State of Louisiana

Coastal Protection and Restoration Authority of Louisiana

Office of Coastal Protection and Restoration

2011 Operations, Maintenance, and **Monitoring Report**

for

Marsh Island Hydrologic Restoration

State Project Number T/V-14
Priority Project List 6

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Iberia Parish

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For
Marsh Island Hydrologic Restoration (TV-14)

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I. Introduction

The Marsh Island Hydrologic Restoration Project is located in Iberia Parish approximately six miles south of Cypremort Point. The project area encompasses approximately 7,310 acres (2,958 ha) of wetlands on the northeast tip of Marsh Island east of Bayou Blanc (figure 1). It comprises 4,290 acres (1,736 ha) of brackish marsh and 3,020 (1,222 ha) acres of open water, based on the Louisiana Department of Natural Resource's GIS data for 2004 (LDNR 2004). Common plant species found in the project area include *Juncus roemerianus* (needlegrass rush), *Spartina patens* (saltmeadow cordgrass), *Schoenoplectus maritimus* (cosmopolitan bulrush), *Schoenoplectus americanus* (chairmaker's bulrush), *Spartina alterniflora* (saltmarsh cordgrass), and *Vigna luteola* (hairypod cowpea) (United States Department of Agriculture, Natural Resources Conservation Service 2002, Chabreck and Linscombe 1988).

Between 1930 and the present, the hydrology of Marsh Island has changed due to tidal influenced erosion, subsidence, and oil and gas exploration (Orton 1959, SCS 1978). Several oil field canals were constructed to facilitate oil and gas exploration in the project area during the 1950's. Recent deterioration and subsidence of the spoil banks deposited in the 1950's have resulted in cuts in the spoil banks that have become conduits for rapid tidal exchanges between the surrounding bays and the interior marshes. These rapid exchanges have resulted in tidal scouring and the loss of marsh vegetation through erosion and subsidence. Lake Sand and a number of interior lakes also supported a significant amount of submerged aquatic vegetation (SAV). Today these lakes are almost devoid of SAV, presumably due to the effects of increased tidal exchange and increased turbidity. Erosion has also lead to the deterioration of the northeast end of Marsh Island and the north rim of Lake Sand, leaving exposed a highly organic brackish marsh.

During the life of the 20 year project, 408 acres (168 ha) of wetlands will be protected (USACE 1994). The project consists of the construction of 9 closures in oil and gas canals at the northeast end of Marsh Island and isolating Lake Sand from Vermilion Bay with a free-standing rock breakwater (figure 1). There is also a shoreline protection of the northeast shoreline of Marsh Island. Project construction began on July 25, 2001 with the construction of approximately 4,000 linear feet (1291 m) of rock breakwater to protect the north shoreline on Lake Sand by contractor Tacon Company, Inc. of Bartlett, Tennessee and subcontractor Luhr Brothers, Inc. of Columbia, Illinois. A total of seven canals were plugged with rock armor while one was plugged with an earthen closure only. An additional closure, constructed of painted steel sheetpile and rock armor, was constructed at the mouth of an oil exploration canal on the eastern end of the project area. Construction of the $2.9 million project was completed on December 12, 2001.

Hurricane Rita struck the coast of southwestern Louisiana on September 24, 2005 with maximum storm surge of 10 ft (3.1 m) in the TV-14 project area (FEMA 2006). USGS calculated the amount of land that changed to water resulting from the storm to be 98 square miles in southwestern Louisiana, 5 square miles in the Teche/Vermilion basin (Barras 2006).

