loss of emergent wetlands, which was exacerbated by Hurricane Katrina in 2005. The purpose of the BS-16 project was to restore historic marsh conditions by re-establishing the shoreline of Lake Lery and by creating new emergent wetlands.

Mechanically dredged material was excavated from near shore water bottoms and used to restore 35,831 linear feet of the Lake Lery shoreline through the creation of a shoreline berm, resulting in the creation of approximately 55 acres of wetlands. Additionally, hydraulically dredged bottom sediments from Lake Lery were pumped into shallow open water and fragmented marsh areas to create approximately 496 acres of intermediate marsh in five marsh creation areas. Additional dredged material was deposited in several shallow, open water areas behind the marsh creation areas, creating and nourishing additional marsh. Final acreages will be quantified after land/water analysis of aerial photography takes place. Immediately following construction, the shoreline berm was planted with smooth cordgrass and California bulrush to help prevent erosion. Additional plantings are planned to address ongoing erosion concerns for portions of the project area.

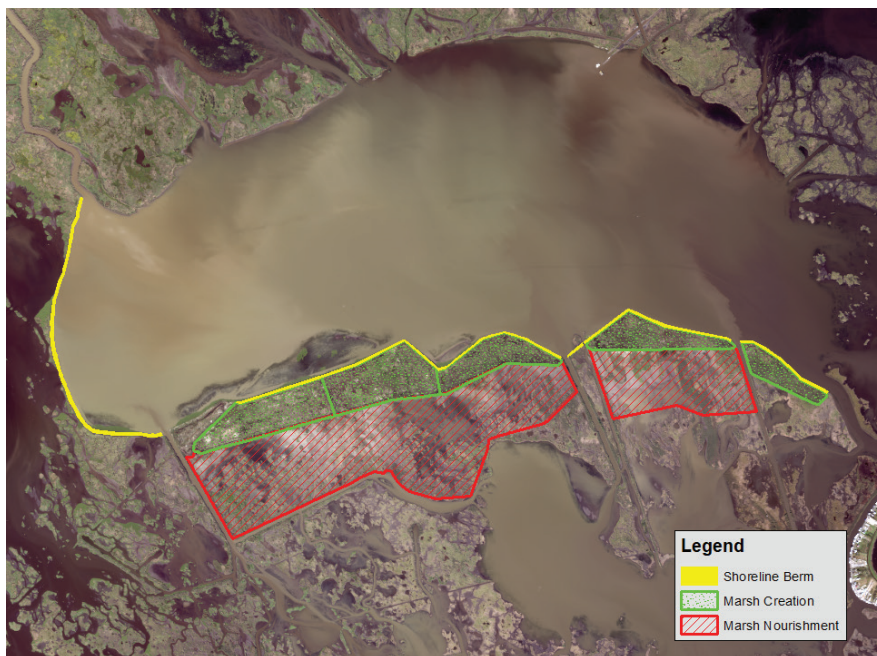


Figure 18. BS-16 Project Area.

PONTCHARTRAIN BASIN

Land Change Dynamics

The Pontchartrain Basin is an abandoned delta bordered by the Pleistocene Terrace on the north and west, Mississippi River on the south and the Chandeleur Islands on the east. Three major lakes, Maurepas, Pontchartrain, and Borgne, cover approximately 55 percent of the basin and are separated by associated land bridges. New Orleans is located within the basin adjacent to the southern shore of Lake Pontchartrain. Forested wetlands cover the western portion of the basin, transitioning to a gradient of fresh, intermediate, brackish, and saline marshes from west to east toward the Gulf of Mexico.

Pontchartrain Basin has experienced a decrease in wetland area, with approximately 116,634 acres (472 km²) of net loss since 1932 (Couvillion et al. 2017). The rate of land change in the Pontchartrain Basin did not change significantly from 1932 to 2016. Wetland loss in this basin is attributed to limited riverine input, erosion, and deteriorating land bridges on the east and west sides of Lake Pontchartrain.

Restoration activities in the Pontchartrain Basin include marsh creation, shoreline protection, hydrologic restoration and barrier island restoration. Excluding hydrologic restoration projects, CWPPRA projects in the Pontchartrain Basin have contributed approximately 1,745 acres (+/- 251 acres) of net land area benefit to the landscape collectively via new land built or land sustained from project inception through 2020. Episodic increases in land area benefit in this basin are evident, as three large marsh creation projects were successively constructed. In addition to the land built, each of the CWPPRA projects in this basin have contributed to a land sustaining effect, as evident in the divergence of the observed land area and without action projections (Figure 19).

