State of Louisiana

Coastal Protection and Restoration Authority (CPRA)

2016 Operations, Maintenance, and Monitoring Report

for

GIWW - Perry Ridge West Bank Stabilization

State Project Number CS-30
Priority Project List 9

June 2016
Calcasieu Parish

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Suggested Citation:

Mouledous, M., and M. Guidry 2016. *2016 Operations, Maintenance, and Monitoring Report for GIWW - Perry Ridge West Bank Stabilization (CS-30),* Coastal Protection and Restoration Authority of Louisiana, Lafayette, Louisiana. 27pp and Appendices.

2016 Operations, Maintenance, and Monitoring Report
For
GIWW - Perry Ridge West Bank Stabilization (CS-30)

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Preface

This report includes monitoring data collected through December 2015, and the annual maintenance inspection from June 2013. The GIWW - Perry Ridge West Bank Stabilization (CS-30) project is a 20-year Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA, Public Law 101-646, Title III, Priority List 9) project administered by the Natural Resources Conservation Service (NRCS) and the Coastal Protection and Restoration Authority of Louisiana (CPRA).

The 2016 report is the 5th report in a series of reports. For additional information on lessons learned, recommendations and project effectiveness please refer to the 2004, 2005, 2008, and 2012 Operations, Maintenance, and Monitoring Report on the CPRA web site at http://coastal.Louisiana.gov/. These reports will be made available for download at the following website: http://cims.coastal.la.gov.

I. Introduction

The Perry Ridge West Bank Stabilization project area is located in the Calcasieu-Sabine Basin, and is included in Region 4 of the Coast 2050 Plan (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998). The major problem in this region is marsh erosion caused by salt water intrusion, rapid water level fluctuation, and wave action (U.S. Department of Agriculture, Soil Conservation Service [USDA/SCS] 1988). Many canals have been dug to aid in navigation, mineral extraction, hunting, and fishing. The project area is located along the northern bank of the Gulf Intracoastal Waterway (GIWW) between Perry Ridge and the Sabine River and is comprised of 1,132 acres (458 ha) of fresh and intermediate marsh in Calcasieu Parish, Louisiana (figure 1).

The GIWW is the dominant hydrologic influence in the project area, the construction of which has caused the area to become a tidal system. The GIWW crosses the entire region and allows salt water to encroach into traditionally freshwater areas. The navigation of double wide barges in the section of the GIWW adjacent to the project area has accelerated wave-induced erosion of the remaining spoil bank and marsh vegetation. The 1999 estimate of the rate of shoreline erosion along the GIWW was 3.9 ft/yr (1.2 m/yr) (U.S. Department of Agriculture, Natural Resources Conservation Service [USDA-NRCS] 1999). Amplification of the effects of meteorological events has occurred and water levels can fluctuate as much as 2 ft (0.7 m) due to strong northerly winds and 10 ft (3 m) during a tropical storm or hurricane. This area has also exhibited wetland vegetation loss since 1956, as indicated by habitat change analysis (figure 2). Bank stabilization of the GIWW is, therefore, a necessary restoration strategy.

There is no significant source of sediment in Region 4. Vertical accretion of the wetlands in this region is predominately by organic production. Terracing and vegetative plantings are common restoration strategies that have been applied in this Region.

Construction of the rock dike portion of the project was completed in December 2001 and the terrace portion of the project was completed in July 2002 and included the following features:

1. A 10,704 linear ft (3,263 m) free-standing rock dike was constructed parallel to the existing shoreline. The centerline of the rock dike was positioned at the location where the existing bottom elevation was approximately -1.0' NAVD 88. The rock dike was constructed as a peaked dike (no top width) to an elevation of +3.7 NAVD 88 with 2 horizontal to 1 vertical side slopes using COE R-650 gradation rock riprap.

2. An earthen plug, approximately 350 ft (107 m) in length, was constructed to close a breach in the existing spoil bank of the GIWW adjacent to the project dike.

3. A total of 22,952 linear ft (6,996 m) of shallow water terraces were constructed in open water areas in the interior emergent marsh. The terraces were constructed of native earthen material to an elevation of +2.5' NAVD 88 with a 4' top width and 3 horizontal to 1 vertical side slopes.

4. After construction, 9,400 trade-gallon size containers of *Schoenoplectus californicus* (California bullwhip) were planted along the perimeter of the constructed terraces. In addition, to stabilize and protect the terrace segments until adequate native species cover developed, the terrace tops and side slopes were seeded with an annual mix of Japanese millet and Brown Top millet and fertilized with ammonium nitrate with minimum 33% nitrogen at a rate of 200 pounds of acre. Application of the seed mix and fertilizer were by manual spreaders.

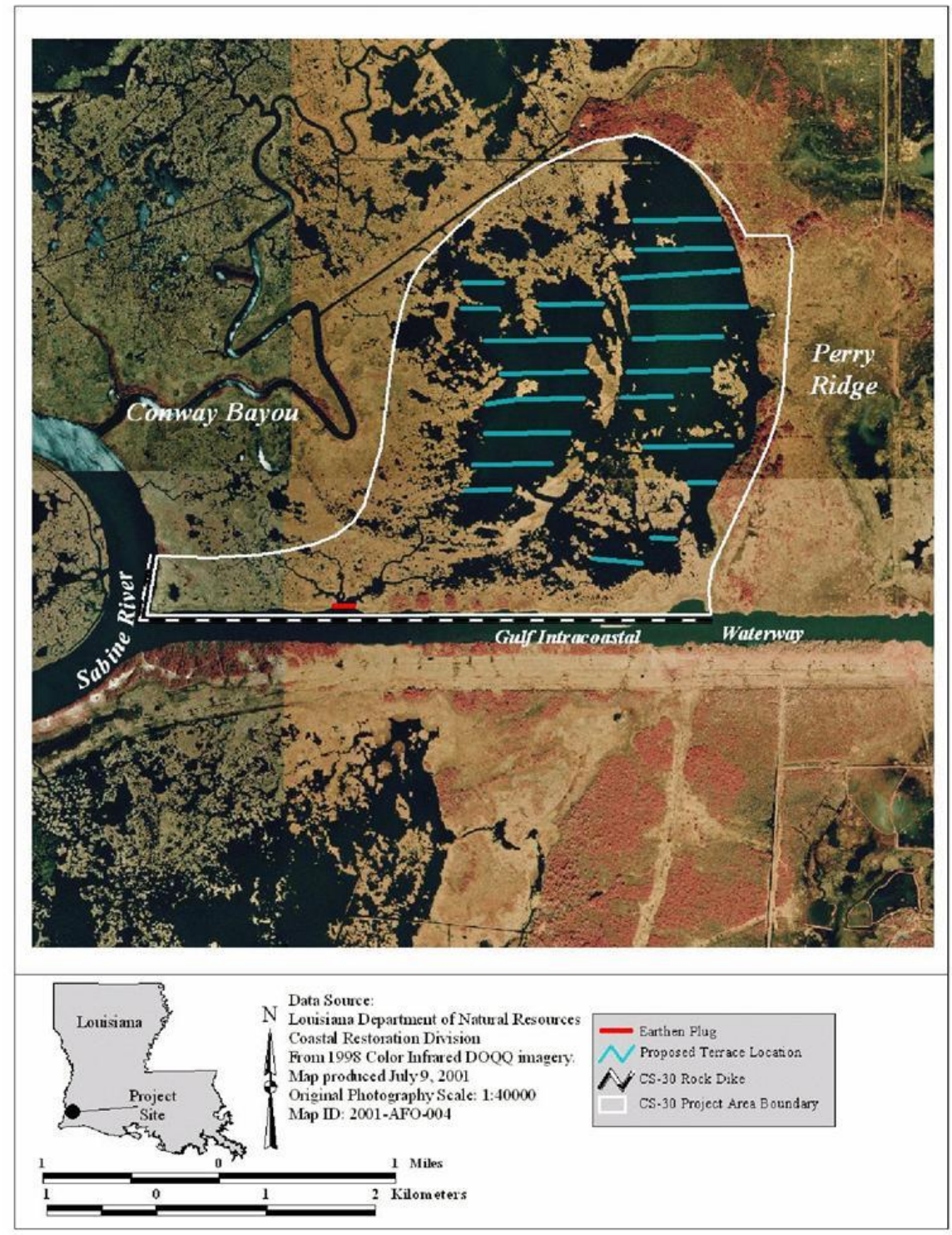

Figure 1. Perry Ridge West (CS-30) construction features and project boundary.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the GIWW - Perry Ridge West Bank Stabilization Project (State Project No. CS-30) is to evaluate the constructed project features and to identify any deficiencies. The information from the site visit will be used to prepare a report detailing the condition of project features and to recommend any necessary corrective actions. Should it be determined that corrective actions are needed, CPRA 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. The annual inspection report also contains a summary of maintenance projects which were completed since completion of constructed project features 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.

An annual O & M inspection of the GIWW Bank Stabilization (Perry Ridge to Texas) Project (CS-30) was held on June 13, 2013 at approximately 11:40am under sunny skies and warm temperatures. In attendance were Mel Guidry, Stan Aucoin, and Darrell Pontiff of CPRA, along with Frank Chapman and Brandon Samson of NRCS, and Josh Carson for other inspections. The inspection began on the eastern end of the project.

The field inspection included a complete visual inspection on the rock dike. The terraces were not inspected during this site visit. Staff gauge readings and existing benchmarks were not available to be used to determine approximate water elevation and existing elevation of the foreshore rock dike. Photographs were taken of the project features visited (see Appendix A) and field inspection notes were compiled to record measurement and deficiencies (Appendix C).

b. Inspection Results

Site 1—Foreshore rock dike

The dike is in very good condition. (Appendix A, Photo 1) There was one area noted where rock had been displaced by a barge. The condition has not changed and will continue to be monitored. (Appendix A, Photo 2) A second location was noted where it appears rock has been moved creating a 7 foot gap in the rock dike (Lat/Long N30° 03’ 34”, W93 ° 41’ 16”). A breach has formed in the 320’ earthen plug located behind the foreshore rock dike. Water is channeling through the breach in the earthen plug into the marsh creating a fairly substantial current behind the dike. (Appendix A, Photo 3-4)

Site 2—Earthen Terraces with vegetative plantings

The earthen terraces and vegetative plantings were not inspected during this trip. In concurrence with the federal sponsor it was decided that the terrace field is in stable condition after several years post construction. Due to logistics/coordination involved with setting up

the inspection as well as the stability of the terraces thus far, it was decided that an inspection was not required every year.

