Coastal Protection and Restoration Authority of Louisiana

State of Louisiana
Coastal Protection and Restoration Authority

2011 Operations, Maintenance, and Monitoring Report

for

Bayou Chevee Shoreline Protection (PO-22)

State Project Number PO-22
Priority Project List 5

June 2011
Orleans Parish

Prepared by:
Bryan P. Gossman
and
Barry Richard

CPRA/Office of Coastal Protection and Restoration
New Orleans Field Office
CERM, Suite 309
2045 Lakeshore Dr.
New Orleans, La 70122

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Operations, Maintenance, and Monitoring Report
For
Bayou Chevee Shoreline Protection
(PO-22)

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Preface

This report includes monitoring data collected through May 2011, and annual Maintenance Inspections through May 2011.

The 2011 report is the 3rd report in a series of reports. For additional information on lessons learned, recommendations and project effectiveness please refer to the 2005 and 2008 Operations, Maintenance, and Monitoring Report on the LDNR web site.

I. Introduction

The Bayou Chevee Shoreline Protection project is located within the northern section of the Bayou Sauvage National Wildlife Refuge, approximately 10 miles northeast of New Orleans, Louisiana (Fig. 1). The project area is located on the southern shoreline of Lake Pontchartrain and is divided into two areas, the north cove area and the south cove area. The north cove project area, comprising 164 acres, is located just north and west of Bayou Chevee. It extends 300 ft into the marsh from the existing shoreline of a 110-acre pond of open-water and includes 54 acres of brackish marsh. The south cove area, consisting of 48 acres, is located southeast of Bayou Chevee and northwest of Chef Menteur Pass. It extends 300 ft into the marsh from the existing shoreline around a 27-acre cove and includes 21 acres of brackish marsh. Project and reference area marshes are dominated by *Spartina patens* (marshhay cordgrass) with *Pluchea spp.* and *Cyperus spp*. present.

High wave and current energies associated with Lake Pontchartrain and Chef Menteur Pass have caused extensive shoreline erosion along the Lake Pontchartrain shoreline that has been estimated to average 15 ft/yr, or approximately 3.55 ac/yr from 1958-1983 (U.S. Army Corps of Engineers [USACE] 1997). Over the twenty year life of the project, the shoreline would be expected to erode 300 feet, without project implementation. Shoreline erosion was not a measurable problem for the interior pond of the north cove prior to 1997 when the pond was separated from Lake Pontchartrain by a 250 ft strip of marsh. However, by early 1997, this marsh had disappeared leaving the interior shoreline exposed to the wave energies of Lake Pontchartrain.

The PO-22 project consists of approximately 8,875 linear feet of rock bankline protection along the shoreline of Lake Pontchartrain, extending north and south from Bayou Chevee. Construction was completed on December 12, 2001. The shore protection should allow for the enclosed shallow water areas to be colonized by a greater abundance of submerged aquatic vegetation (SAV).

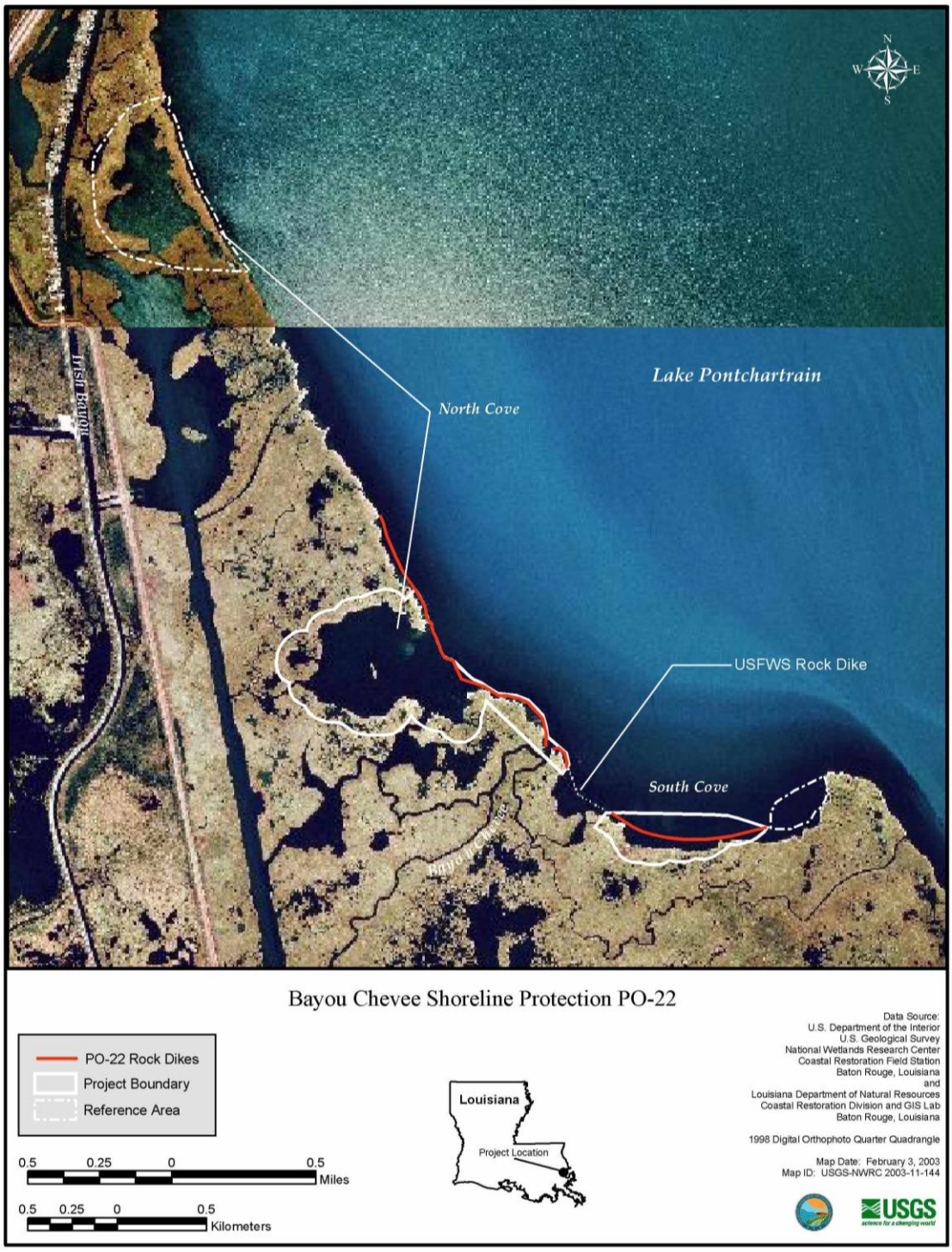


Figure 1. Location of Bayou Chevee Shoreline Protection (PO-22) project boundaries, features and reference area.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Bayou Chevee Shoreline Protection Project (PO-22) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, OCPR shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs (O&M Plan September 3, 2003). The annual inspection report also contains a summary of maintenance projects and an estimated projected budget for the upcoming three (3) years for operation, maintenance and rehabilitation. The three (3) year projected operation and maintenance budget is shown in Appendix B. A summary of past operation and maintenance projects completed since completion of the project are outlined in Section II.