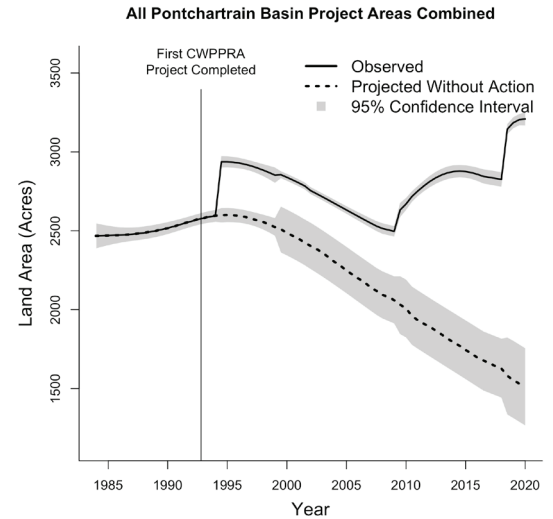


Figure 19. Cumulative land area change analyses for all constructed CWPPRA projects in Pontchartrain basin.

\$94 Million Expended
11 Projects Constructed

4 Projects in Engineering & Design
3 Projects In Construction

Constructed in 2017, the PO-104 project is located on the Big Branch Marsh National Wildlife Refuge along the northeastern corner of Lake Pontchartrain. Prior to construction, the poor condition of this marsh was due to a combination of subsidence, hurricane-induced interior ponding, and shoreline erosion. Several breaches existed along the shoreline and, in places, only a narrow strip of shoreline existed between Lake Pontchartrain and the interior ponds. Should shoreline breaching and enlargement of tidal channels have been allowed to extend, high tidal energy would have intruded into the interior ponds of the project area. This would have caused the interior marshes to experience accelerated loss rates.

Bayou Bonfouca Marsh Creation Project (PO-104)



Figure 20. PO-104 Project Area.

The goal of the PO-104 project was to re-create and nourish approximately 639 acres of low salinity brackish marsh in open waters adjacent to Bayou Bonfouca using sediment dredged from Lake Pontchartrain. Four marsh creation areas comprising 605 acres were filled with hydraulically dredged material. After material placement was complete in the marsh creation areas, additional dredged material was deposited outside of containment, creating an additional 281 acres of marsh in adjacent open water areas and nourishing many more. Final acreages will be quantified after land/water analysis of aerial photography takes place. In October of 2018, native marsh plants were planted to supplement the natural colonization of vegetation within the marsh creation areas. In late 2021, tidal creeks were constructed in the marsh creation areas to ensure hydrologic connection with the surrounding area, thus improving fish and wildlife habitat, and creating access for recreation.

DEMONSTRATION PROJECT

Non-Rock Alternatives to Shoreline Protection Demonstration (LA-16)

Approved: 2009

Constructed: February 2014

The CWPPRA Program encourages the assessment and use of new technology in coastal restoration to adapt to changing conditions through demonstration projects. As shorelines erode inland, the typical berm setting suited for high exposure to wind and waves thins, exposing the more fragile marsh edge to hydrologic forces. Shoreline protection becomes more complicated as former marsh platforms have a low weight-bearing capacity and require lower-density or pile-supported structures.

LA-16 assessed four commercially available structures appropriate for such shorelines along northeast Vermilion Bay. Wave Attenuation Devices (WADs) and Wave Screen System (WSS) were porous to allow water and sediment to pass through, while Buoyancy Compensated Erosion Control Modular System and EcoSystem Units were full water-column wave barriers (McGinnis 2018). While the reference area eroded 51 feet/year from 2014 to 2017, all structures attenuated waves by at least 60 percent and reduced shoreline erosion by at least 70 percent. The more porous structures gained soil volume along the shoreline, and the WSS, which was suspended a couple feet above the bay bottom, also gained soil volume on the bayside of the structure (Figure 21). LA-16 data was prominent in a Louisiana coast-wide synthesis of 12 shoreline protection structures that revealed a positive relationship between structure porosity up to 35 percent and soil volume change (Shows 2018; Figure 23).