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None

ii. Programmatic/ Routine Repairs

The 320ft breach in the earthen plug directly behind the rock dike mentioned in the inspection results is in need of repair. The earthen plug was original to the project and previously prevented higher salinity water in the GIWW from impacting the interior marsh.

d. Maintenance History

General Maintenance: Below is a summary of completed maintenance projects and operation tasks performed since July 2002, the construction completion date of the GIWW Bank Stabilization Project Perry Ridge to Texas (CS-30).

There has been no maintenance performed on this project.

III. Operation Activity

a. Operation Plan

There are no water control structures associated with this project; therefore, no Structural Operation Plan is required.

b. Actual Operations

There are no water control structures associated with this project, therefore no required structural operations.

IV. 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 CS-30 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.

a. Monitoring Goals

The objectives of the GIWW - Perry Ridge West Bank Stabilization Project are to reduce erosion along the northern bank of the GIWW to protect interior marshes, to create marsh habitat, and to maintain submerged aquatic vegetation (SAV).

The following specific goals will contribute to the evaluation of the above objectives:

1. Determine any direct (i.e. creation of land due to terrace construction) and/or indirect changes in land/water ratios in the project area north of the GIWW.
2. Determine changes in the frequency of occurrence of SAV within the shallow water areas of the project and reference areas.
3. Detect the presence and magnitude of erosion of the northern shore of the GIWW along the southern project boundary.

b. Monitoring Elements

Aerial Photography:

In order to evaluate shoreline movement and the extent of interior emergent marsh creation (direct and indirect) in the project area, near-vertical, color-infrared aerial photography (1:12,000 scale) was obtained once prior to construction in 2001, and was obtained post-construction in 2005 and 2010. The original photography was checked for flight accuracy, color correctness, and clarity and was subsequently archived. Aerial photography was scanned, mosaicked, and georectified by USGS/NWRC personnel according to standard operating procedures (Steyer et al. 1995, revised 2000).

Percent land trends were calculated using Landsat Thematic Mapper (TM) data for 1985 - 2010. Linear regressions were calculated for the period of record. The variability in percent land data points around the slope illustrates the influence of various sources of environmental variance or classification error. Positive slopes indicate increasing percent land or historical land gain and negative slopes indicate decreasing percent land or historical land loss (Couvillion et al., 2011).

Submerged Aquatic Vegetation:

To evaluate the effects of earthen terraces on SAV habitat, a modification of the rake method (Chabreck and Hoffpauir 1962) was used to estimate SAV occurrence. The project and reference areas were monitored along 6 transects divided equally among 3 representative shallow ponds. Each transect had a minimum of 25 sampling stations oriented toward the prevailing wind. At each station, aquatic vegetation was sampled by dragging a garden rake on the pond bottom for about 1 second. The presence of vegetation was recorded to determine the frequency of aquatic plant occurrence (frequency = number of occurrences/number of stations x 100). When vegetation was present, the species present was recorded in order to determine the frequencies of individual species (Nyman and Chabreck 1996). SAV abundance was sampled prior to construction in 2000, and post-construction in 2003, 2005, 2007, 2010 and 2015, and will be sampled in 2020.

Shoreline Movement:

The shoreline protection component of the project will be monitored by evaluating aerial photography. Direct shoreline measurements will be collected on the adjacent C/S-24 project area, designed as the first half of a two-project shoreline protection strategy for the Perry Ridge wetlands, which is affected by similar hydrologic conditions. Shoreline monitoring stations, situated on the GIWW spoilbank at 1000 ft intervals, are currently monitored every 3 yr to detect shoreline changes present in the C/S-24 project area as well as a reference area, east of the CS-24 project area.

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 from continuous recorder, vegetative, physical soil characteristics, discrete porewater salinity, surface elevation change, vertical accretion and land:water analysis of 1 km^2 area encompassing the station (Folse et al., 2012). For this report, hydrologic, vegetation, porewater and soil characteristic data are used to provide contextual information for the project. Data from CRMS0697 within the project area is compared to data from CRMS0658 outside the project area in a traditional project versus reference manner (Figure 7). Data collected from the CRMS network are used to develop integrated data indices at different spatial scales (local, basin, coastal) to which we can compare project performance.

Hourly salinity and water levels (ft, NAVD88) are monitored with a continuous recorder at each CRMS-*Wetlands* site. Average annual salinity and percent time flooded are used to develop a Hydrologic Index (HI) score (Snedden and Swenson 2012) based on the suitability of the site in maximizing vegetation productivity according to its specific marsh class (swamp, fresh, intermediate, brackish, and saline). The HI score (between 0 and 100) corresponds to the percent of maximum vegetation productivity expected to occur if the separate effects of salinity and inundation interact in a multiplicative fashion on vegetation productivity.

Vegetation composition and cover are estimated from 10 permanent 2x2 m plots that are randomly distributed along a transect in the emergent marsh within each of the 1 km^2 CRMS-*Wetlands* sites. Data are collected using the Braun Blanquet method. Individual species' cover data are summarized according to the Floristic Quality Index (FQI) method (Cretini and Steyer 2011) where cover is qualified by scoring species according to whether they are generally associated with disturbance or stability.

At each monthly servicing, a measurement of interstitial water salinity is collected adjacent to each CRMS-*Wetlands* gauge at 10 and 30 cm depths. Interstitial water salinity is also determined at 5 of the vegetation plots when vegetation is surveyed.

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Historical analysis of Satellite imagery shows that over 500 acres of land were lost in the project area from 1956 to 1990 (figure 2). More recently, the general land change trend was still slightly negative (-0.04% per year) prior to construction from 1985 to 2002 (figure 6). Incorporating the 2004 through 2010 data, which includes the post-construction satellite imagery, causes the general trend to become positive (0.33% per year).

Land to water analysis using aerial photography was completed pre-construction in November 2001 and post-construction in October 2005 and November 2010 (figures 3 - 5). The project area increased by 45 acres from 2001 to 2005, 25 acres of which were terraces (Table 1). Another 9 acres were gained by 2010. The land change rate using these 3 years of photography was 0.49% per year.

Table 1. Land:Water acreages from 2001 (pre-construction), 2005 and 2010 in the project area.

	Project Area					
	2001		2005		2010	
	acres	%	acres	%	acres	%
Land	521	43.45	566	47.21	575	48.00
Water	678	56.55	633	52.79	623	52.00
Total	1199		1199		1198	

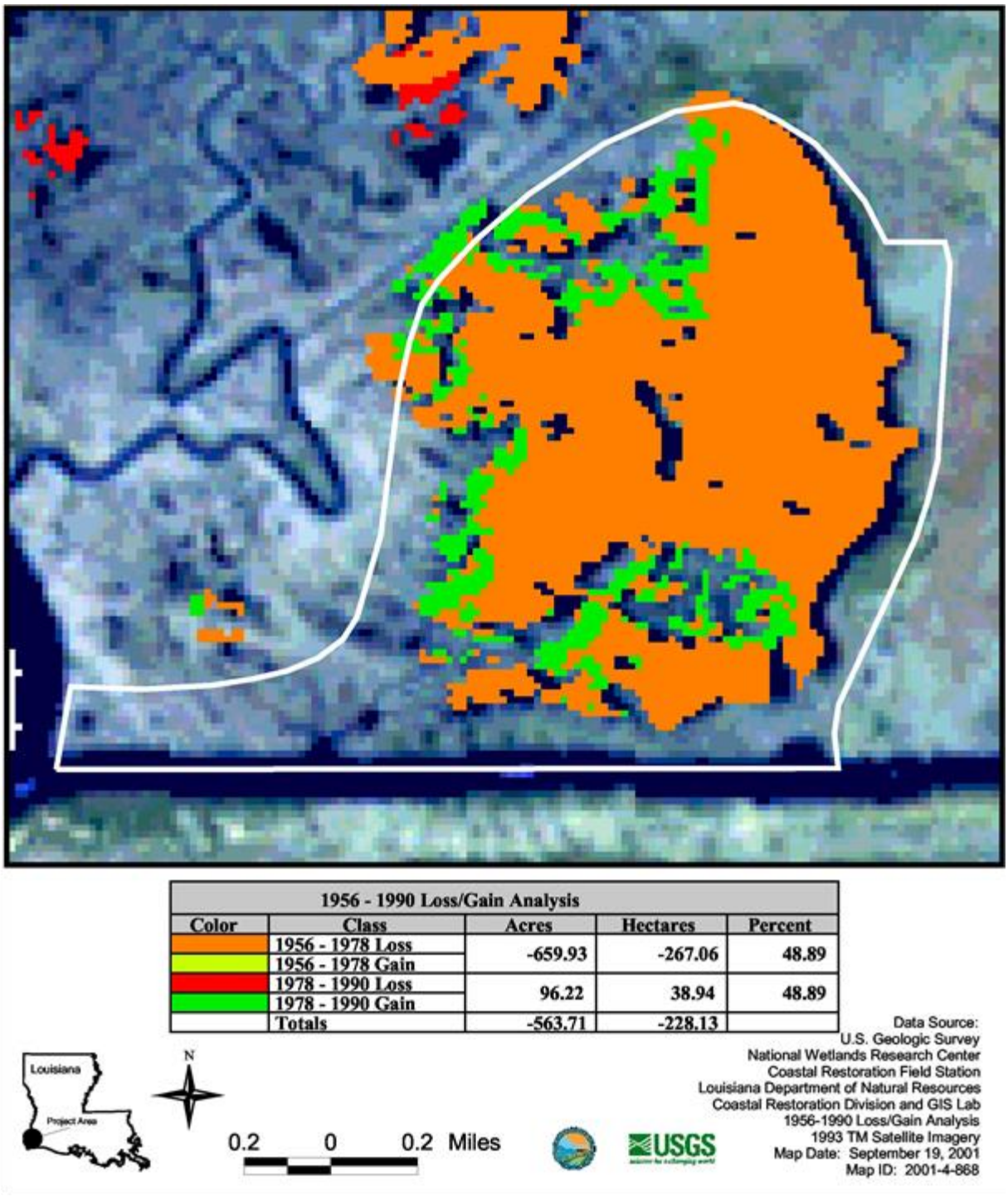

Figure 2. Perry Ridge West (CS-30) project land loss/gain analysis from satellite imagery for the period 1956-1990.