An inspection of the Bayou Chevee Shoreline Protection Project (PO-22) was held on May 2, 2011, by representatives of OCPR Barry Richard and Kyle Breaux, and Billy Hicks of the USACE. At the time of the inspection the water level at the Chef Pass Gauge was 1.2 feet NAVD88. Photographs from the inspection are included in Appendix A of this report.

b. Inspection Results

Rock Rip Rap

There was no visible damage to the dikes. The southern reach and the southern portion of the northern reach are showing noticeable signs of settlement. The northern portion of the northern reach is still at an acceptable grade.

While the water level was higher than normal, the settlement of approximately 70% of the project feature was evident (photo 1). At some points it was below the water level and at most it was just above. The northern section of the project is still at an acceptable elevation to provide shoreline protection (photo 2), however the majority of the project is low enough that it is providing little or no protection to the shoreline from normal and abnormal tidal actions.

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

Add rock to low sections of dike.

ii. Programmatic/ Routine Repairs

None at this time

III. Monitoring Activity

Pursuant to a CWPPRA Task Force decision on August 14, 2003 to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) for CWPPRA, updates were made to the PO-22 Monitoring Plan to merge it with CRMS-*Wetlands* and provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the Breaux Act. There is one CRMS site located in the project area. CRMS3626 is located in the northwestern portion of the North Cove project area and can serve as a good reference for general conditions in the area.

a. Monitoring Goals

The objective of the Bayou Chevee Shoreline Protection project is to provide shore protection for the north cove and south cove areas of the Bayou Sauvage National Wildlife Refuge and enhance the establishment of submerged aquatic vegetation in the south cove area while maintaining or enhancing their establishment in the north cove area.

The following goals will contribute to the evaluation of the above objective:

1. Decrease the mean rate of shoreline erosion in both the north and south cove areas.

2. Maintain (north cove) or maintain/increase (south cove) mean abundance of submerged aquatic vegetation in the ponds behind the rock dikes.

b. Monitoring Elements

The following monitoring elements will provide the information necessary to evaluate the specific goals listed above:

<u>Shoreline Change</u>

Using GPS, shoreline position was documented as-built in early 2002; and post-construction in January 2005, May 2008, and May 2011. Additional surveys will be conducted in 2013, 2016, and 2019 post-construction for mapping shoreline change and movement over time. Field shoreline data are overlaid onto aerial photography using GIS software and compared to previous surveys to calculate changes in land area. Shoreline erosion rates for the project areas will be compared to the shoreline erosion rates of the reference areas, and with historical rates of shoreline erosion collected by Gagliano et al. (1988).

Vegetation (SAV)

Methods described in Nyman and Chabreck (1996) were used to determine the frequency of occurrence of SAV along two transects established in each of the north and south cove project and reference areas (Fig. 2). SAV was sampled for pre-construction years 1998 and 2001, and in 2004, 2008, and 2011 post-construction. Additional surveys will be conducted in years 2013, 2016, and 2019.

Figure 2. Yellow lines indicate the location of submerged aquatic vegetation transects for the Bayou Chevee Shoreline Protection (PO-22) project.

CRMS Supplemental

Additional data collected at CRMS-*Wetlands* stations can be used as supporting or contextual information for this project. Data types collected at CRMS sites include hydrologic, emergent vegetation, physical soil characteristics, discrete porewater salinity, marsh surface elevation change, vertical accretion, and land:water analysis of 1 km^2 area encompassing the station (Folse et al. 2008). For this report, salinity, water level, and vegetation data from one site within the project area (CRMS3626, Fig. 3) in naturally occurring marsh is used to supplement the project data. In the future, data collected from the CRMS network over a sufficient amount of time to develop valid trends will be used to develop integrated data indices at different spatial scales (local, basin, coastal) to which we can compare project performance.

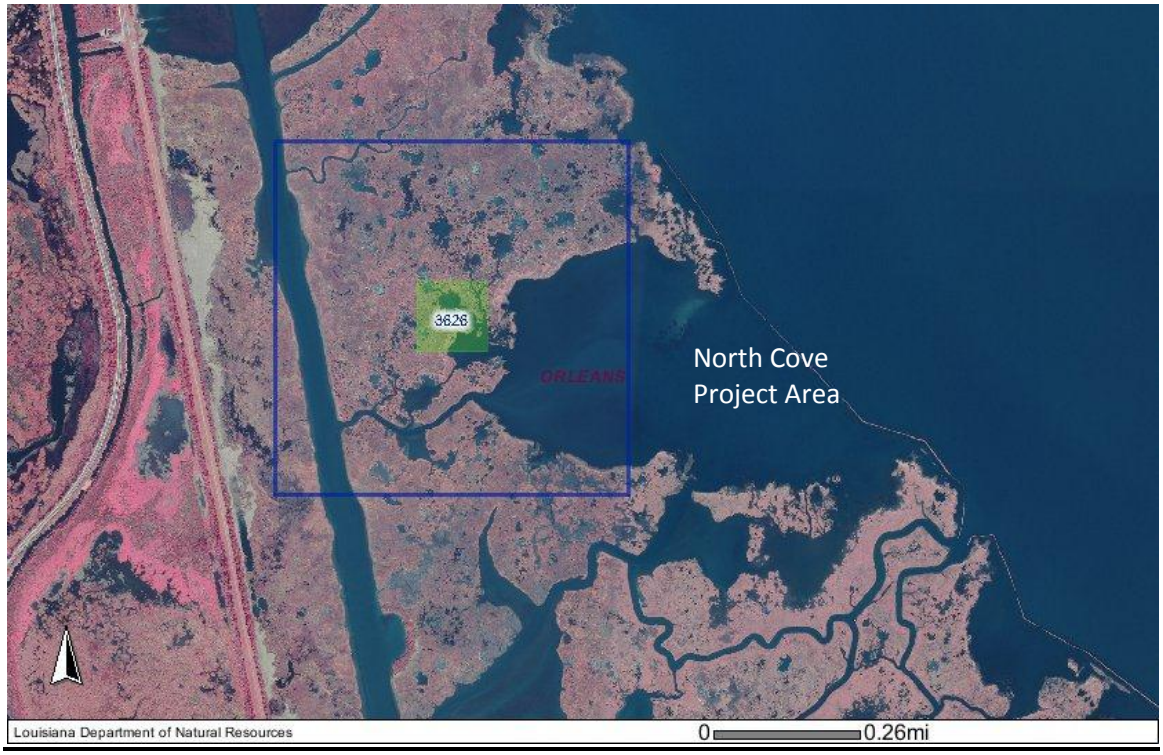


Figure 3. Location of CRMS3626 near North Cove project area. Yellow shaded area indicates data collection area for vegetation, soils, and hydrologic data. Blue square indicates area for land/water analysis.

c. Preliminary Monitoring Results

Shoreline Change

All areas have experienced some land loss since the previous survey in 2008. The North Cove project area experienced a loss of 3.99 ac of land from 2008 to 2011

(Fig. 4). The majority of the land loss in this area occurred on the north facing bank along the southeastern shoreline.