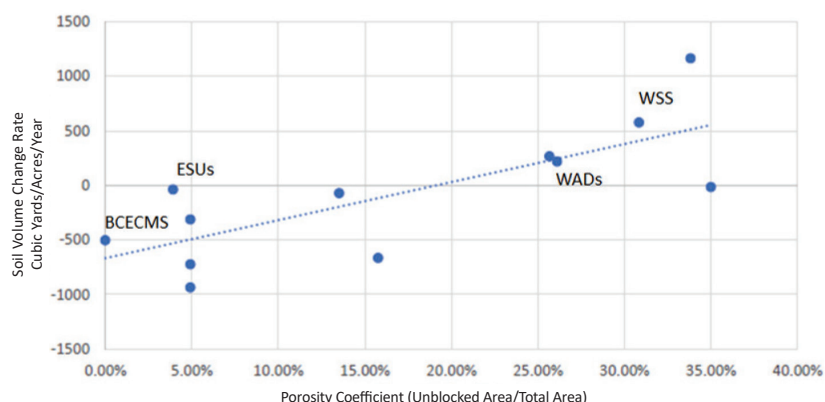


Figure 21. Left. Relationship between structure porosity and soil volume change behind shoreline protection structures across coastal Louisiana featuring LA-16 structures (adapted with permission from Shows 2019).

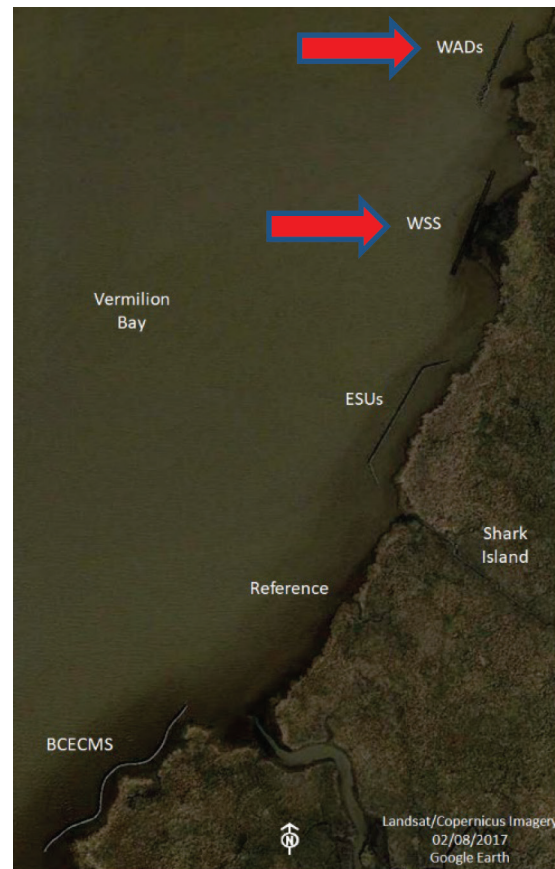


Figure 23. Aerial imagery during low water levels about 3 years after installation of LA-16 structures. Note mudflat formation behind the porous WADs and WSS.



Figure 22. CWPPRA provides opportunities to assess new wetland restoration techniques. Demonstration projects can be proposed at Regional Planning Team Meetings like the one pictured here from 2018 in Morgan City.



Figure 24. A close up image of each section of structures shows a better view of mudflat formation behind the WADs and WSS.

Coastwide Reference Monitoring System (CRMS)

In response to the need for enhanced evaluation and monitoring of Louisiana's growing coastal restoration program, CWPPRA developed the Coastwide Reference Monitoring System-Wetlands (CRMS-Wetlands) to provide a pool of reference sites by which to evaluate the effectiveness of individual restoration projects, as well as the overall program, and to provide a means to assess landscape change (Steyer et al., 2003a). The CRMS network of sites is comprised of approximately 390 ecological monitoring locations distributed across Louisiana's nine coastal basins within and outside of project boundaries (Figure 25). The sites encompass a range of ecological conditions, including fresh, intermediate, brackish, and salt marsh and swamp habitat, and are monitored using standardized data collection techniques at fixed sampling schedules. The reference network approach enables multiple scale evaluations of project conditions by habitat, basin or coast-wide. Construction of most CRMS sites occurred from 2005-2007 with continuous data collection since that time.