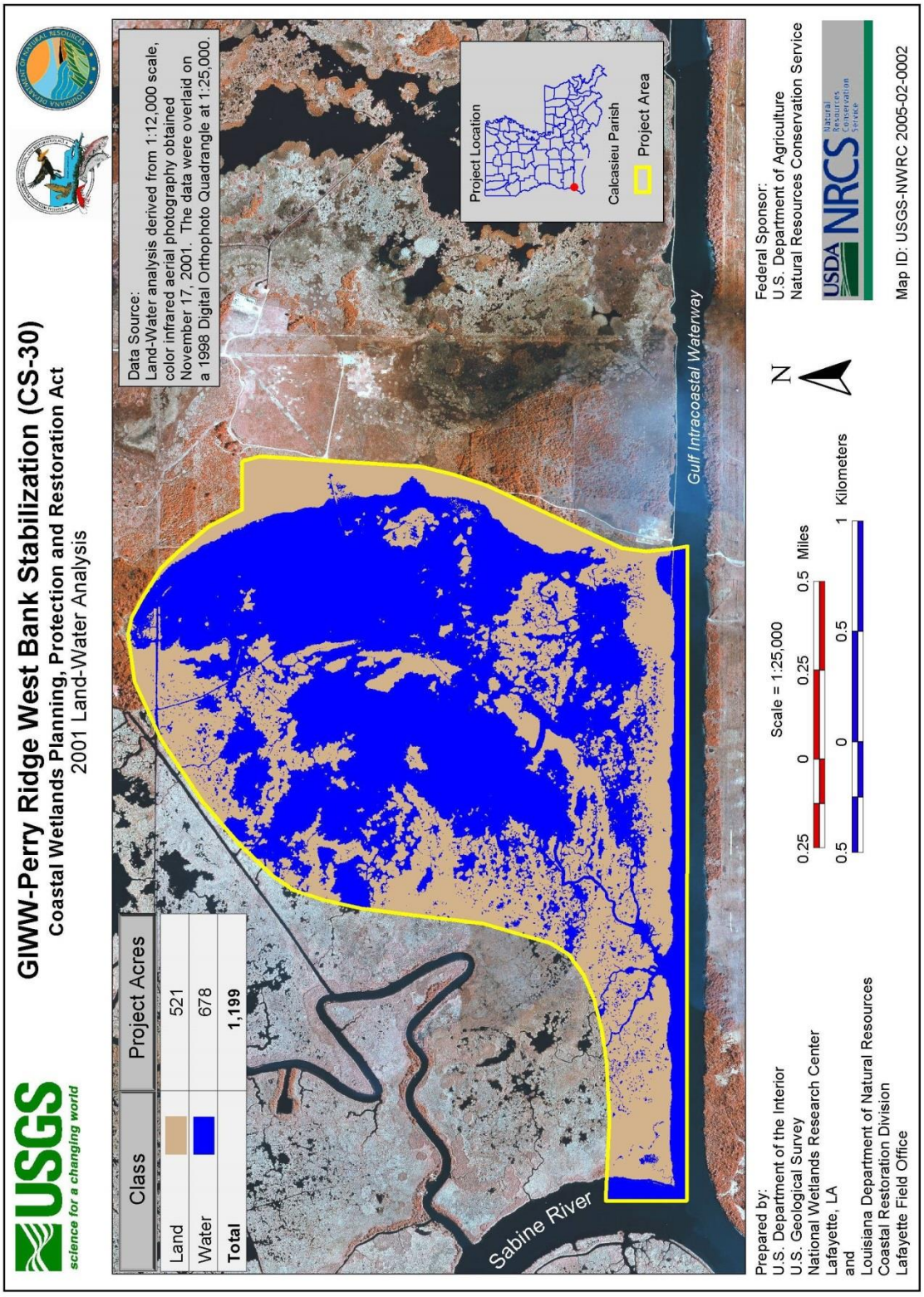

Figure 3. Perry Ridge West (CS-30) project 2001 land/water analysis.

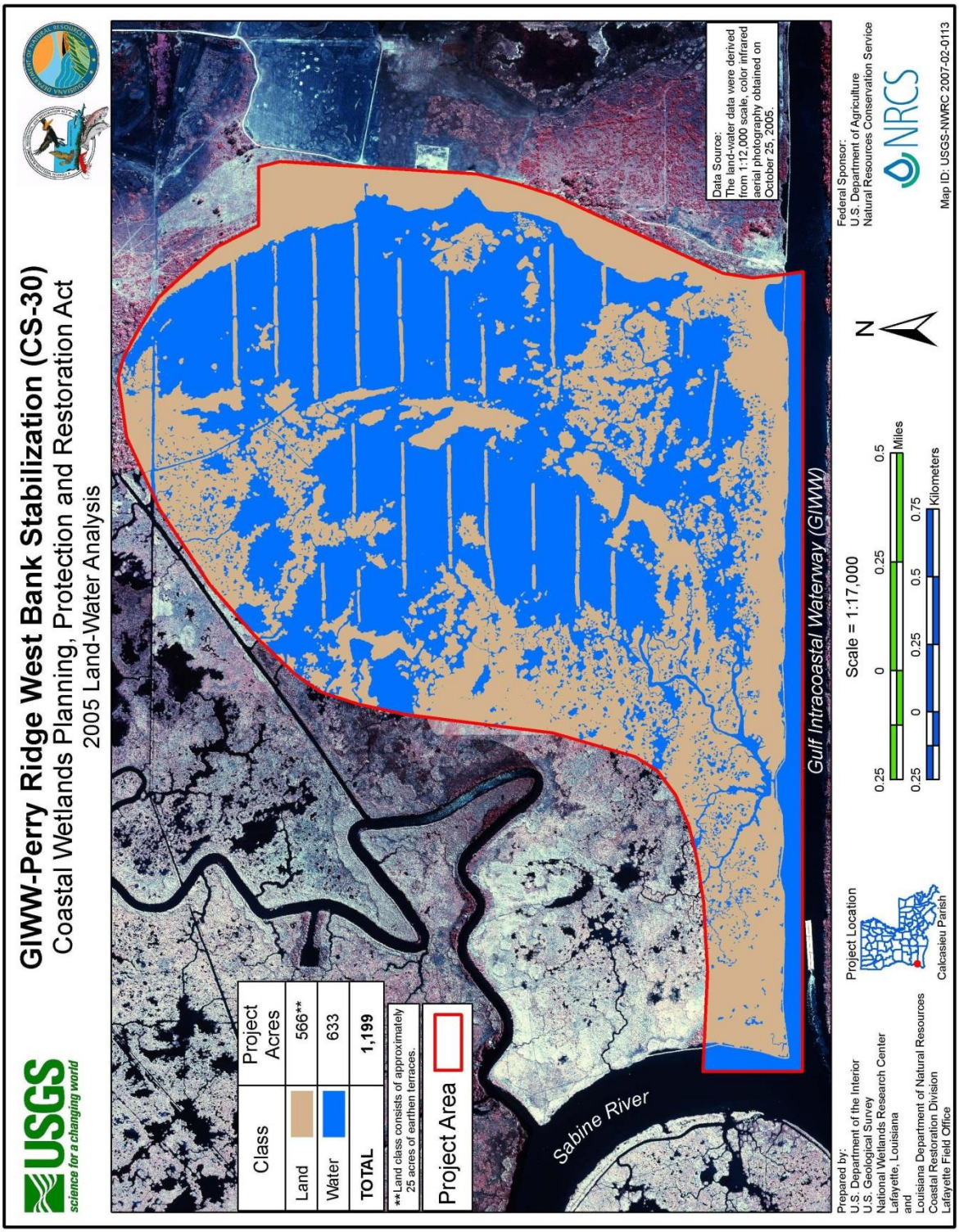

Figure 4. Perry Ridge West (CS-30) project 2005 land/water analysis.

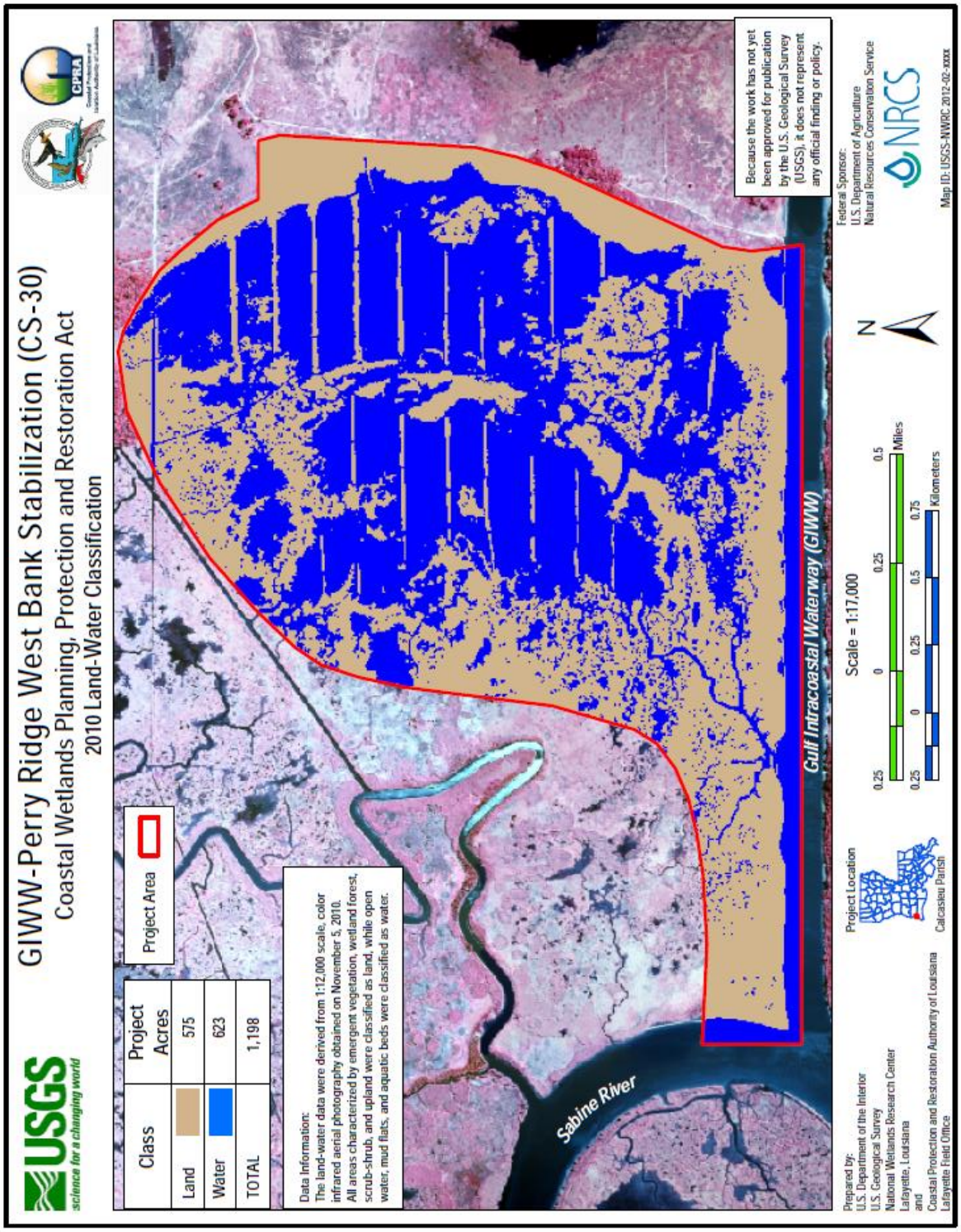

Figure 5. Perry Ridge West (CS-30) project 2010 land/water analysis.