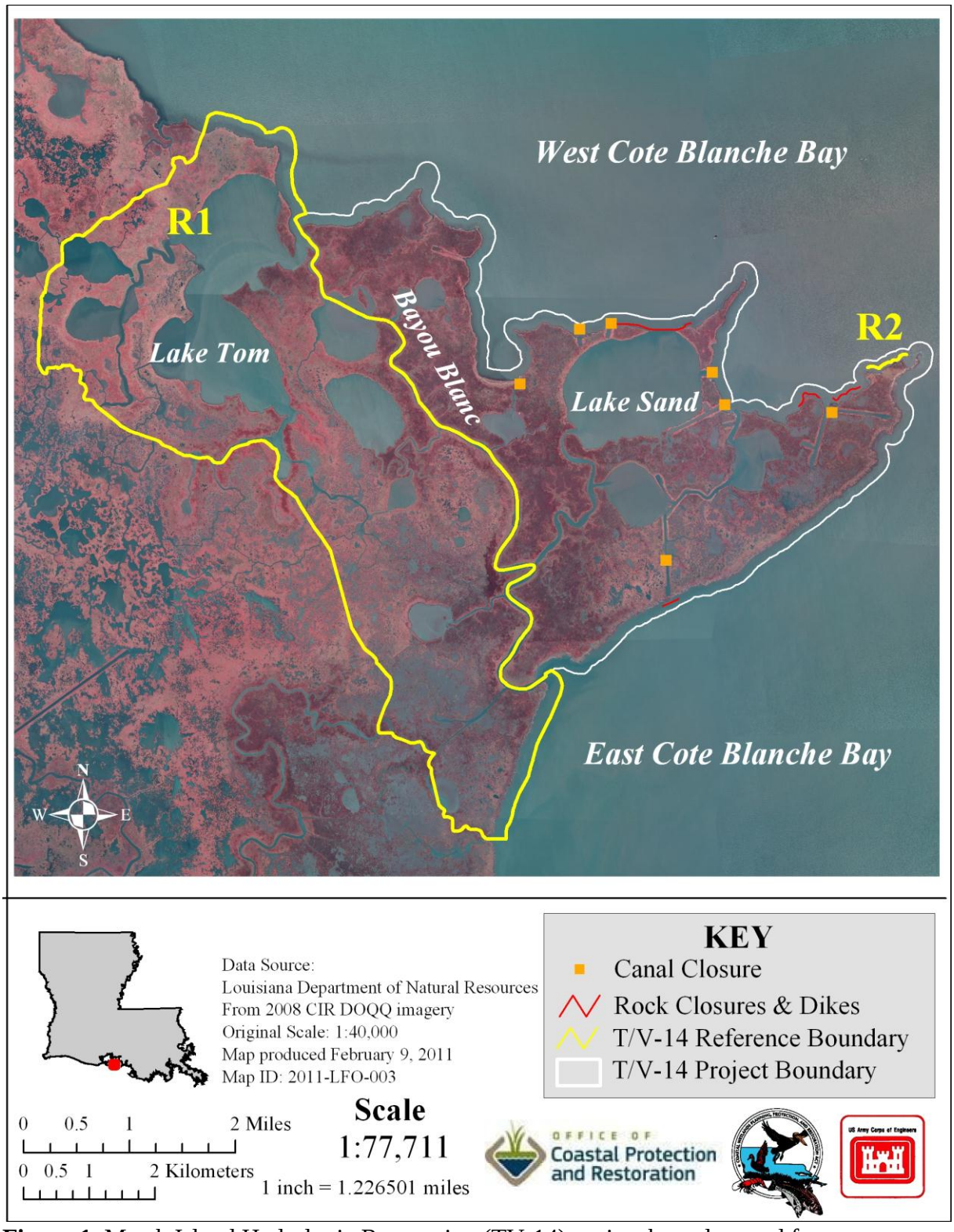

Figure 1. Marsh Island Hydrologic Restoration (TV-14) project boundary and features.

Hurricane Ike struck near Galveston, Texas on September 13, 2008. A maximum storm surge of 7 - 8 ft (2.1 – 2.4 m) NAVD 88 was reported near the TV-14 project area (East et al. 2008)

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Marsh Island Hydrologic Restoration Project (TV-14) 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. 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 C. A summary of past operation and maintenance projects completed since completion of the Marsh Island Hydrologic Restoration Project are outlined in Section IV.

An inspection of the Marsh Island Hydrologic Restoration Project (TV-14) was held on March 29, 2011 under partly cloudy skies and warm temperatures. In attendance were Darrell Pontiff, Dion Broussard, and Troy Barrilleaux from OCPR; Edmond Mouton, Tim Marcantel and Jill Jordan representing LDWF; Billy Hicks representing USACE. The annual inspection began at approximately 10:30 a.m. at Structure No. 9 and ended at Structure No. 1 at approximately 12:00 p.m.