The North Cove reference area has experienced a loss of 3.33 ac since the previous survey (Fig. 5). Most of the land loss has occurred on the shoreline of Lake Pontchartrain rather than the interior of the pond. The shoreline has retreated along the entire surveyed length at a fairly uniform rate. At some point between the 2008 and 2011 surveys, the narrow strip of marsh separating the interior pond from the lake breached at the southern end, creating a connection between the two.

The South Cove project area lost a total of 2.44 ac from 2008 to 2011 (Fig. 6). The majority of the land loss was concentrated in two areas; the pond in the western portion of the project area, and the shoreline behind the rocks at the eastern end. The land created directly behind the rocks from the placement of spoil during construction remains intact.

The South Cove reference area had the greatest land loss of all four areas with 5.85 ac of land lost between 2008 and 2011 (Fig. 6). The shoreline has retreated all along the area surveyed, with the greatest loss occurring at the eastern and western ends. The several small islands that were present at the eastern end of the reference area near Chef Menteur Pass in the 2008 survey had completely eroded by the 2011 survey.

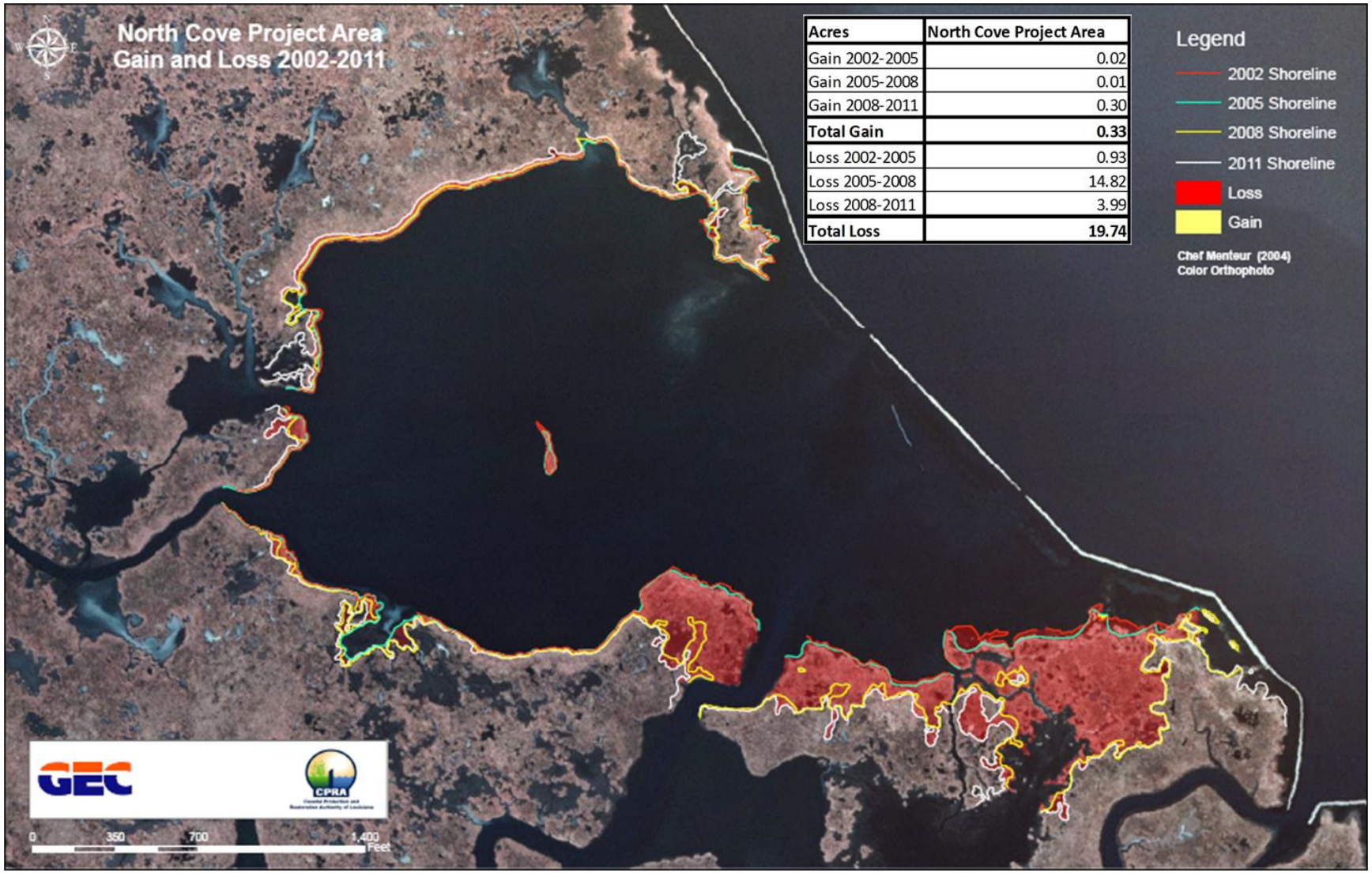
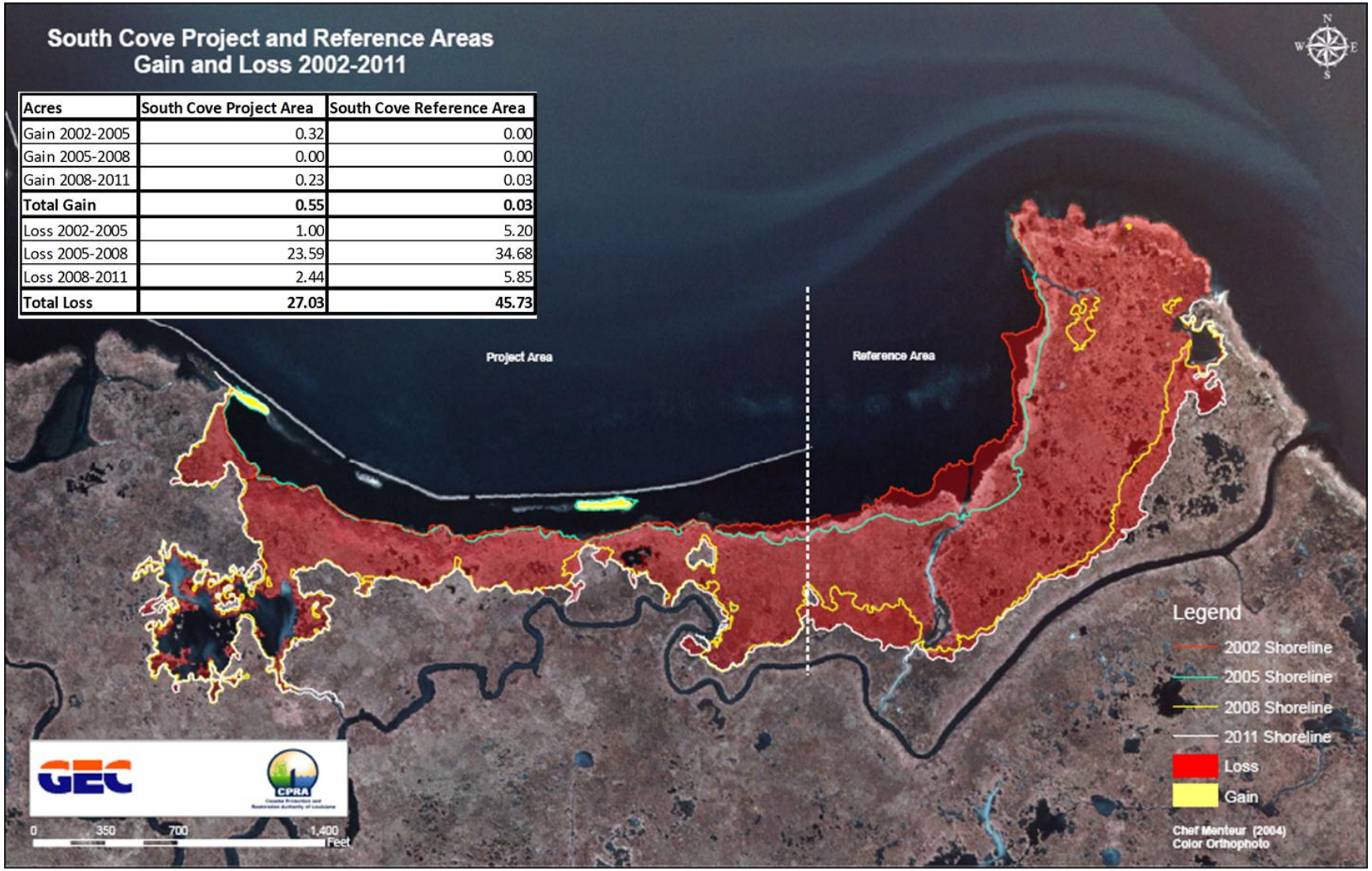