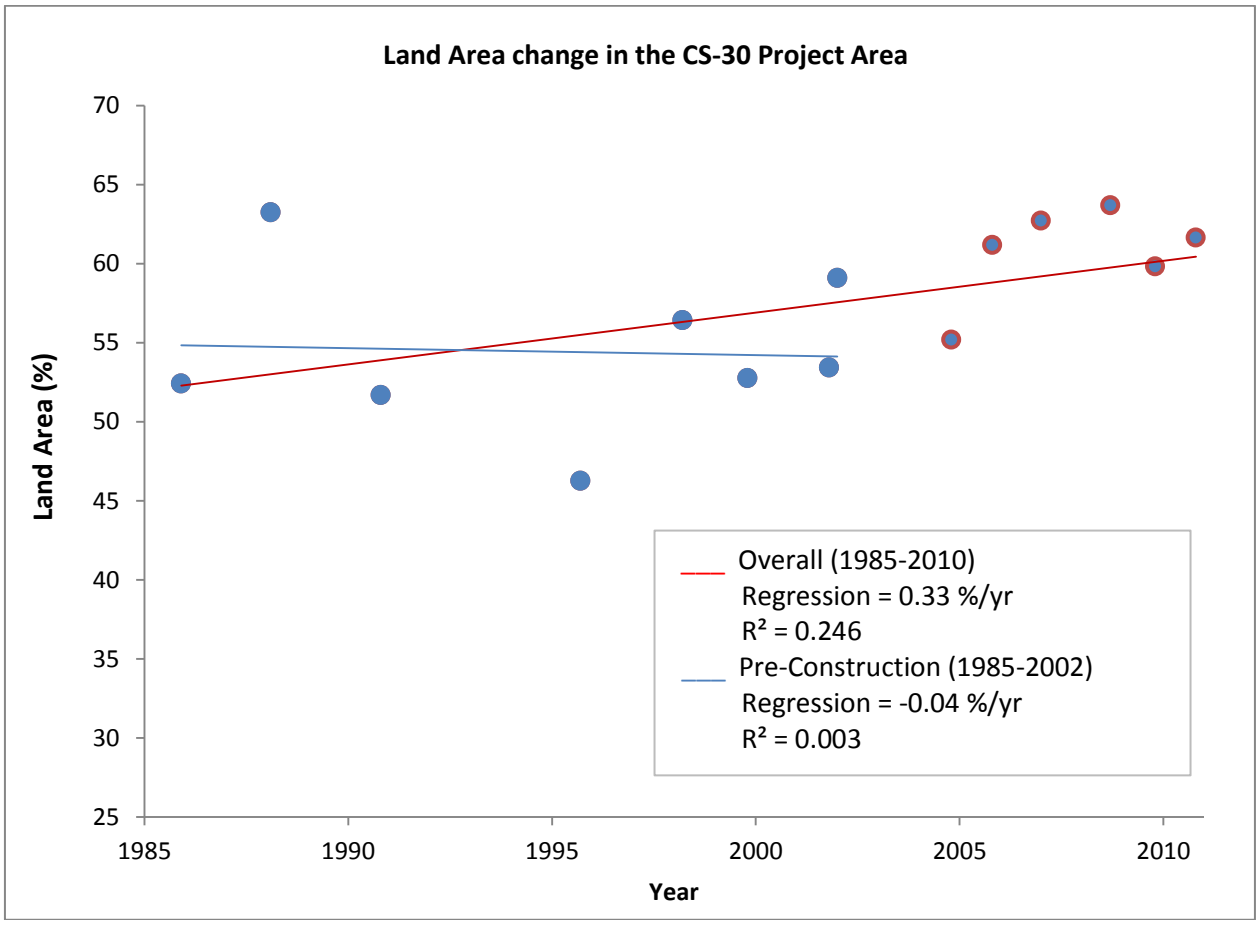

Figure 6. Project scale percent land change for CS-30. Percent land values are displayed for all cloud free TM images available for 1984-2010. The red line depicts the percent land trend for the entire period of record. The blue line depicts the percent land trend for the pre-construction time period only. Percent land calculated as percent land of total project area. See Couvillion et al. 2011.

Submerged Aquatic Vegetation:

Data were collected along 12 transects pre-construction in 2000 and post-construction in years 2003, 2005, 2007, 2010 and 2015 (figure 7). The frequency of occurrence of SAV remained the same between the 2000 and 2003 surveys (near 100%) in both the project and reference areas (figure 8). However, the number of species increased between 2000 and 2003 (figure 9). SAV coverage dropped to 66% in both project and reference areas following Hurricane Rita in 2005, but recovered in both areas in 2007 to pre-storm levels. In the 2010 survey, frequency of occurrence increased in the reference area, but dropped again in 2015, while the project area remained near 100% in both surveys. There was no significant difference in total SAV coverage between the project and reference areas. Over time, both the project and reference areas saw a decrease in *Ruppia maritima*, an indicator of more saline conditions, and an increase in fresher species such as *Myriophyllum spicatum, Najas guadalupensis and Potamogeton* sp.

Shoreline movement:

Evaluation of the 2010 land to water ratio indicates that shoreline erosion appears to have halted since the construction of the rock dike. Visual observations also indicate vertical accretion of the wetland area behind the rock dike at many locations. Direct shoreline measurements on the adjacent CS-24 project have shown that the project has been effective in preventing erosion at most project area stations, while the reference area continued to retreat.

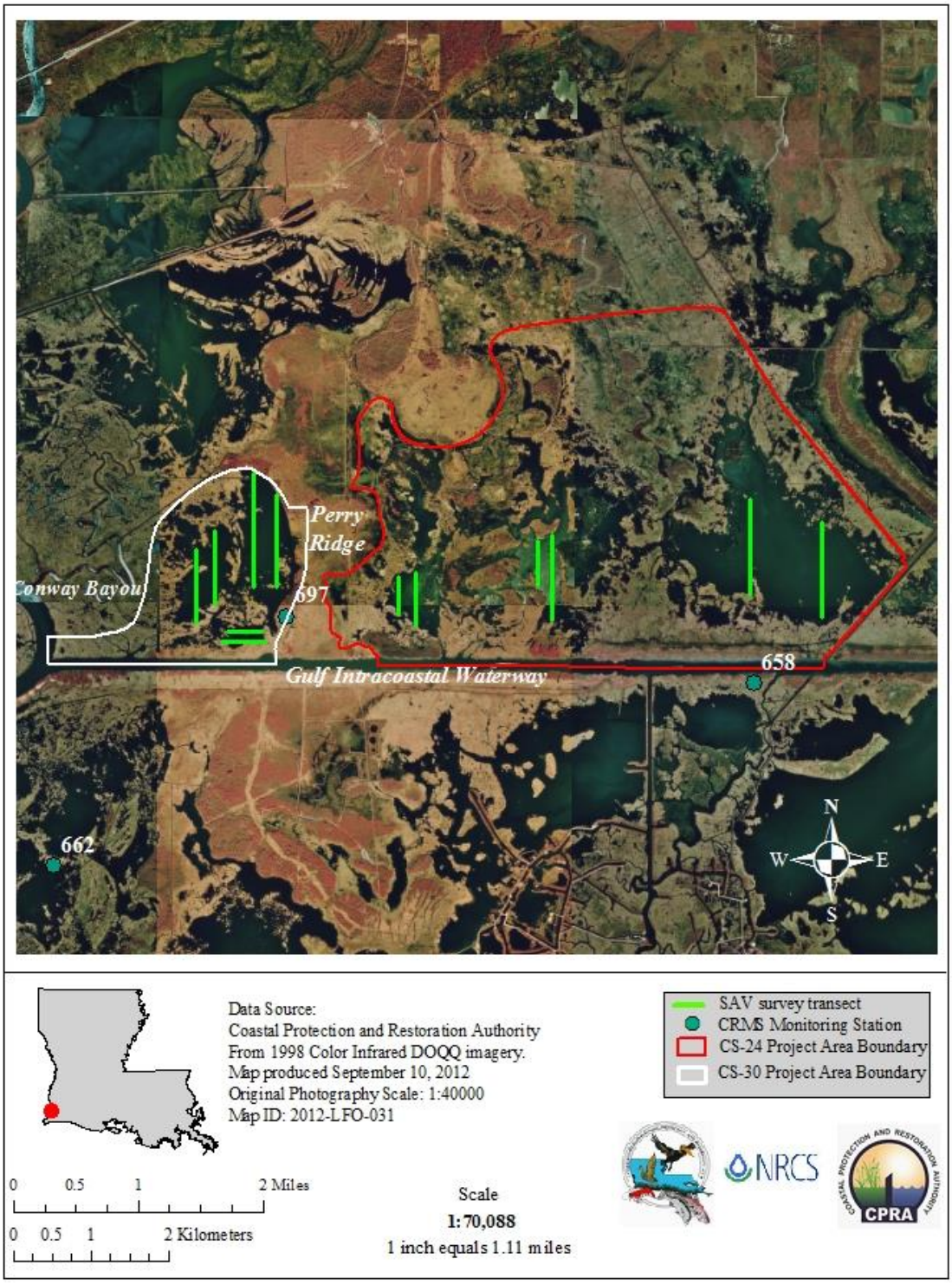

Figure 7. Location of SAV transects and CRMS-*Wetlands* stations within Perry Ridge West (CS-30) project.