The field inspection included a complete visual inspection of most of the project features. Staff gage readings and existing temporary benchmarks where available were used to determine approximate elevations of water, embankments and weir features. Photographs were taken at each project feature (see Appendix B) and Field Inspection notes were completed in the field to record measurements and deficiencies (see Appendix D).

b. Inspection Results

<u>Closure No. 1</u>

The erosion problems and Hurricane Rita damages have been repaired through the recent maintenance project that was completed in February 2009. The dike was capped and bank paving installed on both ends of the closure. This site is in good condition since this work was performed. This site is showing significant silt deposition on the north side of the dike on both the east and west sides, with the majority of the silt appearing on the west side of the dike continuing along the shoreline for several hundred feet. (Photos: Appendix A, Photo 1).

Closure No. 2

The dike was capped and bank paving installed as noted above and is in good condition since the work was performed. (Photos: Appendix A, Photo 2).

Closure No. 3

The rock closure dike appears in good condition and was extended on the western end along with installing bank paving during the recent maintenance event. Also, it was observed (and confirmed with aerial photography post Hurricane Rita) that a large open water area has developed within the marsh near the western terminus of Closure No. 3 and that the bankline between that point and the eastern end of Closure No. 2 has eroded very severely and such that the "landbridge" between Vermilion Bay on the north of Marsh Island and the northwestern portion of Lake Sand proper is now narrow and may become subject to breaching thus allowing an undesirable water connection between the two bodies of water. OCPR and COE agree that this area is in poor condition and should be considered for maintenance at some point in time. It is recommended that an additional reach of shoreline protection dike be constructed, an estimated 1,500 to 1,800 linear feet, to connect the western end of Closure No. 3 to the eastern end of Closure No. 2. This reach of bank has been recently surveyed and the estimated cost for rock dike and flotation is approximately $800,000. OCPR and COE agreed that due to this area being of concern but not yet critical status; and budget constraints, this maintenance work would be undertaken at a later time.(Photos: Appendix A, Photo 3).

Closure No. 4

The Lake Sand Dike closure as originally constructed and recently repaired for Hurricane Rita damages, appears in good condition. The dike was capped in those areas where it was below elevation +3.0 as well as extended on the eastern end with bank paving. Dike has maintained elevation in capped areas. (Photos: Appendix A, Photos 4-5).

Closure No. 5

The steel sheet pile, rock riprap wingwalls, and stone bank/marsh paving placed as part of the Hurricane LILI repair project is in good condition and were apparently very effective in preventing additional damage by the erosive action of Hurricane Rita. The staff gage was re-set as part of the recent maintenance event. The overbank marsh areas paved to make same "hard" and paid for with O & M funding needs to be continually evaluated for its effectiveness. Overbank areas are presently sound and in great condition. (Photos: Appendix A, Photo 6).

Closure No. 6

The breach on the southern end of the dike that had occurred prior to Hurricane Rita and subsequently worsened as a result of the tidal surge has been repaired as part of the recent maintenance event. The dike was extended on the northern end and bank paving was installed on both ends of the closure. This site is in good condition since the repairs have been made. (Photos: Appendix A, Photo 7).

Closure No. 7

This closure site is in good condition and spoil material from the dredging of the north-south canal in 2008 was placed along the eastern end of the rock dike in an effort to stabilize this section of shore. In addition dredge spoil material was pumped behind the rock dike as part of this same access dredging and a small area of marsh creation was formed which is now starting to vegetate. (Photos: Appendix A, Photos 8-9).

Closure No. 8

This closure site is in good condition since the existing breach on the south side of the closure was repaired in the 2008 maintenance event noted above in Section IV. Spoil material was placed to close off the breach and also placed on top of the existing rock dike. Spoil material was also placed from the north end of the rock dike towards the bay to make a connection to the existing mitigation rock dike along the bay shore. (Photos: Appendix A, Photos 10).

Closure No. 9

The rock riprap shoreline protection dike constructed on the south shoreline of Marsh Island was noted to now sit out further into the waters of the Gulf as discussed in the last inspection. Conditions were such that the feature was functioning well and that sediment had accreted and a growth of marsh vegetation had extended over the new fill. This rock shoreline feature will still function as a breakwater and extend the life of the earthen pipeline closure to the north. The recent construction of the TV-21 East Marsh Island Marsh Creation project has helped to reinforce the breach that had occurred on the southeast corner of the pipeline canal since the last inspection. The pipeline canal north of the rock breakwater was filled in with sediment from the marsh creation project and construction of containment dikes have now closed off the breach at the shoreline. No maintenance will be necessary at closure No. 9 as a result of the work performed through the TV-21 project. (Photos: Appendix A, Photos 11-13).