Figure 4. 2002, 2005, 2008, and 2011 shoreline position with estimates of land loss and gain for the North Cove project area of the Bayou Chevee Shoreline Protection (PO-22) project.

Figure 5. 2002, 2005, 2008, and 2011 shoreline position with estimates of land loss and gain for the North Cove reference area of the Bayou Chevee Shoreline Protection (PO-22) project.



Acres	South Cove Project Area	South Cove Reference Area
Gain 2002-2005	0.32	0.00
Gain 2005-2008	0.00	0.00
Gain 2008-2011	0.23	0.03
Total Gain	**0.55**	**0.03**
Loss 2002-2005	1.00	5.20
Loss 2005-2008	23.59	34.68
Loss 2008-2011	2.44	5.85
Total Loss	**27.03**	**45.73**

Figure 6. 2002, 2005, 2008, and 2011 shoreline position with estimates of land loss and gain for the South Cove project and reference areas of the Bayou Chevee Shoreline Protection (PO-22) project. The dashed line indicates the boundary between project and reference areas

Vegetation (SAV)

The pre-construction surveys for overall SAV frequency for the North Cove showed mixed results. The project and reference areas showed very similar frequencies (96.8% and 100%, respectively) in the 1998 survey; however in 2001 SAV frequency in the project area had fallen to 6.2% versus 60.8% in the reference area (Fig 7). The post-construction surveys show higher SAV frequency in the project area in 2004 and 2011, with the 2008 survey showing higher frequency in the reference area. Post-construction surveys indicate greater similarity between project and reference areas. Mean SAV frequency was 86.2% in the project area and 75.2% in the reference area for the three post-construction surveys.

In the 2011 survey, Eurasian water milfoil, *Myriophyllum spicatum*, was the dominant species in both the project and reference areas (Fig. 8, Table 1). Widgeongrass, *Ruppia maritima*, was also present in both areas, but in smaller numbers than in previous years. Southern naiad, *Najas guadalupensis*, was present in the reference area but not the project area. Similar to previous surveys eelgrass, *Vallisneria americana*, was observed in the project area but not the reference area.

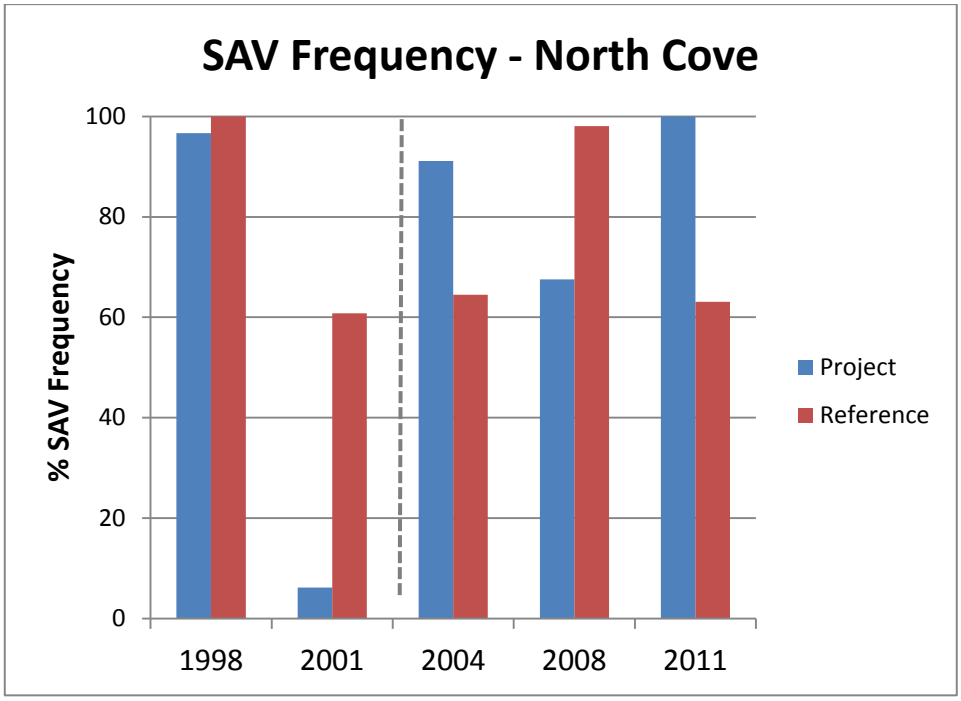


Figure 7. Frequency of occurrence of submerged aquatic vegetation (all species) in samples for North Cove project and reference areas for survey years 1998, 2001, 2004, 2008, and 2011 for the Bayou Chevee Shoreline Protection (PO-22) project. Dashed line indicates project construction.