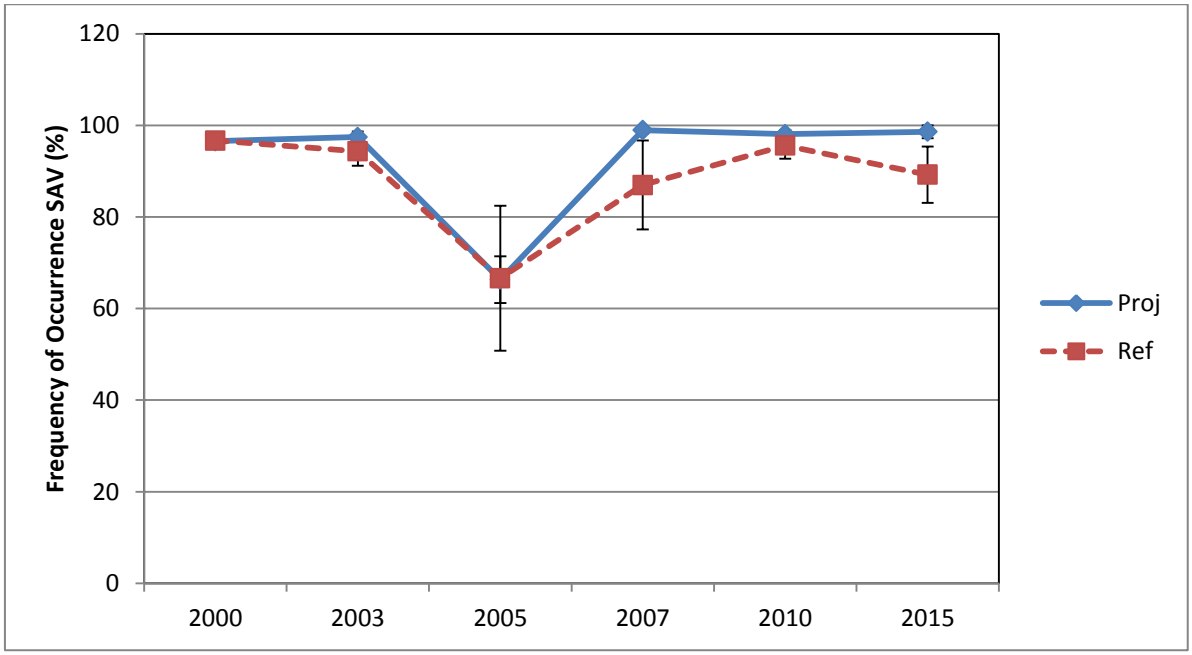

Figure 8. Total percent cover of SAV by area in years 2000, 2003, 2005, 2007, 2010 and 2015 (means ± SE).

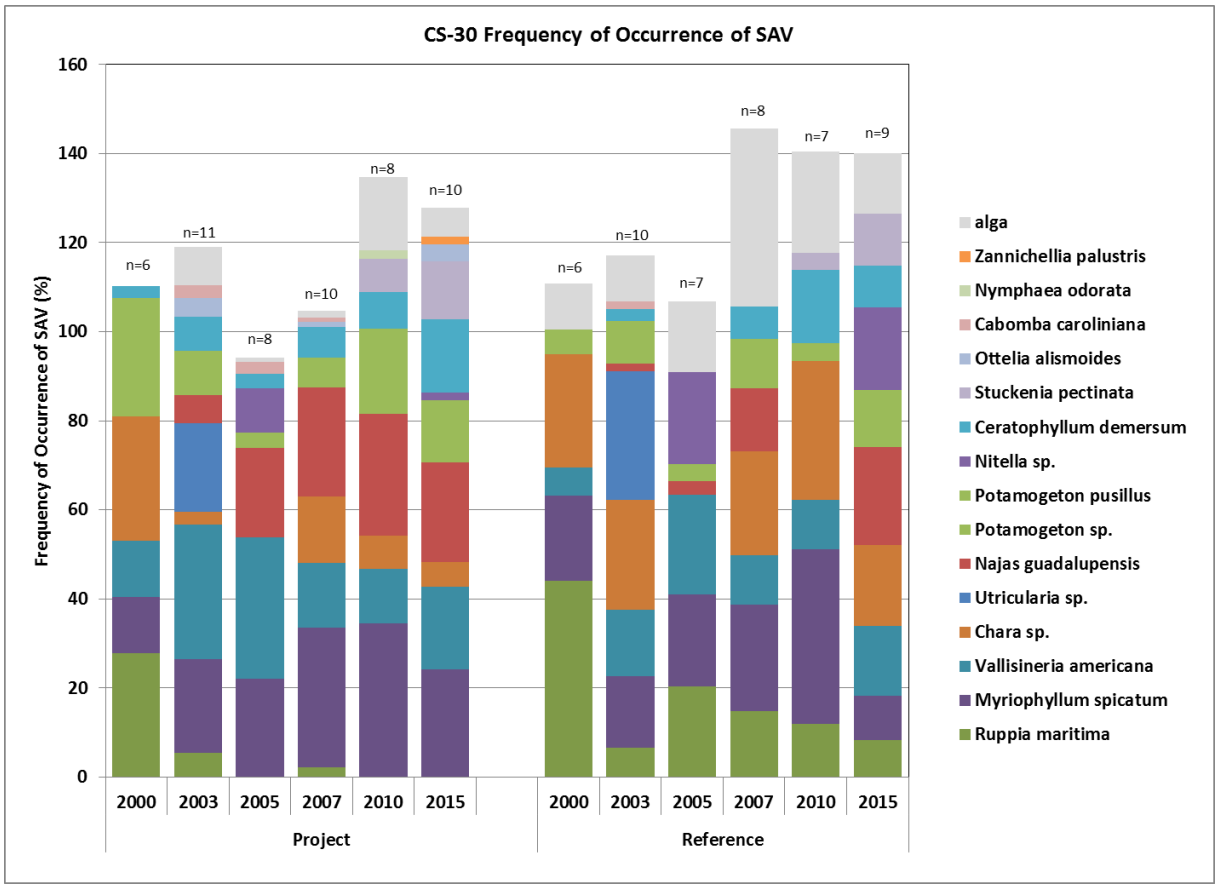

Figure 9. Frequency of occurrence by species within project and reference areas in years 2000, 2003, 2005, 2007, 2010 and 2015.

CRMS Supplemental:

Hydrologic:

Reference site CRMS0697 had a slightly higher HI score than CRMS0658 for 2015, though both sites scored very high (figures 10 and 11). High spring rainfalls reduced salinities within the project area site and reference site. Index values at both sites improved significantly over the previous year's scores (60 at CRMS0697 and 53 at CRMS0658). Site CRMS0697 also scored higher than other intermediate sites throughout the coast and when compared to all sites within the Calcasieu/Sabine basin and coastwide in general (figure 12).

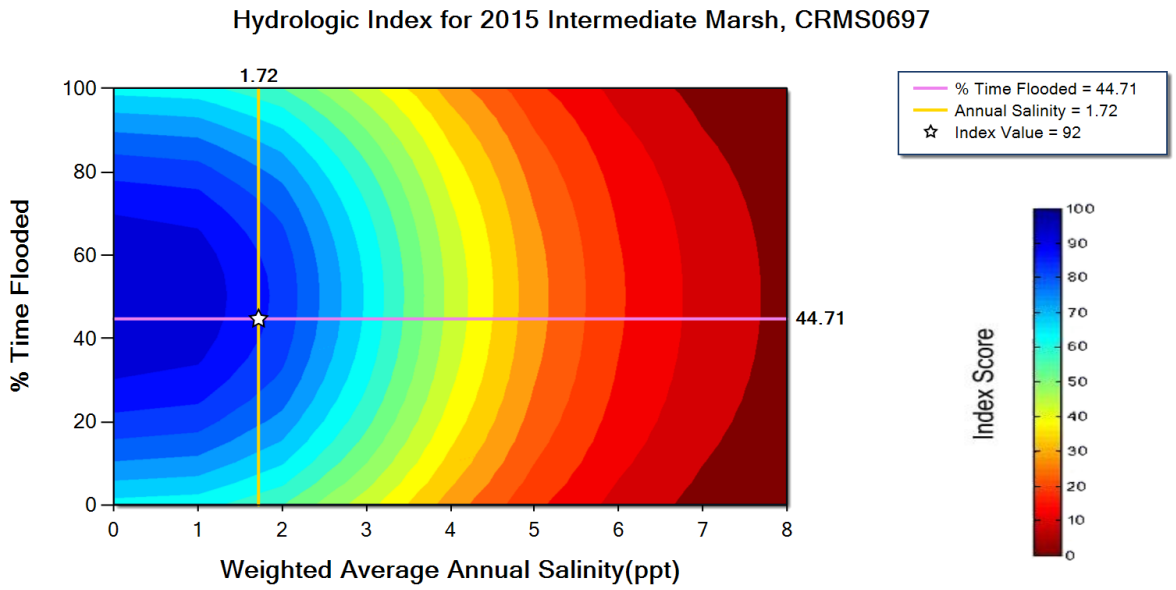

Figure 10. Hydrologic index score for CRMS0697 based on the combined influences of average annual salinity (horizontal axis) and flood duration (vertical axis).

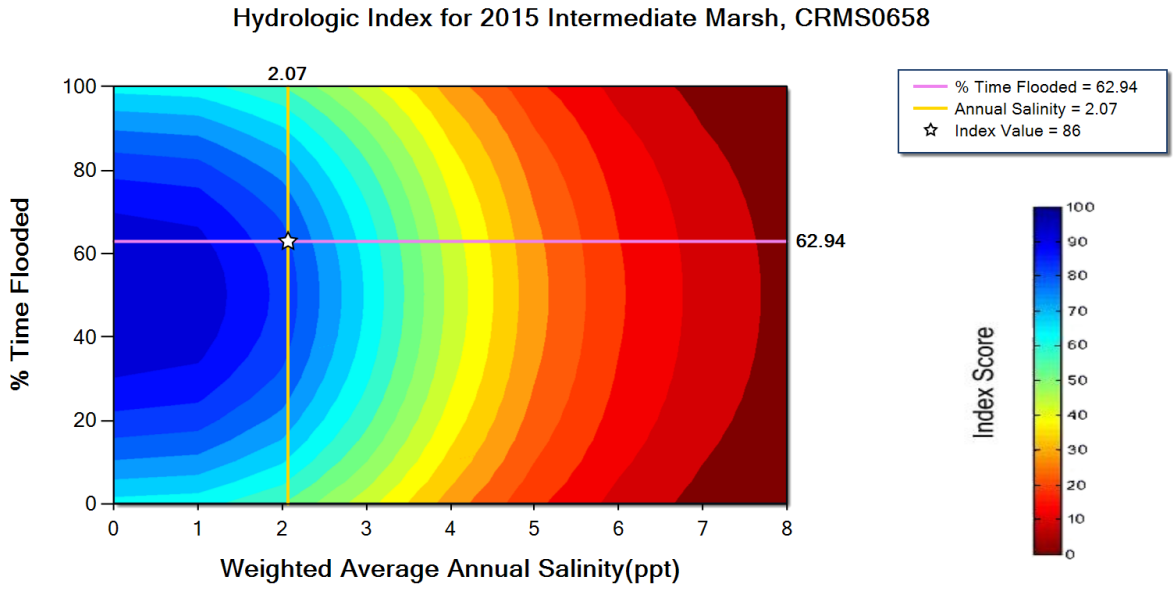

Figure 11. Hydrologic index score for CRMS0658 based on the combined influences of average annual salinity (horizontal axis) and flood duration (vertical axis).