II. Maintenance Activity (continued)

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

ii. Programmatic/ Routine Repairs

d. Maintenance History

General Maintenance : Below is a summary of completed maintenance projects and operation tasks performed since December 2001, the construction completion date of the Marsh Island Hydrologic Restoration Project (TV-14).

2005 Maintenance Project–Grillot, Inc. (Through lease agreement with Bertucci Contracting Corp.) This maintenance project included the placement of paving stone (18" thick) spread out around the wingwalls of the plug at Lake Sand Canal No. 5 Closure to "harden" the area while still allowing flow in extreme tidal events to pass around the structure without washing away the existing bank. Also included was the extension of the rock dike on the southern end of Canal No. 5. Approximately 4,000 tons of 1000# stone was placed on Lake Sand Closure No. 4 to reconstruct the rock dike where stone was displaced. This maintenance project was a result of damages that occurred during Hurricane Lili in 2002. The costs associated with the engineering, design and construction of the Marsh Island Maintenance Project are as follows:

Construction (FEMA)	$267,059.11*
Construction (CWPPRA)	$ 64,092.00
E & D, construction oversight, as-builts	$ 30,262.00
TOTAL CONSTRUCTION COST:	**$361,413.11**

* This cost was reimbursed by FEMA

2008 Repair of Closure No. 8 Breach – This repair work included placing spoil material on the southern end of the rock plug from the dredging of the north-south access canal adjacent to this closure. The work was performed by Renaissance Petroleum Co. as part of their CUP application for a new oil and gas well on the east end of Marsh Island. Additional dredge material was also placed along the entire reach of the west levee of the proposed TV-21 project as well as on the northern end of Closure No. 8 towards the bay connecting to an existing rock dike. Hydraulic dredge material was also pumped behind Structure No. 7 to create marsh behind the rock dike. In addition, spoil material from the bucket dredge operation was placed on the west side of the north-south access canal to bridge a small area of marsh that connects to

Structure No. 7. This work was completed in November 2008 and was performed at no cost to CWPPRA and OCPR.

2009 Maintenance Project – Antill Pipeline Construction - This maintenance project included placing 175 tons of 130# rock at Closure No. 1, 370 tons of 130# rock at Closure No. 2, 2,270 tons of 130# rock at Closure No. 4, and 570 tons of 130 # rock at Closure No. 6. Bank paving (using 30# rock) was placed at the ends of all of the closures as part of this project which was completed in February 2009. This maintenance project was a result of damages sustained from Hurricane Rita in 2005 and other required routine maintenance. The costs associated with the engineering, design and construction of the Marsh Island Maintenance Project are as follows:

Construction (FEMA)	$113,083.30
Construction (CWPPRA)	$358,041.70
E & D, construction oversight, as-builts	$ 44,627.14
Project Total	**$515,752.14**

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

As mandated in the monitoring plan, the four continuous recorders were removed at the end of 2006. 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 TV-14 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 are no CRMS-*Wetlands* sites inside the TV-14 project area, however, there are 9 sites located on Marsh Island.

a. Monitoring Goals

The objective of the Marsh Island Hydrologic Restoration Project is to restore more natural hydrologic conditions in the project area resulting in the protection of the existing marsh.

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

1. Reduce water level variability in the project area.
2. Decrease the rate of marsh loss in the project area.
3. Reduce erosion rate of the northeast shoreline of Marsh Island.
4. Increase the occurrence of submerged aquatic vegetation in Lake Sand and in shallow open water within the project area.

b. Monitoring Elements

Aerial Photography:

Near-vertical color-infrared aerial photography (1:12,000 scale) was used to measure vegetated and non-vegetated areas for the project and reference areas. The photography was obtained in 2000 prior to project construction and post-construction in years 2004 and 2009. Additional photography will be acquired in 2016. 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) (figure 2).