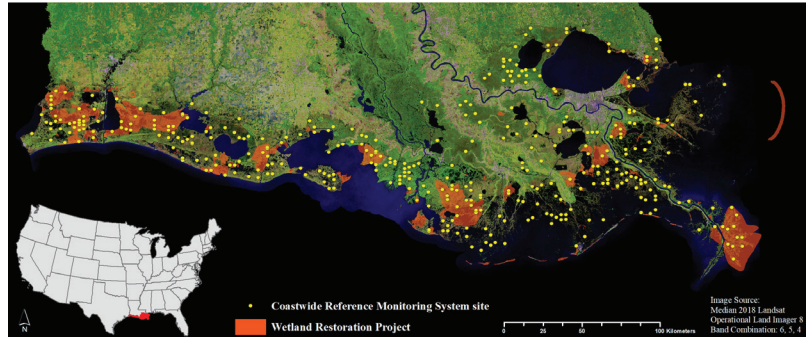


Figure 25. Distribution of CRMS sites and CWPPRA projects across the Louisiana coast.

Data variables collected at each CRMS site include water level, salinity, sediment accretion, surface elevation change, composition and abundance of vegetation, and soil characteristics within a 200 m² sampling area (Figure 25). The ratio of land to water is determined within a larger 1 km² area encompassing the sampling area to monitor land change through time. After the data undergo quality assurance and control procedures, data are approved and entered into the CPRA's Coastal Information Management System database (<https://cims.coastal.louisiana.gov/>). CRMS data feed into interpretable tools that can be used to assess the condition of individual CRMS sites, restoration projects, hydrologic basins, and the entire Louisiana coast. Calculated or derived data (e.g., averages, marsh classification, elevations, elevation change rates, and CRMS indices) are hosted on the CRMS website (<https://www.lacoast.gov/crms/Home.aspx>). Information is analyzed and summarized in maps, charts, tables, graphs, and indices, and lastly incorporated into interactive report cards. The CRMS program is as dynamic as the coastal habitats it monitors. Continuously evolving, the program continues to develop new products and analysis tools to improve project planning and implementation, and to support the evaluation of restoration actions planned and implemented by not only the CWPPRA Program but other coastal restoration programs across the State as well. In addition to the integral role CRMS data play for CWPPRA project planning and evaluation, CRMS data are leveraged to support adaptive management, future scenario modeling, and scientific research.

COASTWIDE REFERENCE MONITORING SYSTEM STATIONS in Barataria Basin

HYDROGRAPHIC STATIONS		SOIL POREWATER STATION	SURFACE ELEVATION CHANGE STATION	VERTICAL ACCRETION STATION
<p>M01 Vertical movement of marsh mats</p> <p>H01 Hourly Underwater Sonde</p>	<p>M01 Floating System: This monitoring system is deployed in thick marsh mats that can support instrument weight. The data sonde is suspended in the fluid ooze layer and records vertical mat movement, salinity, and water temperature.</p>	<p>M01 Static System: An anchored pulley system is used to record vertical mat movement in thin marsh mats that cannot support the weight of the monitoring equipment.</p>	<p>P01, P02 Soil Porewater Salinity</p> <p>E01 Surface Elevation Changes</p>	<p>A01 Soil Accretion</p>
<p>H01 - Installed in open water, this sonde captures hourly salinity, water surface elevation, and water temperature data.</p>		<p>P01, P02 - Water samples are extracted from 10 cm and 30 cm depths using a syringe. The pore water samples are used to assess the salinity that the root zone experiences.</p>	<p>E01 - This station uses a Rod Surface Elevation Table (RSET) instrument to measure surface elevation changes relative to a steel rod that is set deep (~100 ft) into the marsh subsurface. An RSET table connects to the rod using a permanently attached collar and measurements are taken by lowering 9 fiberglass pins to the marsh surface. Data are collected over time to measure changes in surface elevation.</p>	<p>A01 - Soil accretion, or land building, data are collected by measuring soil that accumulates above a feldspar marker horizon that has been previously placed on the marsh surface. A specialized cryogenic coring device is used to ensure accurate readings of the feldspar location within the core.</p>

CPRA, USGS

Conclusion

The CWPPRA Program has been actively rebuilding wetlands and helping address coastal land loss for over 30 years. Projects that have rebuilt the barrier islands, improved coastal and interior marshes, and restored natural hydrologic regimes have all improved the coastal landscape.