Table 1. Relative frequency of submerged aquatic vegetation species for North Cove project and reference area during pre-construction years 1998 and 2001, and post-construction years 2004, 2008 and 2011 for the Bayou Chevee Shoreline Protection (PO-22) project. The symbol (.) denotes the species was not observed in that area.

Species	North Cove Project					North Cove Reference				
	1998	2001	2004	2008	2011	1998	2001	2004	2008	2011
Empty Sample	3.3	50.4	5.7	30.6	.	.	9.8	29.8	1.9	36.9
Alga	.	46.0	58.1	14.4	15.0	.	81.4	27.4	18.3	14.6
Ceratophyllum demersum	16.7	.	12.1	.	.	.	.	11.3	.	.
Myriophyllum spicatum	88.3	.	66.1	31.5	97.0	100.0	.	21.0	45.2	50.5
Najas guadalupensis	30.0	.	49.2	.	.	100.0	.	38.7	80.8	19.4
Potamogeton pusillus	.	.	.	56.8	.	.	.	.	26.9	.
Ruppia maritima	81.7	6.2	17.7	53.2	8.0	78.3	60.8	33.9	92.3	11.7
Vallisneria americana	46.7	.	.	3.6	3.0	.	.	.	.	.

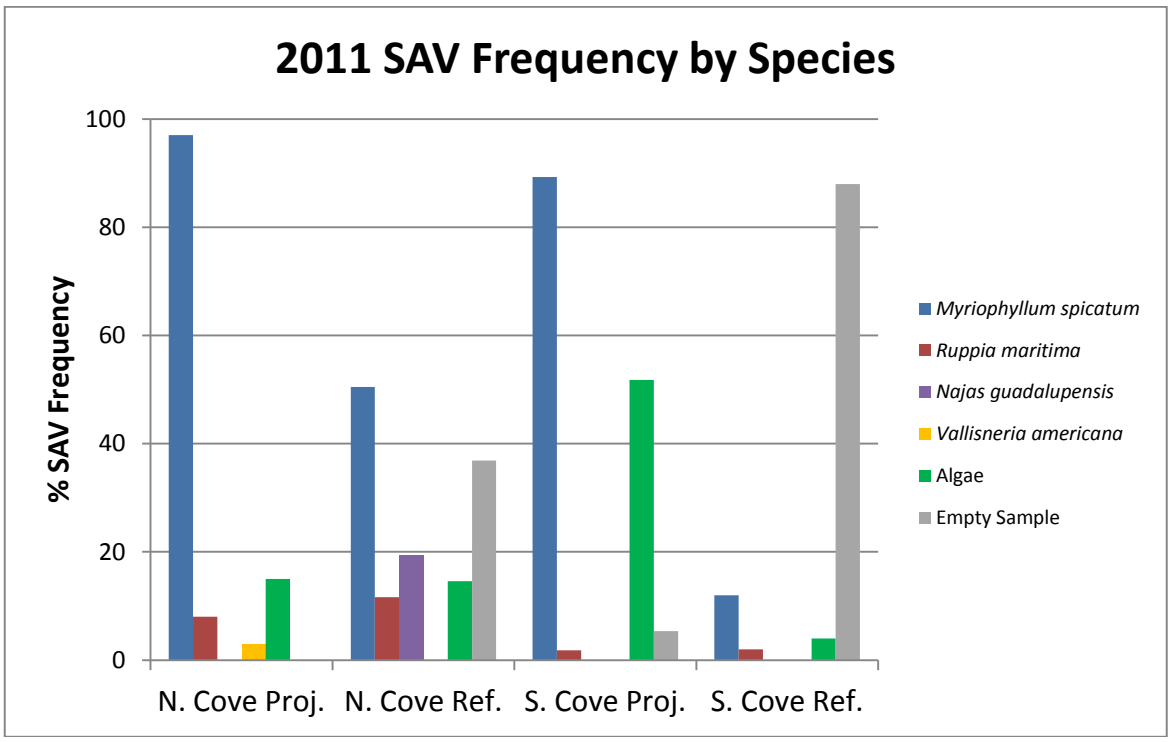


Figure 8. Frequency of occurrence of submerged aquatic vegetation in samples for North and South cove project and reference areas during the 2011 survey for Bayou Chevee Shoreline Protection (PO-22).

In the South Cove, both pre-construction surveys for overall SAV frequency of occurrence showed similar results for project and reference areas. In 1998, both areas had frequencies of 43.3%. In 2001, no SAV was measured in either area. However, post-construction surveys show consistently higher SAV frequency in the project area than in the reference area (Fig. 9). Mean SAV frequency for the three post-construction surveys was 67.4% in the project area and 13.7% in the reference area.

Although SAV frequency was high in the South Cove project area (94.6%) in 2011, species diversity was low (Fig. 8, Table 2). Excluding algae, the SAV observed in the project area was almost entirely *Myriophyllum spicatum*, with a small amount of *Ruppia maritima.* The South Cove reference area was mostly devoid of SAV; 88.0% of samples contained no SAV. The species composition of samples that did contain SAV was similar to the project area, with *Myriophyllum spicatum* dominant followed by *Ruppia maritima.*