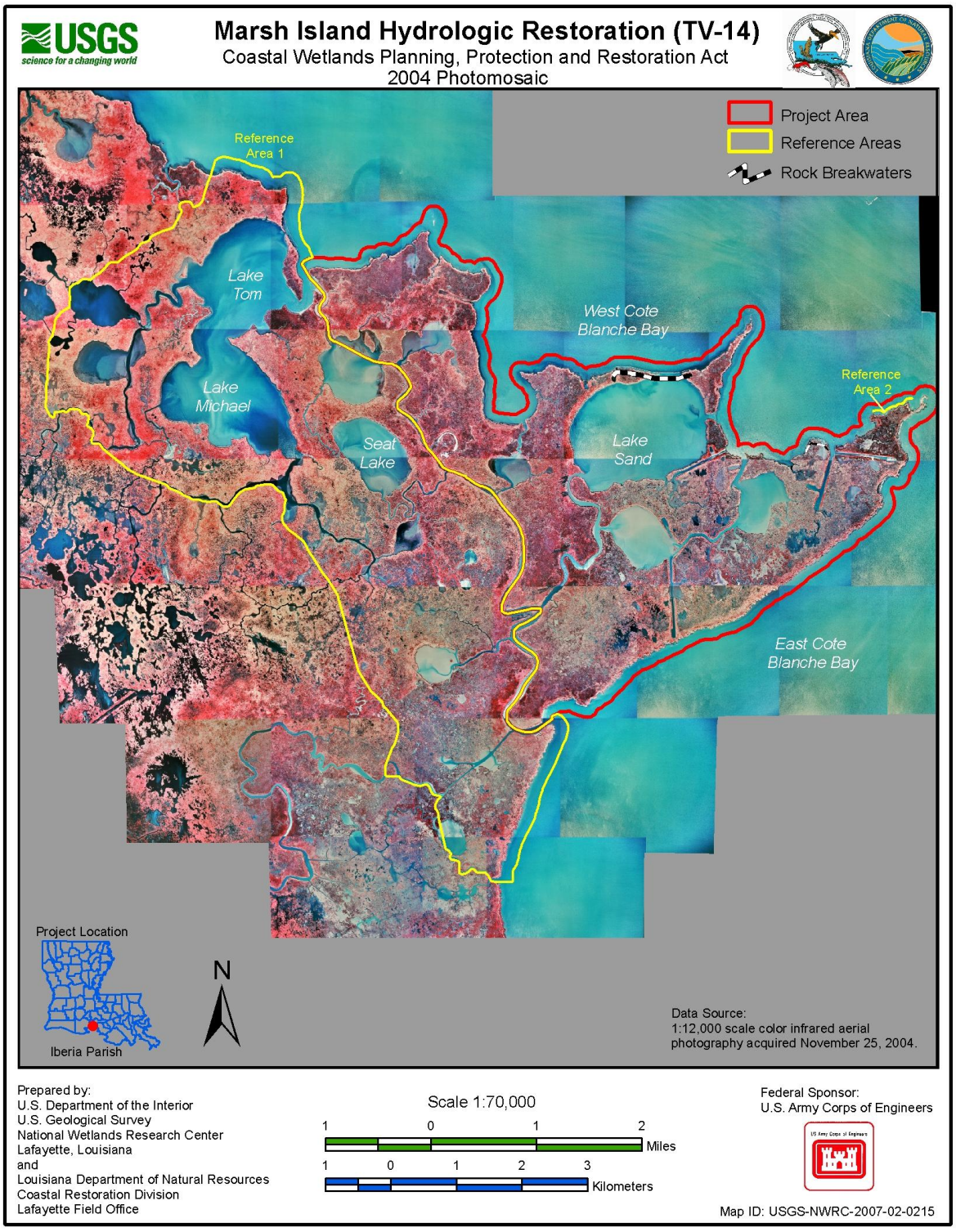

Figure 2. Photomosaic of the 2004 color-infrared aerial photography for the TV-14 project and reference areas from aerial photography taken November 25, 2004.

Shoreline Change:

To document shoreline movement along the northeast shoreline of Marsh Island, a differential GPS (DGPS) survey of unobstructed sections of shoreline was conducted at the vegetative edge of the bank to document the position of the shoreline in pre-construction year 1999 and post-construction in 2003 and 2009 (figures 3-4). A subsequent survey will be conducted in 2016. A similar survey will be conducted concurrently along a 2,000 ft (609.6 m) section of reference area 2 (R2). DGPS shoreline positions were mapped. No shoreline position data were collected in 2007.