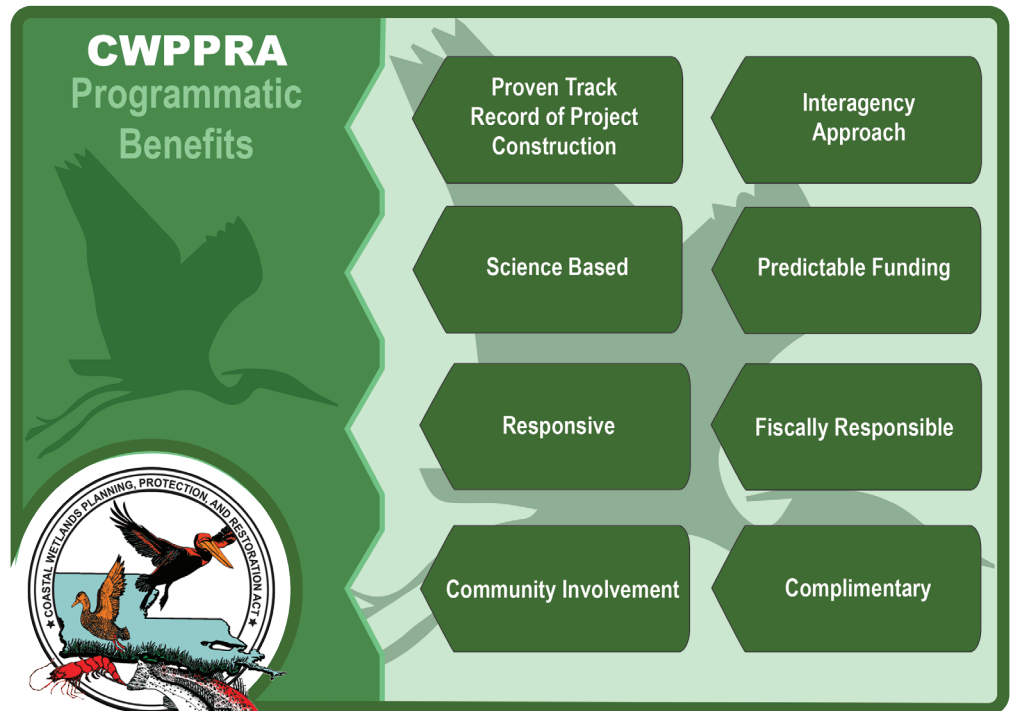
Capitalizing on CWPPRA's public planning process, which includes local government and citizen contribution to project nomination and development, several comprehensive restoration plans have been developed and widely accepted. CWPPRA has laid the foundation on which subsequent restoration initiatives have been modeled. In fact, several projects that have been designed through CWPPRA have been adopted and constructed through these other programs and initiatives. This type of synergy between funding vehicles supports efficiencies in project implementation.

A diverse, interdisciplinary team of academics, scientists, and engineers collects and analyzes data from CWPPRA projects using the CRMS and project-specific monitoring to evaluate the ecologic response from within the project footprint to the entire ecosystem. This helps guide the program to develop projects with a science-driven process. Using technological advances, the program supports successful restoration while monitoring and evaluating the success of projects to produce low cost restoration techniques for realistic future application.

CWPPRA's funding source, the Sport Fish Restoration and Boating Safety Trust Fund, authorized through Fiscal Year 2021 by the Fixing America's Surface Transportation Act of 2015, is supported by excise taxes on fishing equipment, and small engine and motorboat fuel taxes. The fund contributes 18.673 percent of its annual revenues to CWPPRA appropriations, 70 percent of which supports the Louisiana CWPPRA Program. With predictable funding through the Federal Sport Fish and Boating Safety Trust Fund and the experienced interagency team of coastal scientists and engineers, CWPPRA is, and will continue to be, uniquely able to quickly construct cost effective priority projects, typically within 3 to 5 years.

With a project selection process that funnels new projects into planning, engineering and design, and construction phases every year, the restoration of coastal Louisiana through the CWPPRA Program is only limited by funding. Shovel-ready projects are always in the queue and additional funding could be executed quickly to advance project implementation.