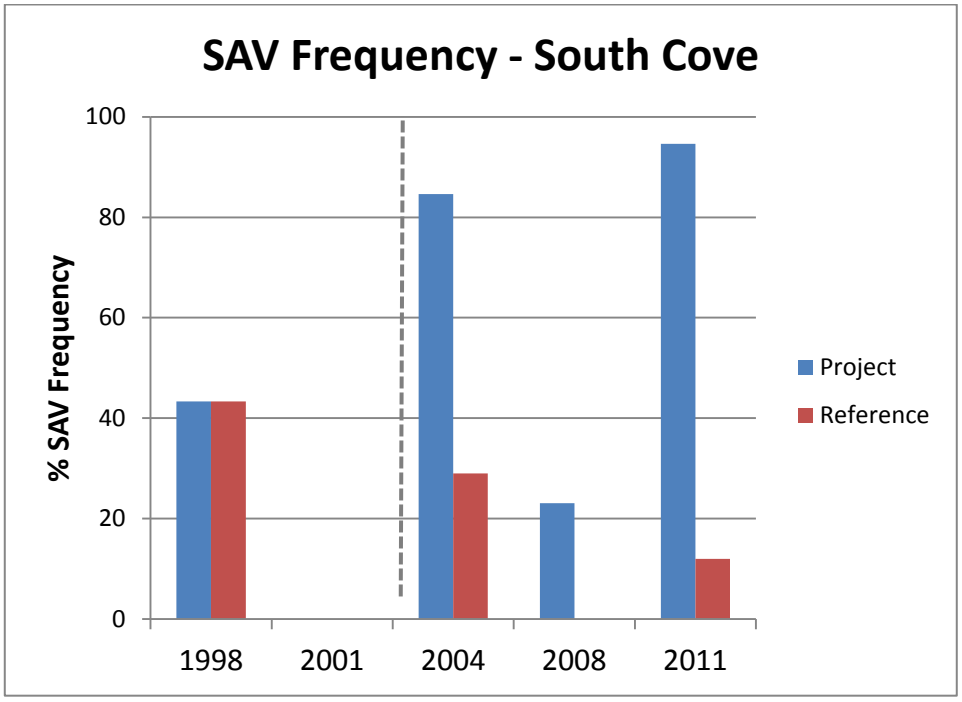


Figure 9. Frequency of occurrence of submerged aquatic vegetation (all species) in samples for South Cove project and reference areas for survey years 1998, 2001, 2004, 2008, and 2011 for the Bayou Chevee Shoreline Protection (PO-22) project. Dashed line indicates project construction

Table 2. Relative frequency of submerged aquatic vegetation species for South Cove project and reference area during pre-construction years 1998 and 2001, and post-construction years 2004, 2008, and 2011 for the Bayou Chevee Shoreline Protection (PO-22) project. The symbol (.) denotes the species was not documented in that area.

Species	South Cove Project					South Cove Reference				
	1998	2001	2004	2008	2011	1998	2001	2004	2008	2011
Empty Sample	56.7	100.0	.	63.5	5.4	56.7	100.0	64.5	90.0	88.0
Alga	.	.	26.9	19.2	51.8	.	.	6.5	10.0	4.0
Ceratophyllum demersum	.	.	28.9	.	.	.	.	.	.	.
Myriophyllum spicatum	13.3	.	82.7	19.2	89.3	6.7	.	25.8	.	12.0
Najas guadalupensis	.	.	5.8	13.5	.	.	.	1.6	.	.
Ruppia maritima	.	.	21.2	11.5	1.8	13.3	.	4.8	.	2.0
Vallisneria americana	36.7	.	.	.	.	30.0	.	.	.	.

CRMS Supplemental

With the exception of several salinity spikes, mean daily salinities in the area ranged from 2 – 10 ppt during the period from May 2008 through May 2011 (Fig. 10). Salinities at the time of the 2011 SAV survey were < 1 ppt in all areas due to the opening of the Bonnet Carre Spillway. Based on daily average water elevation, the marsh surface at CRMS3626 was flooded 19.1% of the time during the period from May 2008 through May 2011 (Fig. 11).

The Floristic Quality Index (FQI) (Cretini et al. 2011) is a tool that has been used to assess the quality of the vegetation community at CRMS sites. The FQI is calculated by assigning each species a CC score, or coefficient of conservatism, which is scaled from 1 to 10 and reflects a species' tolerance to disturbance and habitat specificity. A modified FQI was developed by the CRMS Vegetation Analytical Team, which assembled a team of experts to assign CC scores to Louisiana's wetland plant species. The modified FQI equation takes into account not only the CC scores, but also the percent covers of species at a site, and the resulting score is scaled from 0 to 100.

Mean FQI scores for CRMS3626 have remained relatively steady from 2007 to 2010 (Fig. 12), ranging from 65.4 to 75.2. The ideal range for FQI scores in brackish marsh is 80-100 (Cretini et al. 2011). The marsh at CRMS3626 is dominated by *Spartina patens*. Other species include *Lythrum lineare* and *Schoenoplectus americanus*.

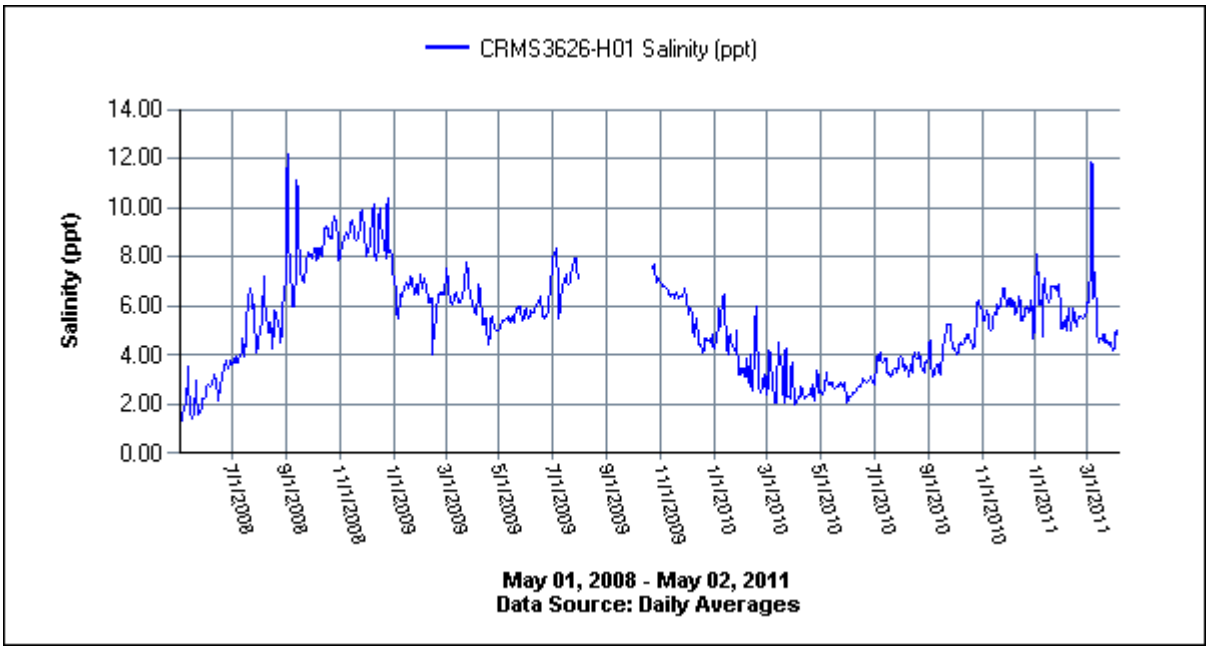


Figure 10. Daily average salinity at CRMS3626 from May 2008 through May 2011.