Water Level:

Water level variability was monitored hourly at two continuous data recorders deployed in the project area and two continuous data recorders deployed in reference area 1 (R1) (figure 5). Staff gages adjacent to the continuous recorders were surveyed to correlate water levels to a known datum, the North American Vertical Datum of 1988 (NAVD88). Continuous data recorders were installed in October 1999 documented hourly water level data until December 31, 2006, a period of five years following project construction.

Submerged Aquatic Vegetation (SAV):

SAV was monitored using the rake method (Chabreck and Hoffpauir 1962). Restoration of the Lake Sand shoreline is expected to influence SAV primarily in Lake Sand, while canal plugs and spoil bank repair work is expected to influence SAV primarily in other shallow open water areas. Separate tests were therefore used to evaluate SAV in Lake Sand and SAV in shallow open water areas. The frequency of occurrence of SAV in Lake Sand was compared to the frequency of occurrence of SAV in Lake Tom found in R1. Three parallel transects were established and separated by a distance approximately equal to one-fourth the pond width (figure 6). Each transect is composed of a minimum of twenty-five equally spaced sampling stations. At each station, aquatic vegetation was sampled by dragging a garden rake on the pond bottom for one second. The presence of vegetation was recorded to determine the frequency of aquatic plant occurrence (frequency = number of occurrences/25 x 100). When vegetation was present, the species present were recorded in order to determine the frequencies of individual species (Nyman and Chabreck 1996). In shallow open water areas, three small ponds in the project area were compared to three small ponds in R1. Two parallel transects, separated by a distance approximately equal to one-third the pond width were established in each pond and investigated using similar sampling techniques as discussed above. Ancillary salinity data, collected with continuous data recorders and monthly discrete samples, will be evaluated in concert with the statistical analysis to aid in the interpretation of SAV data. SAV was monitored in the fall preceding construction in 1999 and in post-construction years 2002, 2004, 2006 and 2009, and will be surveyed in 2011, 2013, and 2016.

Figure 3. Aerial view of the northeastern shore (left edge of photo) of the TV-14 project.

Figure 4. Shoreline configuration of the eastern shore of the TV-14 project.