Overall, CWPPRA is meeting an otherwise unfilled niche by building near-term projects in acute, and often highly strategic, areas of need. This continues to be CWPPRA's greatest asset and contribution to turning the tide on Louisiana's land loss.



USGS

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Appendices

Appendix 1. Useful Links

<http://www.lacoast.gov/new/Projects/List.aspx>

Complete list of authorized projects under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) since its implementation in 1990

<https://www.lacoast.gov/crms/Home.aspx>

Monitoring data at 390 Coastwide Reference Monitoring System (CRMS) sites

<http://www.mvn.usace.army.mil/Missions/Environmental/CWPPRA/Meeting-Documents/>

CWPPRA Public Meeting Documents

<http://www.mvn.usace.army.mil/Missions/Environmental/CWPPRA/Priority-Project-Lists/>

CWPPRA Priority Project List Documents and Process

<https://www.lacoast.gov/calendar/>

CWPPRA Meeting Calendar

<http://coastal.la.gov/our-plan/2017-coastal-master-plan/>

2017 Coastal Master Plan

Task Force Member Agencies:

<https://www.fws.gov/southeast/lafayette>; <http://www.fws.gov/coastal/CoastalGrants/>

U.S. Department of the Interior (represented by the U.S. Fish and Wildlife Service)

<https://www.nrcs.usda.gov/wps/portal/nrcs/site/la/home/>

U.S. Department of Agriculture (represented by the Natural Resources Conservation Service)

<http://habitat.noaa.gov/restoration/index.html>

U.S. Department of Commerce (represented by the National Oceanic and Atmospheric Administration
National Marine Fisheries Service)

<https://www.epa.gov/la/water-louisiana>

U.S. Environmental Protection Agency (represented by the Water Quality Protection Division of EPA Region 6)

<http://www.coastal.la.gov/>

Louisiana's Governor's Office (represented by the Coastal Protection and Restoration Chairman)

<http://www.mvn.usace.army.mil/Missions/Environmental/CWPPRA>

U.S. Army Corps of Engineers (represented by the New Orleans District)

Appendix 2.

Table 1. Louisiana waterfowl, other migratory and resident birds, and mammals, reptiles, and amphibians benefited by CWPPRA projects.

Dabbling ducks	Diving ducks	Geese	Other migratory and resident birds	Mammals, reptiles, and amphibians
Mallard, mottled duck, gadwall, American widgeon, pintail, northern shoveler, green-winged teal, and blue-winged teal.	Lesser scaup, ring-necked duck, and several merganser species.	White-fronted geese, Canada geese, and snow geese	<p>Brown and white pelicans cormorants and anhingas.</p> <p>Hérons: great blue heron, little blue heron, bitterns, green-backed heron, yellow-crowned night heron, black-crowned night heron, great egret, snowy egret, glossy ibis, white-faced ibis, and white ibis.</p> <p>Others: American coots, rails, gallinules, shorebirds, terns, boat-tailed grackle, red-winged blackbird, eastern kingbird, northern harrier, belted kingfisher, and songbirds.</p>	<p>Mammals: Louisiana black bear, nutria, muskrat, mink, river otter, raccoon, swamp rabbit, coyote, and white-tailed deer</p> <p>Reptiles: American alligator, western cottonmouth, red-eared turtle, common snapping turtle, and soft-shell turtle</p> <p>Amphibians: tree frogs, bullfrog, pig frog, leopard frogs, and salamanders</p>

Table 2. Commercially and recreationally important fisheries species benefited by CWPPRA projects.

Freshwater fisheries	Commercially important fisheries	Recreationally important estuarine species
Largemouth bass, crappie, bluegill, gar, blue catfish, and shad. Crawfish and river and grass shrimp	Gulf menhaden, striped mullet, catfishes, gars, and freshwater drum. Brown and white shrimp, blue crab, Gulf stone crab, and the American oyster	Spotted sea trout, white trout, red drum, black drum, Atlantic croaker, spot, southern flounder, snappers, mackerel, groupers, and sharks.



The 2021 Evaluation Report to the U.S. Congress
on the Effectiveness of Coastal Wetlands Planning,
Protection and Restoration Act (CWPPRA) Projects