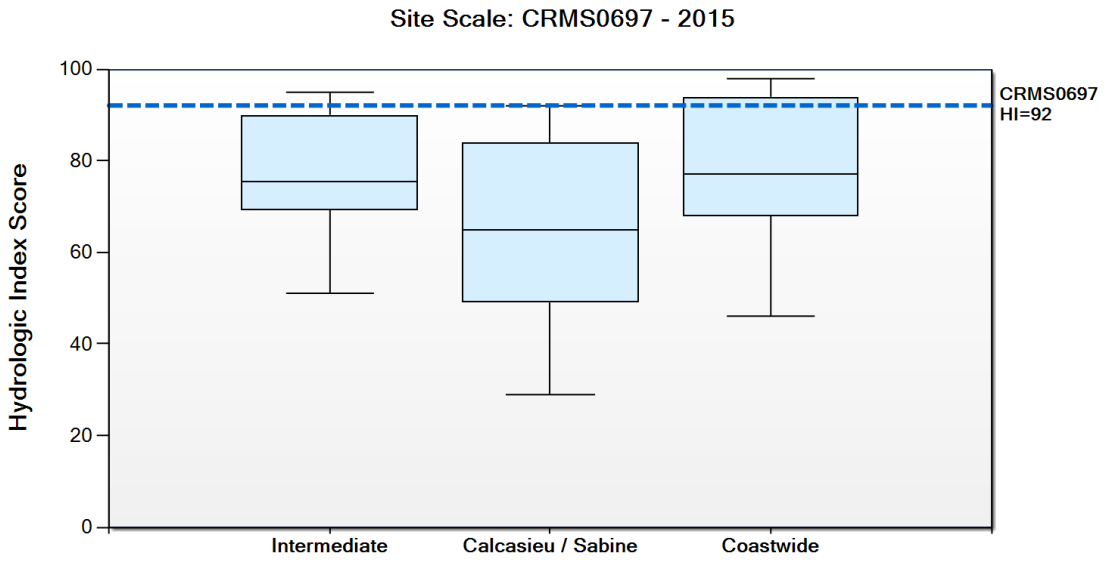

Figure 12. Hydrologic Index Score for CRMS0697 in 2015 compared to the distribution of scores for all coastwide sites within the intermediate marsh type, within the Calcasieu/Sabine basin, and across the entire Louisiana coastal zone.

Vegetation:

Cover and floristic quality were fairly consistent at site CRMS0697 until 2011 when a slight increase in both occurred (figure 13). Following 2011, cover and FQI score were reduced through 2014, likely due to lingering effects of the drought and increased soil salinities which caused a decrease in the dominant species, *Spartina patens*. A slight recovery at the site was observed in 2015 enabling the site to score higher than other sites in the same marsh class and coastwide, though the site scored below average when compared to sites within the same basin (figure 15). Reference site CRMS0658 saw a decrease in cover and FQI score following Hurricane Ike in 2008, but recovered to pre-storm levels by 2009 (figure 14). Since then, cover and quality have been erratic from year to year, with the lowest readings occurring in 2014, when percent cover was below 60%. Like CRMS0697, the site saw a recovery in 2015 and has been dominated by *Spartina patens* in all years.

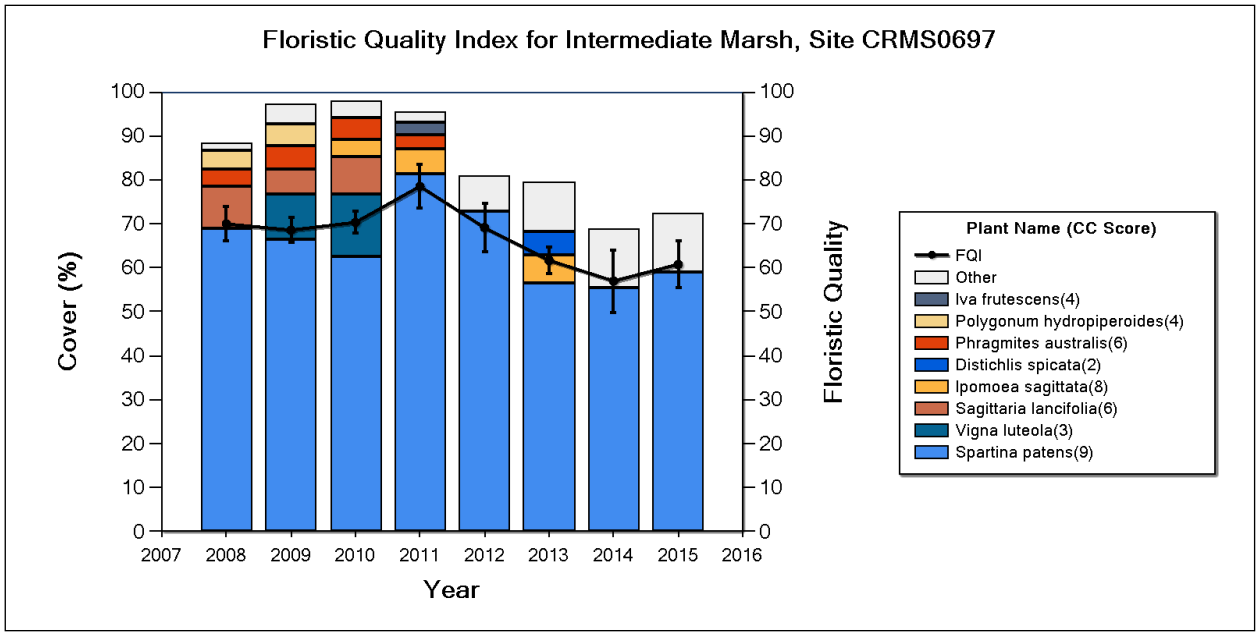

Figure 13. Percent coverage and floristic quality index of species collected from CRMS0697, within the project area in years 2008 – 2015. The CC scores represent the quality of individual species from 1 to 10 where 1 represents disturbance species and 10 indicates stability.

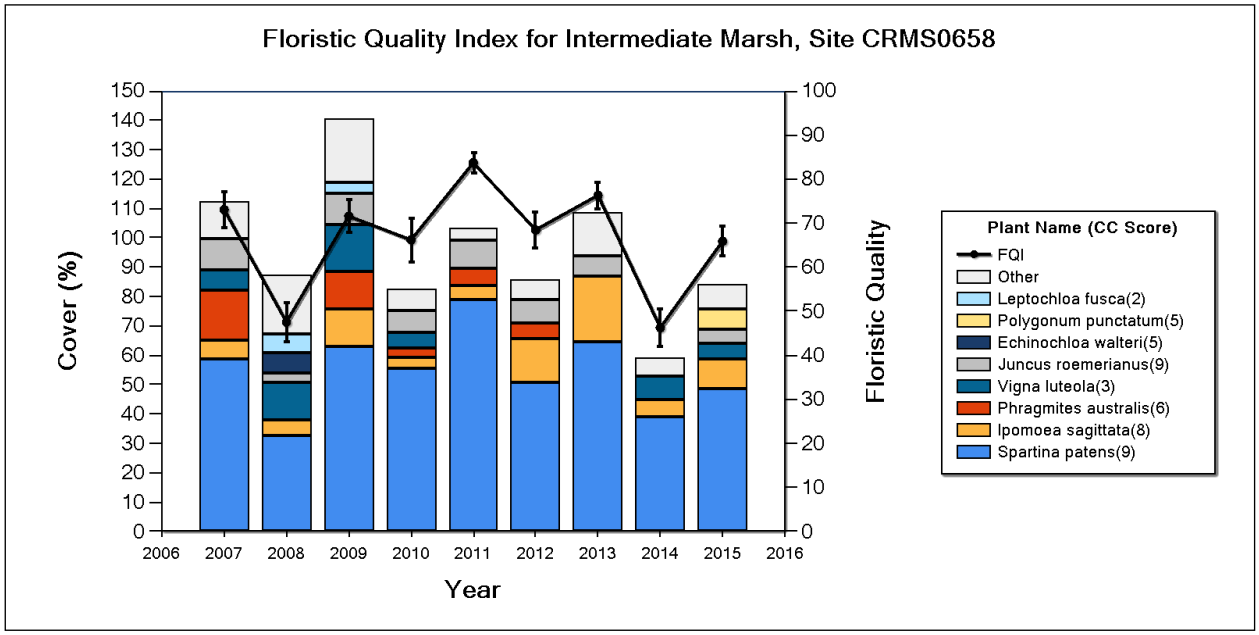

Figure 14. Percent coverage and floristic quality index of species collected from reference site CRMS0658 in years 2008 – 2015. The CC scores represent the quality of individual species from 1 to 10 where 1 represents disturbance species and 10 indicates stability.

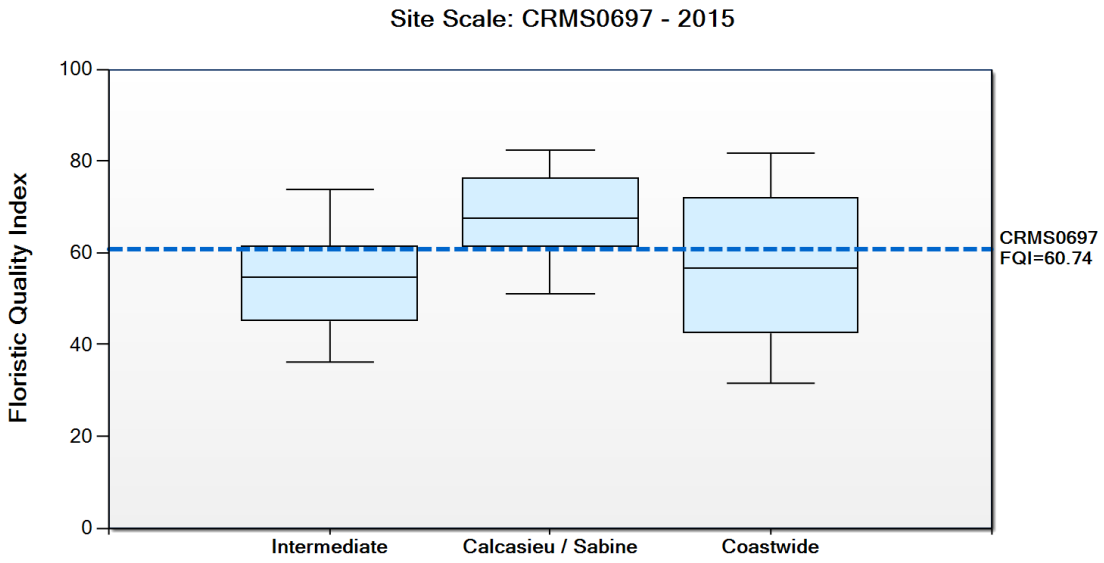

Figure 15. Floristic Quality Index score for CRMS0697 in 2015 compared to the distribution of scores for all coastwide sites within the intermediate marsh type, within the Calcasieu/Sabine hydrologic basin, and across the entire Louisiana coastal zone.