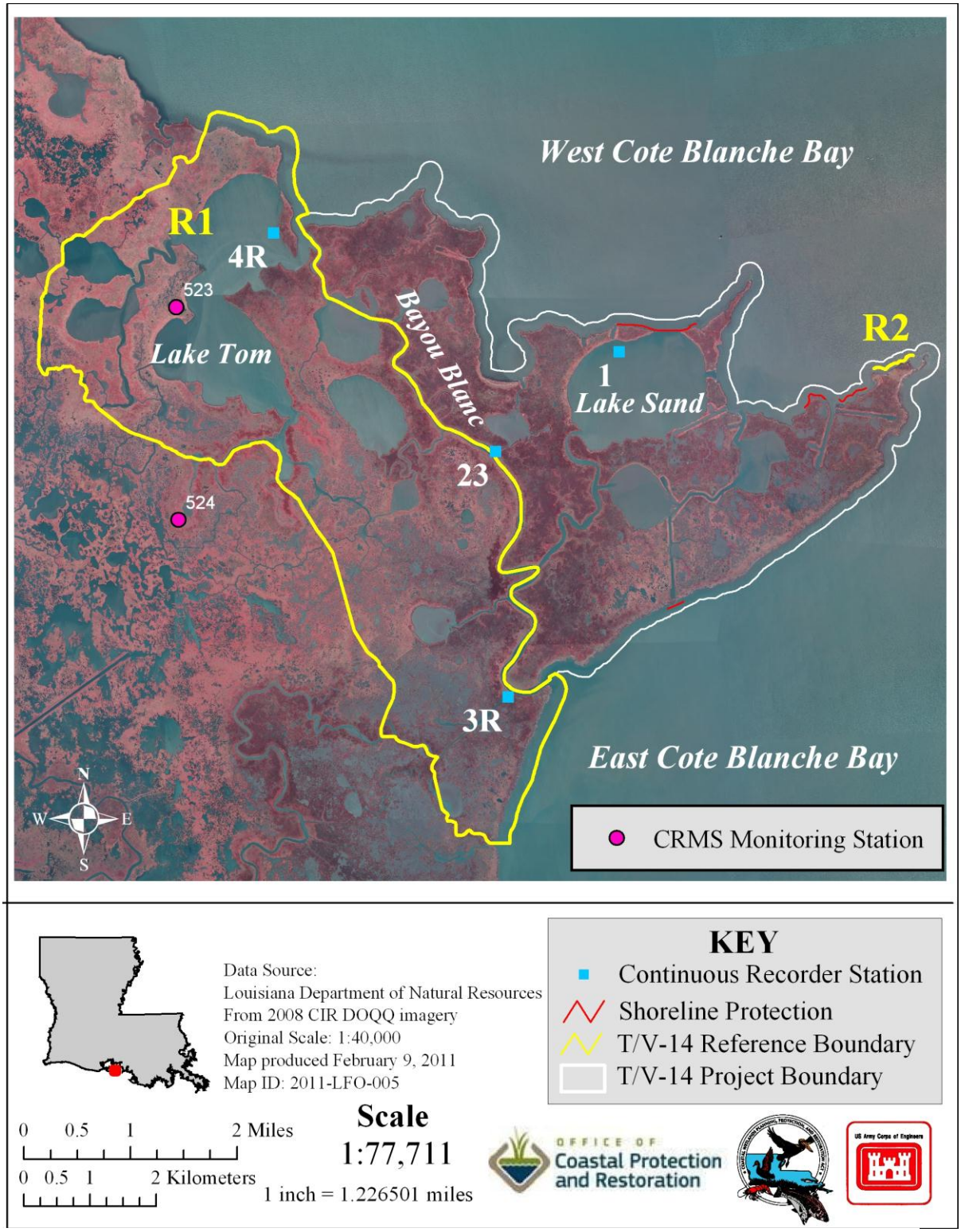

Figure 5. Continuous hydrographic monitoring stations for the TV-14 project.