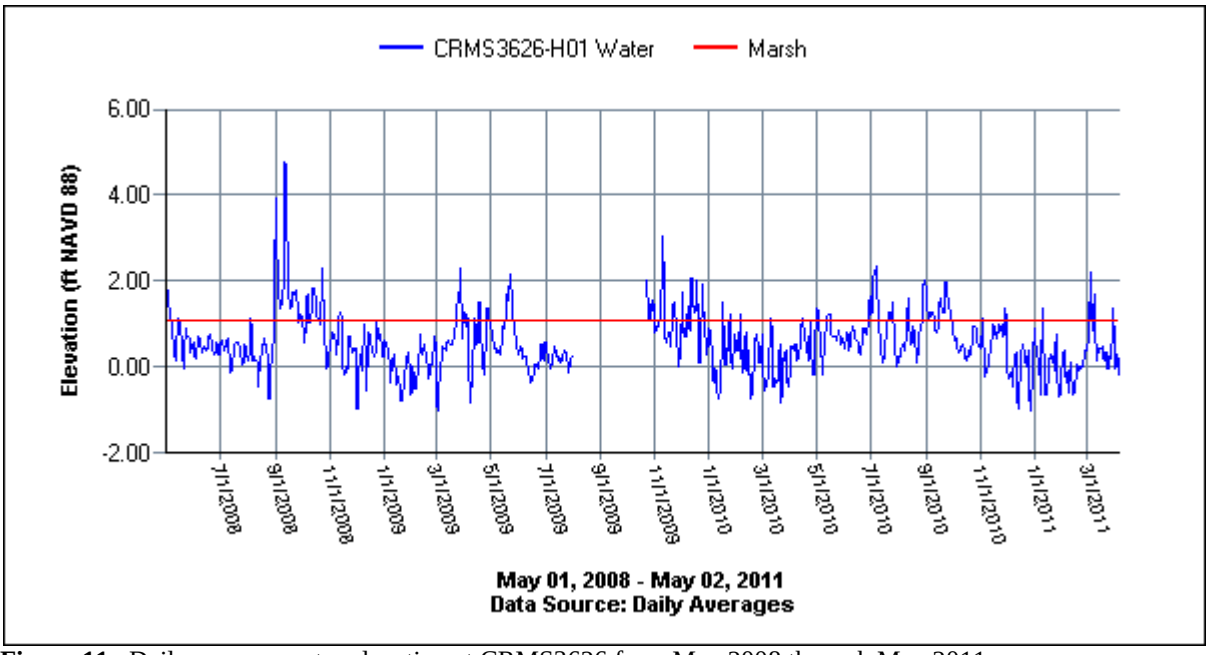


Figure 11. Daily average water elevation at CRMS3626 from May 2008 through May 2011.

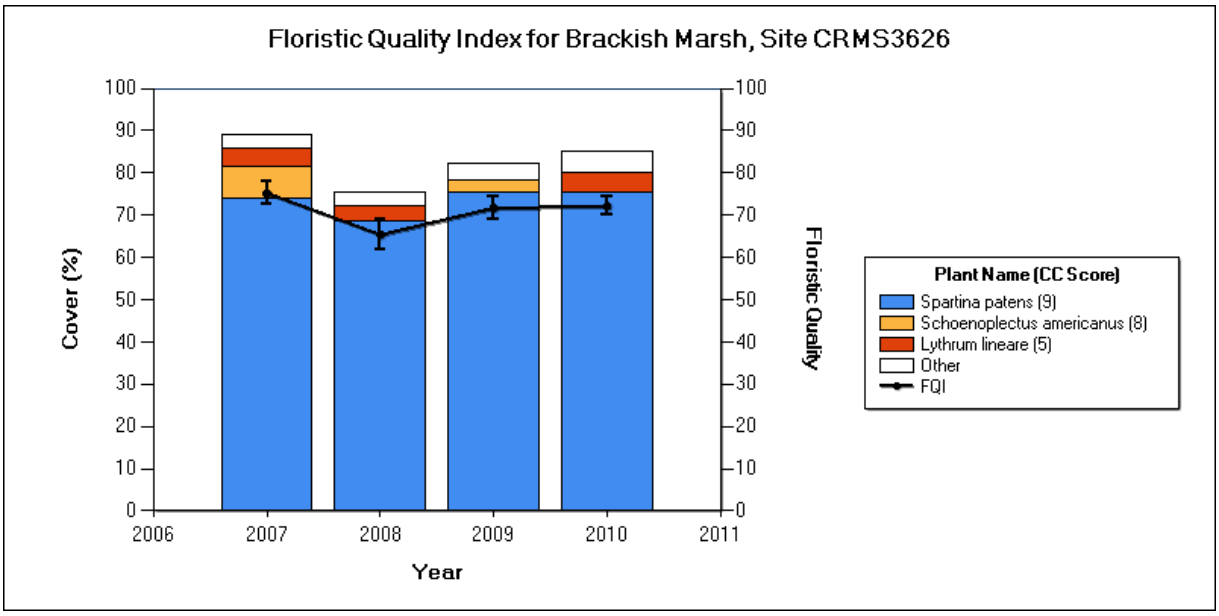


Figure 12. Mean percent cover of dominant species and FQI score for CRMS3626 from 2007-2010.

d. Discussion

Shoreline Change

With the exception of the North Cove reference area, the amount of land loss that occurred from 2008 to 2011 was far less than that which occurred from 2005 to 2008. This is due to the massive amount of land loss that occurred as a result of Hurricane Katrina in Sept. 2005. The 2011 survey shows a return to land loss rates closer to those observed in the 2005 (pre-Katrina) survey. From project construction through 2005 the North and South Cove project areas lost a combined 1.93 ac of land compared to 38.41 ac between 2005 and 2008. Between 2008 and 2011, the same areas lost 6.43 ac.

In the 2011 survey, the North Cove project area had lost slightly more land than the reference area (3.99 ac vs. 3.33 ac) since the previous survey in 2008. In the project area, a similar pattern was observed in the 2008 and 2011 surveys, with the majority of the land loss occurring on the north facing bank along the southeastern shoreline of the cove. In the reference area, most of the land loss is due to the steady erosion of the Lake Pontchartrain shoreline.

The land loss rate in the South Cove project area was greatly reduced between the 2008 and 2011 shoreline surveys. At the time of the 2008 survey, the shoreline at the western end of the project area had breached into an existing pond surrounded by degraded, fragmented marsh. This was an area of high land loss during the 2011 survey, although it is likely that the cause of the land loss was the continued degradation of the marsh through subsidence, rather than the effects of wind driven waves that could be stopped with shoreline protection.