Porewater:

Means by month of interstitial water salinity for sites CRMS0697 and CRMS0658 are presented in figures 16 and 17. Salinities at both stations averaged at or below 5 ppt prior to 2011 at both the 10 and 30 cm levels. Throughout the low rainfall year of 2011, salinities progressively increased and were near 20 ppt at the reference site CRMS0658 by December. Within the project area station, salinities weren't as high, but did reach 15 ppt by the end of the year at the 10 cm level. Salinities dropped sharply in 2012, but still remained above normal through 2013. Porewater salinities returned to pre-drought levels in 2014 in the project area. Though salinities at CRMS0658 had dropped below 5 ppt at the 10 cm level by 2014, it wasn't until 2015 that these lower salinities were measured at the 30 cm level.

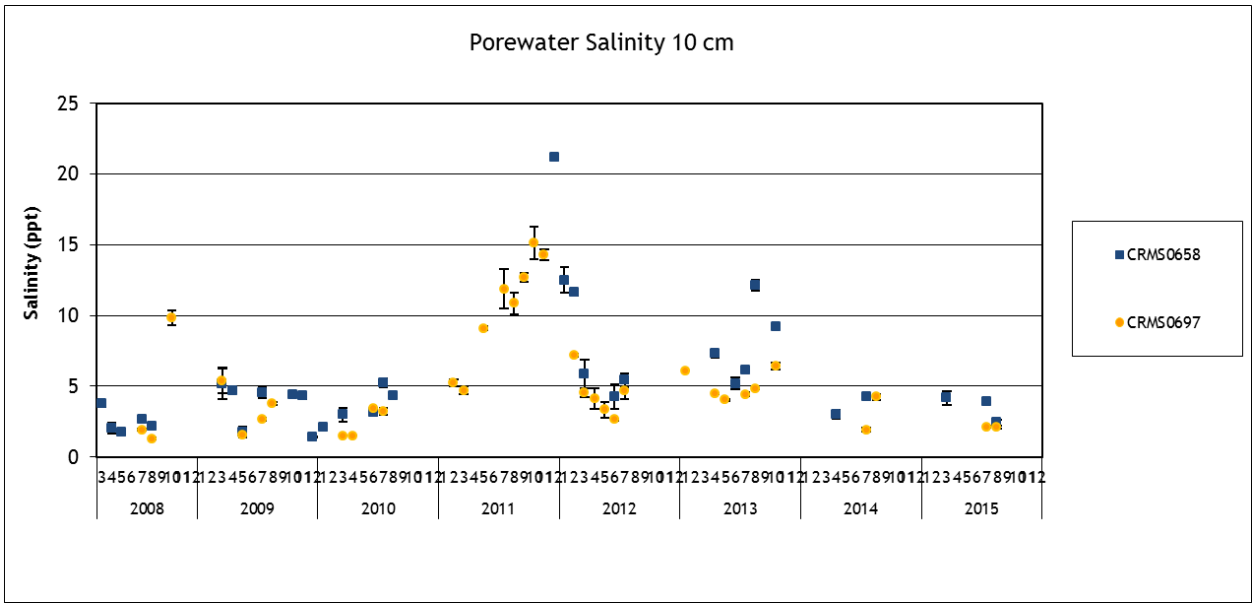

Figure 16. Interstitial water salinity at 10 cm below the soil surface for CRMS0658 and CRMS0697. Error bars, where present, represent the mean of stations for that month ± 1 Std. Err.

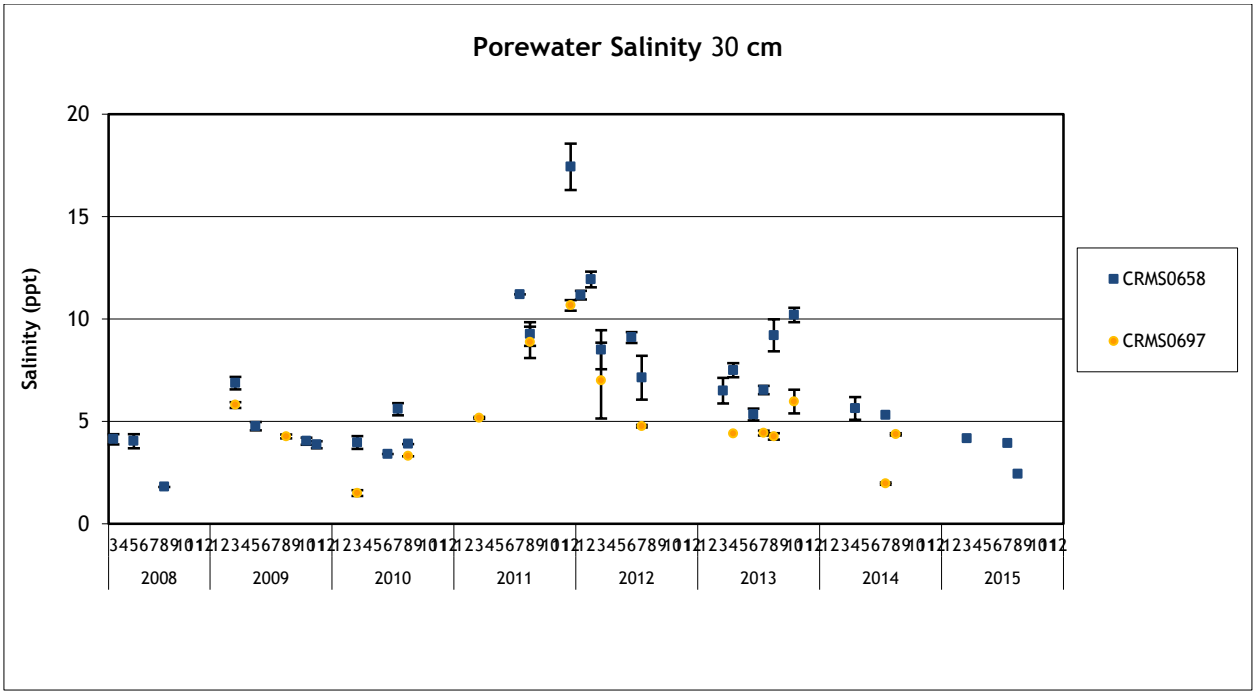

Figure 17. Interstitial water salinity at 30 cm below the soil surface for CRMS0658 and CRMS0697. Error bars, where present, represent the mean of stations for that month ± 1 Std. error.

Soils:

Soil cores were collected one time (within a year of site establishment) to describe soil properties (bulk density and percent organic matter) at CRMS0697 within the project area and CRMS0658 within the reference area. Three, 4" (10.16-cm) diameter cores were collected to a depth of 24 cm and divided into 6, 4-cm sections at the site. All cores were sampled after Hurricane Rita.

Figures for mean bulk density and organic matter (OM%) are presented in figures 18 and 19. Bulk densities were similar at both sites and not significantly different below 4 cm. Mean densities were low (<0.3g/cm^3) throughout the entire profile of the sites. OM% was low in the top 4 cm of the profile for CRMS0697 (~26%), but was higher than 40% through 12 cm.

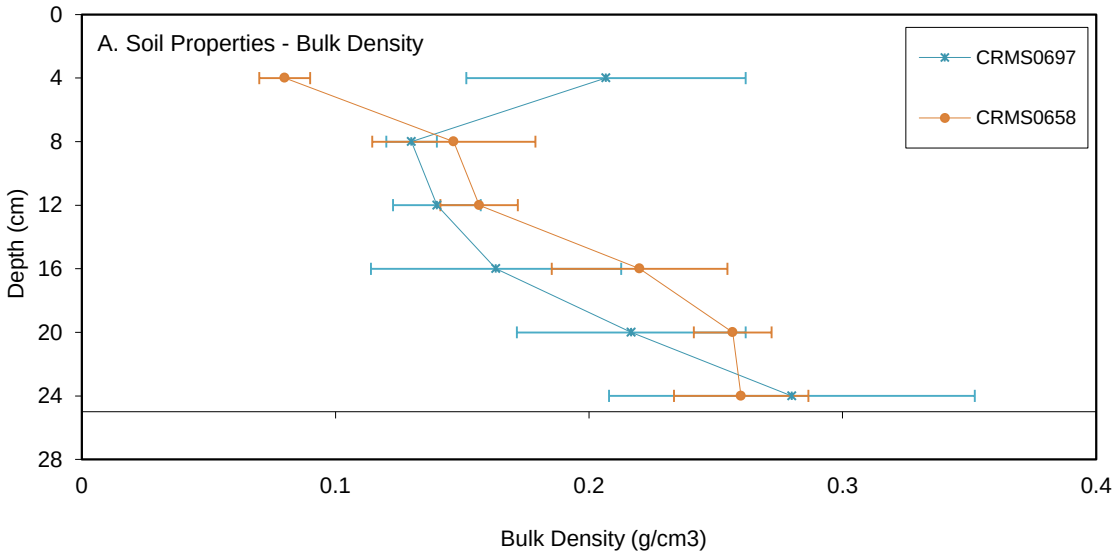

Figure 18. Mean ± 1 Standard error of soil bulk density collected at project site CRMS0697 and reference site CRMS0658.

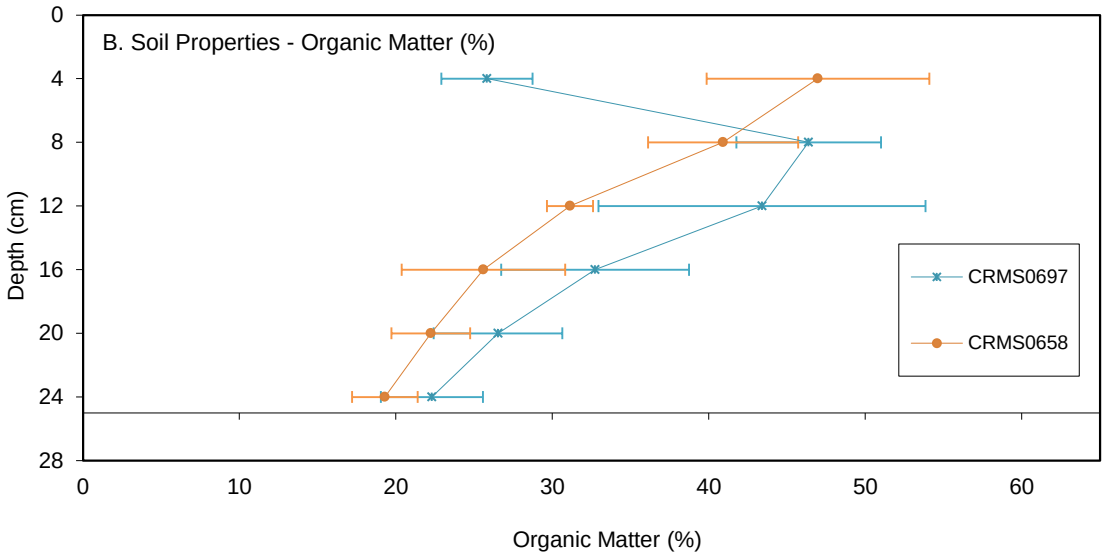

Figure 19. Mean ± 1 Standard error of soil organic matter content collected at project site CRMS0697 and reference site CRMS0658.

V. Conclusions

a. Project Effectiveness

The project has been effective in achieving the goal of preventing land loss. The project area has experienced a 4.5% gain in land since the project was constructed. Although much of this can be attributed to the construction of the earthen terraces, an additional 29 acres have been created since 2001. This is supported by the percent land change analysis which shows an increase in percent land through time. Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline.

The goal of maintaining SAV abundance has been achieved. The percent cover of SAV within the project area has remained near 100% in all years, excluding the post-Rita survey. The diversity of species has increased since construction of the earthen terraces.

Porewater salinities within the project have returned to normal intermediate levels following high levels in the years following the drought of 2011. The cover and quality of vegetation at the project area site was impacted by these salinities, but is showing a recovery as of 2015.

The rock dike has proven effective in preventing GIWW bank erosion. With the exception of one location, the dike has been very stable with no maintenance required. Once the area of concern is addressed the dike will continue to function as designed.

Though a formal inspection was not conducted, the earthen terraces were observed during the SAV monitoring survey in 2015. The segments remain intact, however the bullwhip plantings showed die-back in some areas, likely due to high salinities in 2011. The remaining plantings looked healthy, though, as well as the vegetation growing on the crown of the terraces.

b. Recommended Improvements

A maintenance event to address the breach in the earthen plug has been initiated by CPRA. Lonnie Harper & Associates Inc. has completed the surveying and engineering services necessary to prepare plans and specifications for the proposed breach repair. Incremental funding was approved at the October 10, 2013 CWPPRA Task Force Meeting. Once the permits are received, the maintenance event will move forward to construction. A sheetpile wall and rock armoring will be used to plug the breach.

c. Lessons Learned

VI. Literature Cited

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APPENDIX A
(Inspection Photographs)

Photo No. 1, Typical Rock Dike

Photo No. 2, Low Area of Displaced Rock Dike

Photo No. 3, Gap in Earthen Plug behind Rock Dike, Water Flow Channeling into Marsh

Photo No. 4, Water Flow through Displaced Rock Dike, Water Flow Channeling into Marsh

APPENDIX B
(Three Year Budget Projection)

GIWW-PERRY RIDGE BANK STABILIZATION/ CS-30 /PPL 9

Three-Year Operations & Maintenance Budgets 07/01/2016 - 06/30/2019

Project Manager	O & M Manager	Federal Sponsor	Prepared By
Pat Landry	*Mel Guidry*	*NRCS*	*Mel Guidry*

	2016/2017 (-15)	2017/2018 (-16)	2018/2019 (-17)
Maintenance Inspection	$ 7,057.00	$ 7,269.00	$ 7,487.00
Structure Operation			
State Administration	$5,000.00	$ -	$ -
Federal Administration	$5,000.00	$ -	$ -
Maintenance/Rehabilitation			

16/17 Description: Repair breach behind rock dike

E&D		
Construction	$253,000.00	(Incl 10% Contingency)
Construction Oversight	$93,330	
Sub Total - Maint. And Rehab.	$ 346,330.00	

17/18 Description

E&D	$ -	
Construction	$ -	
Construction Oversight	$ -	
Sub Total - Maint. And Rehab.	$ -	

18/19 Description:

E&D	$ -	
Construction	$ -	
Construction Oversight	$ -	
Sub Total - Maint. And Rehab.	$ -	

	2016/2017 (-15)	2017/2018 (-16)	2018/2019 (-17)
Total O&M Budgets	**$ 363,387.00**	**$ 7,269.00**	**$ 7,487.00**

O &M Budget (3 yr Total)	**$ 378,143.00**
Unexpended O & M Budget	**$ 381,825.00**
Remaining O & M Budget (Projected)	**$ 3,682.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET

GIWW-Perry Ridge West Bank Stabilization Project / PROJECT NO. CS-30 / PPL NO. 9 / 2016/2017

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$7,057.00	**$7,057.00**
General Structure Maintenance	LUMP	0	$0.00	**$0.00**
Engineering and Design	LUMP	0	$0.00	**$0.00**
Operations Contract	LUMP	0	$0.00	**$0.00**
Construction Oversight	LUMP	1	$93,330.00	**$93,330.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	1	$5,000.00	$5,000.00
FEDERAL SPONSOR Admin.	LUMP	1	$5,000.00	$5,000.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$10,000.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument		EACH	0	$0.00	$0.00
Staff Gauge / Recorders		EACH	0	$0.00	$0.00
Marsh Elevation / Topography		LUMP	0	$0.00	$0.00
TBM Installation		EACH	0	$0.00	$0.00
OTHER					$0.00
				TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings		EACH	0	$0.00	$0.00
OTHER					$0.00
				TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:	Repair breach behind rock dike.				
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
Rock Rip rap	0	0.0	400	$200.00	$80,000.00
Aggregate Surface Course	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navigation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)		LN FT	80	$1,500.00	$120,000.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	0	$0.00	$0.00
Materials		LUMP	0	$0.00	$0.00
Mob / Demob		LUMP	1	$30,000.00	$30,000.00
Contingency (10%)		LUMP	1	$23,000.00	$23,000.00
General Structure Maintenance		LUMP	0	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$253,000.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$363,387.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET

GIWW-Perry Ridge West Bank Stabilization Project / PROJECT NO. CS-30 / PPL NO. 9 / 2017/2018

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$7,269.00	**$7,269.00**
General Structure Maintenance	LUMP	0	$0.00	**$0.00**
Engineering and Design	LUMP	0	$0.00	**$0.00**
Operations Contract	LUMP	0	$0.00	**$0.00**
Construction Oversight	LUMP	0	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSOR Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument		EACH	0	$0.00	$0.00
Staff Gauge / Recorders		EACH	0	$0.00	$0.00
Marsh Elevation / Topography		LUMP	0	$0.00	$0.00
TBM Installation		EACH	0	$0.00	$0.00
OTHER					$0.00
				TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings		EACH	0	$0.00	$0.00
OTHER					$0.00
				TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
Rock Rip rap	0	0.0	0	$0.00	$0.00
Aggregate Surface Course	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navigation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	0	$0.00	$0.00
Materials		LUMP	0	$0.00	$0.00
Mob / Demob		LUMP	0	$0.00	$0.00
Contingency		LUMP	0	$0.00	$0.00
General Structure Maintenance		LUMP	0	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$7,269.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET

GIWW-Perry Ridge West Bank Stabilization Project / PROJECT NO. CS-30 / PPL NO. 9 / 2018/2019

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$7,487.00	**$7,487.00**
General Structure Maintenance	LUMP	0	$0.00	**$0.00**
Engineering and Design	LUMP	0	$0.00	**$0.00**
Operations Contract	LUMP	0	$0.00	**$0.00**
Construction Oversight	LUMP	0	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	0	$0.00	$0.00
FEDERAL SPONSOR Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:					
Secondary Monument	EACH	0	$0.00	$0.00
Staff Gauge / Recorders	EACH	0	$0.00	$0.00
Marsh Elevation / Topography	LUMP	0	$0.00	$0.00
TBM Installation	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL SURVEY COSTS:	**$0.00**

GEOTECHNICAL

GEOTECH DESCRIPTION:					
Borings	EACH	0	$0.00	$0.00
OTHER				$0.00
			TOTAL GEOTECHNICAL COSTS:	**$0.00**

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
Rock Rip rap	0	0.0	0	$0.00	$0.00
Aggregate Surface Course	0	0.0	0	$0.00	$0.00
	0	0.0	0	$0.00	$0.00
Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00	$0.00
Navigation Aid		EACH	0	$0.00	$0.00
Signage		EACH	0	$0.00	$0.00
General Excavation / Fill		CU YD	0	$0.00	$0.00
Dredging		CU YD	0	$0.00	$0.00
Sheet Piles (Lin Ft or Sq Yds)			0	$0.00	$0.00
Timber Piles (each or lump sum)			0	$0.00	$0.00
Timber Members (each or lump sum)			0	$0.00	$0.00
Hardware		LUMP	0	$0.00	$0.00
Materials		LUMP	0	$0.00	$0.00
Mob / Demob		LUMP	0	$0.00	$0.00
Contingency		LUMP	0	$0.00	$0.00
General Structure Maintenance		LUMP	0	$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
OTHER				$0.00	$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$7,487.00**

APPENDIX C
(Field Inspection Notes)

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: CS-30 GIWW-Perry Ridge West Bank Stabilization

Date of Inspection: June 13, 2013 Time: 11:40 am

Structure No.

Inspector(s): Mel Guidry, Stan Aucoin, and Darrell Pontiff (CPRA)
Frank Chapman, Brandon Samson (NRCS), Josh Carson (COE)

Structure Description: Rock Dike/Earthen Terraces

Water Level: Not Available

Type of Inspection: Annual

Weather Conditions: Sunny and warm

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	N/A				
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	N/A				
Timber Piles	N/A				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	N/A				
Rip Rap (fill) (foreshore dike)	Good			1-2	Dike in good condition. Low area where it appears a barge has displaced the rock.
				3-4	Seven foot gap in rock dike. Cut in Earthen Plug behind dike.
					Survey of location complete at this location. N 30° 03' 34.0" W 93° 41' 16.2"
Earthen Terraces	N/A				Not inspected on this trip.
Vegetative Plantings					