The land loss rate in the South Cove reference area was also greatly reduced between the 2008 and 2011 surveys. The land loss rate observed in the 2011 survey was similar to that seen before Hurricane Katrina.

For the total period from project construction through the 2011 survey, land loss in combined project and reference areas has been high and fairly similar (46.8 ac and 52.4 ac respectively). However, for the two surveys that did not include land loss caused by Hurricane Katrina, the North and South Cove project areas lost 82% less land than their associated reference areas (8.4 ac vs. 15.3 ac).

Vegetation (SAV)

In the North Cove, frequency of occurrence of SAV has been high in both the project and reference areas since construction of the rock dike. In two of the three post-construction surveys, SAV frequency has been higher in the project area than the reference area. Additionally, the project appears to have stabilized the SAV population in the project area. Prior to construction, SAV frequency ranged from 6.2% to 96.7%, while post-construction frequencies have ranged from 67.6% to 100%. The pond in the reference area where the SAV transects are located is separated from Lake Pontchartrain by a narrow strip of marsh. This marsh protects the interior pond from the high wave energies experienced along the lakeshore. The rock dike in the project area serves the same function; buffering waves and creating a favorable environment for SAV growth.

In the South Cove, frequency of occurrence of SAV has been consistently higher in the project area than in the reference area since construction of the rock dike. It appears that the shoreline protection is promoting favorable conditions for SAV growth. Because the shoreline in the reference area continues to retreat to the south, the SAV transects are left further from the shoreline in a deep, high-energy environment.

CRMS – Supplemental

Salinity is one of the multiple variables that affect SAV abundance and distribution. The salinities observed at CRMS3626 are ideal for estuarine species such as *Ruppia maritima*. The dominant species in the 2011 survey, *Myriophyllum spicatum*, can tolerate salinities up to 20 ppt as long as it has fresher water in the spring (Stutzenbaker 1999). The less frequently occurring species, *Najas guadalupensis* and *Vallisneria americana*, prefer fresh water but can tolerate salinities approaching 3.5 ppt after they are established.

IV. Conclusions

a. Project Effectiveness

For the most part, the project has been effective in achieving the goal of reducing the rate of shoreline erosion in the North and South Cove areas. However, as evidenced by the large amount of shoreline retreat between 2005 and 2008, the capacity of the rock structure to prevent erosion was overcome by the effects of Hurricane Katrina in 2005. For the two surveys that did not include land loss caused by Hurricane Katrina, the North and South Cove project areas lost 74% less land than their associated reference areas (8.4 ac vs. 14.6 ac).

The project has clearly been effective in achieving the goal of maintaining SAV abundance in the North Cove and maintaining/increasing abundance in the South Cove project areas. Frequency of occurrence of SAV in both the North Cove project and reference areas has been high since construction of the rock dike. In the South Cove, SAV frequency has been consistently higher behind the shoreline protection in the project area than in the reference area.

b. Recommended Improvements

A maintenance lift is necessary to raise the elevation of the portions of the rock dike that have settled. Portions of the rock dike are no longer providing adequate shoreline protection due to settlement. Consider extending the rock dike at the South end to Chef Menteur Pass to reduce the rapid erosion occurring along this stretch of shoreline.

c. Lessons Learned

This project shows how dynamic and vulnerable wetlands are. The sharp contrast in land loss between 2005 and 2008 illustrates the destructive power of hurricanes. Efforts should be taken in the future to minimize construction delays. Rock structures should terminate on land to prevent the "erosional shadow" created by having the rocks end in open water. Heavy erosion along north facing shorelines shows the need to consider prevailing wind direction and wave angles in project design.

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Appendix A
(Inspection Photographs)

Photo #1 – A low portion of Southern Reach.

Photo #2 – Acceptable portion of Northern Reach.

Appendix B
(Three Year Budget Projection)

Bayou Chevee Shoreline Protection Project (PO-22)																						
Federal Sponsor: USACE																						
Construction Completed : December 7, 2001																						
PPL 5																						
Current Approved O&M Budget	Year 0	Year - 1	Year -2	Year -3	Year -4	Year -5	Year -6	Year -7	Year -8	Year -9	Year -10	Year -11	Year -12	Year -13	Year -14	Year -15	Year -16	Year - 17	Year -18	Year -19	Project Life	Currently
June 2009	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Budget	Funded
State O&M	$0	$3,940	$0	$0	$4,255	$0	$206,911	$4,596	$0	$0	$0	$5,093	$0	$0	$0	$5,644	$0	$0	$0	$6,254	$236,693	$236,693
Corps Admin	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Federal S&A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total																					$236,693	$236,693
																					Remaining	Current 3 year
Projected O&M Expenditures																					Project Life	Request
Maintenance Inspection		$3,940			$4,255			$4,596				$5,093				$5,644				$6,254	$16,991	$5,093
General Maintenance																					$0	$0
Surveys																					$0	$0
Sign Replacement																					$0	$0
Federal S&A																					$0	$0
Maintenance/Rehabilitation																					$0	$0
E&D							$11,711														$0	$0
Construction							$166,666														$0	$0
Construction Oversight							$28,534														$0	$0
Total					$4,255	$0	$206,911	$4,596	$0	$0	$0	$5,093	$0	$0	$0	$5,644	$0	$0	$0	$6,254	$16,991	$5,093
O&M Expenditures from COE Report				$30,866				Current O&M Budget less COE Admin					$236,693				Current Project Life Budget less COE Admin					$236,693
State O&M Expenditures not submitted for in-kind credit				$0				Remaining Available O&M Budget					$205,827				Total Projected Project Life Budget					$47,857
Federal Sponsor MIPRs (if applicable)				$0				**Incremental Funding Request Amount FY12-FY14**					**-$200,734**				**Project Life Budget Request Amount**					**-$188,836**
Total Estimated O&M Expenditures (as of April 2010)				$30,866																		

Appendix C
(Field Inspection Notes)

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: **PO-22 Bayou Chevee Shoreline Protection** Date of Inspection: 5/2/11 Time: 9:30 am

Structure No. no number assigned Inspector(s): Richard, Breaux, Hicks

Structure Description: Foreshore Rock Dike Water Level Inside: 1.2' Outside: 1.2'

Type of Inspection: Bi-Annual Weater Conditions: Cloudy, medium wind

Item	Condition	Pysical Damage	Corrosion	Photo #	Observations and Remarks
Foreshore Rock Dike North Cove	Fair	Settling	None		North end looking good. South end settling below acceptable grade.
Foreshore Rock Dike South Cove	Poor	Settling	None		Settling below acceptable grade.
USFWS Dike Segment	Poor	Settling	None		Settled below acceptable grade.
Exposed Shore South of Dike	Poor	Inundated/ Washed Away	N/A		This is recovering, but the process is slow. Needs protection.
					Remarks: Project needs maintenance lift.