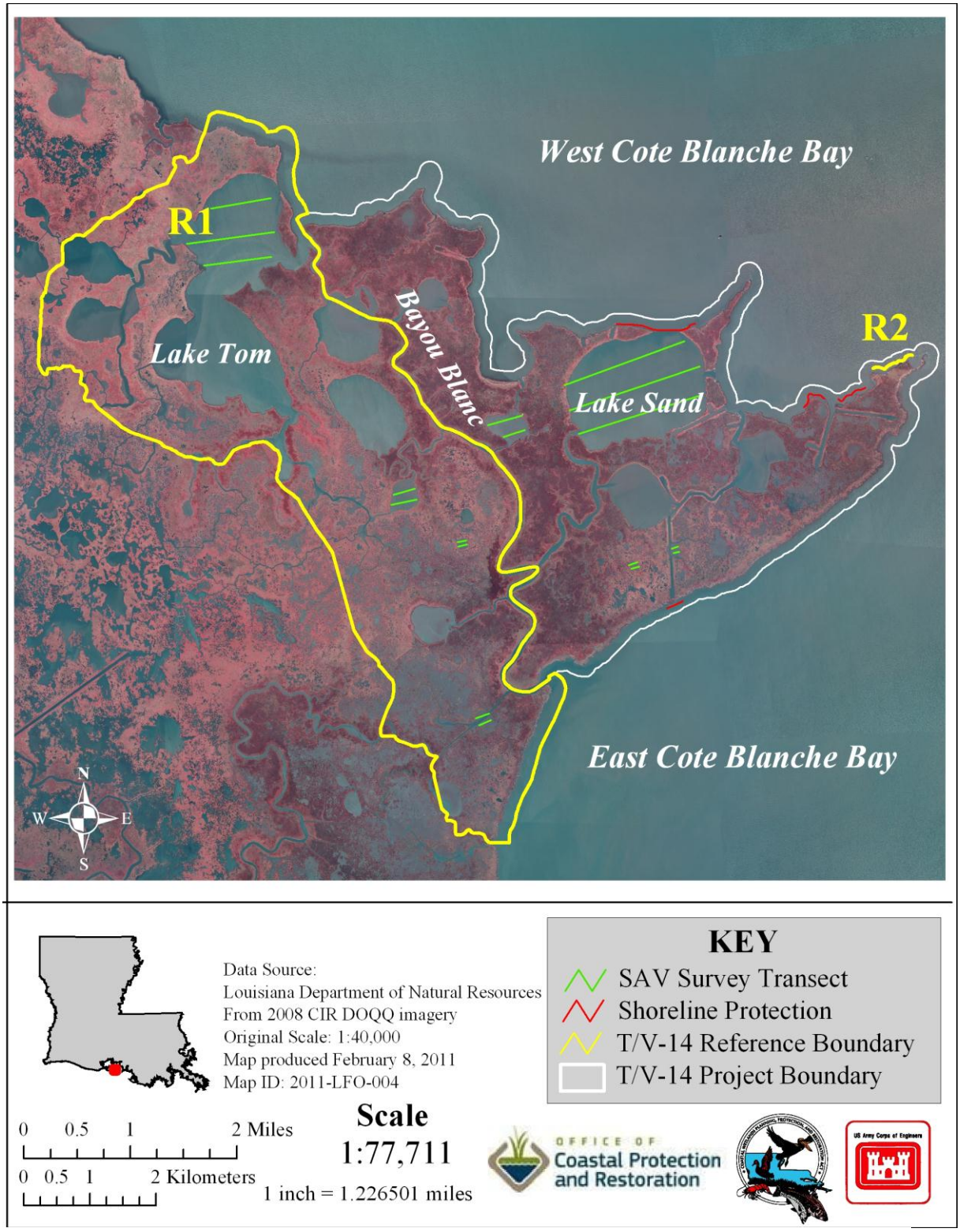

Figure 6. Typical SAV monitoring survey transects for the TV-14 project and reference areas.

IV. Monitoring Activity (continued)

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Pre-construction classification (2000) indicated 69.8% land and 30.2% water within the project area and 64.4% land and 35.6% water within R1 (Table 1,figure 7). Post-construction classification of land area and open water, collected in November 2004, indicated 58.6% land and 41.4% water in the project area and 58.3% land and 41.7% water within R1 (Table 1,figure 8). However, due to a correction of the project and R1 boundaries resulting in a change in acreage for both areas, the pre- and post-construction classifications are not directly comparable. The project and R1 boundaries were updated to correct inaccuracies due to the low-resolution satellite imagery used to create the boundaries during project planning. Because of the low resolution, some parts of the project and R1 were excluded. For both areas, the boundaries were expanded to include these areas as well as some open water surrounding the project area and R1. As a result, the first comparison of land and water area is being made using the 2009 data. The photography flown on December 20, 2009 indicated 56.3% land and 43.7% water within the project area and 56.2% land and 43.8% water within R1 (figure 9). These values indicate a loss of approximately 2% land in both the project area and reference areas for the period 2004-2009 (Table 1).

Table 1. Land and water area percentages and percent change for the project and R1 reference areas 2000-2009.

Date/Area	% Land	% Water	%Change Land 2004-2009
2000 Project	69.8*	30.2*	
2000 Reference	64.4*	35.6*	
2004 Project	58.6	41.1	
2004 Reference	58.3	41.7	
2009 Project	56.3	43.7	-2.3
2009 Reference	56.2	43.8	-2.1

* The project boundary was expanded to include water along the edge of the project area between 2000 and 2004 and L:W comparisons cannot be directly made from the 2000 analysis (see figures 7 and 8).

Shoreline Position:

Data were collected in 1999 (pre-construction), 2003 and 2009. Comparison of the 2003 dataset to the preconstruction data indicated a gain of 1.08 m/yr in the protected section of the shoreline and a loss of 0.62 m/yr in the unprotected section. Comparing the 2009 survey (post Hurricanes Rita and Ike) to the 2003 survey indicated a loss of 0.77 m/yr in the protected area and 3.58 m/yr in the unprotected area. Overall loss from 1999 to 2009 was 0.16 m/yr in the protected section and 2.56 m/yr in the unprotected section (figure 10).

Water Level:

Hourly salinity and relative water level data for the 2 project and 2 reference stations for the pre-and post-construction time periods were analyzed from the following datasets:

Station	Data collection period
TV14-01	10/12/1999 – 12/31/2006
TV14-02*	10/12/1999 – 3/14/2002
TV14-23	3/14/2002 – 12/31/2006
TV14-03R	10/12/1999 – 12/31/2006
TV14-04R	10/12/1999 – 12/31/2006

*The continuous recorder at TV14-02 was removed because of access problems following project construction. The replacement station, TV14-23 was installed closer to Bayou Blanc, a more accessible location.

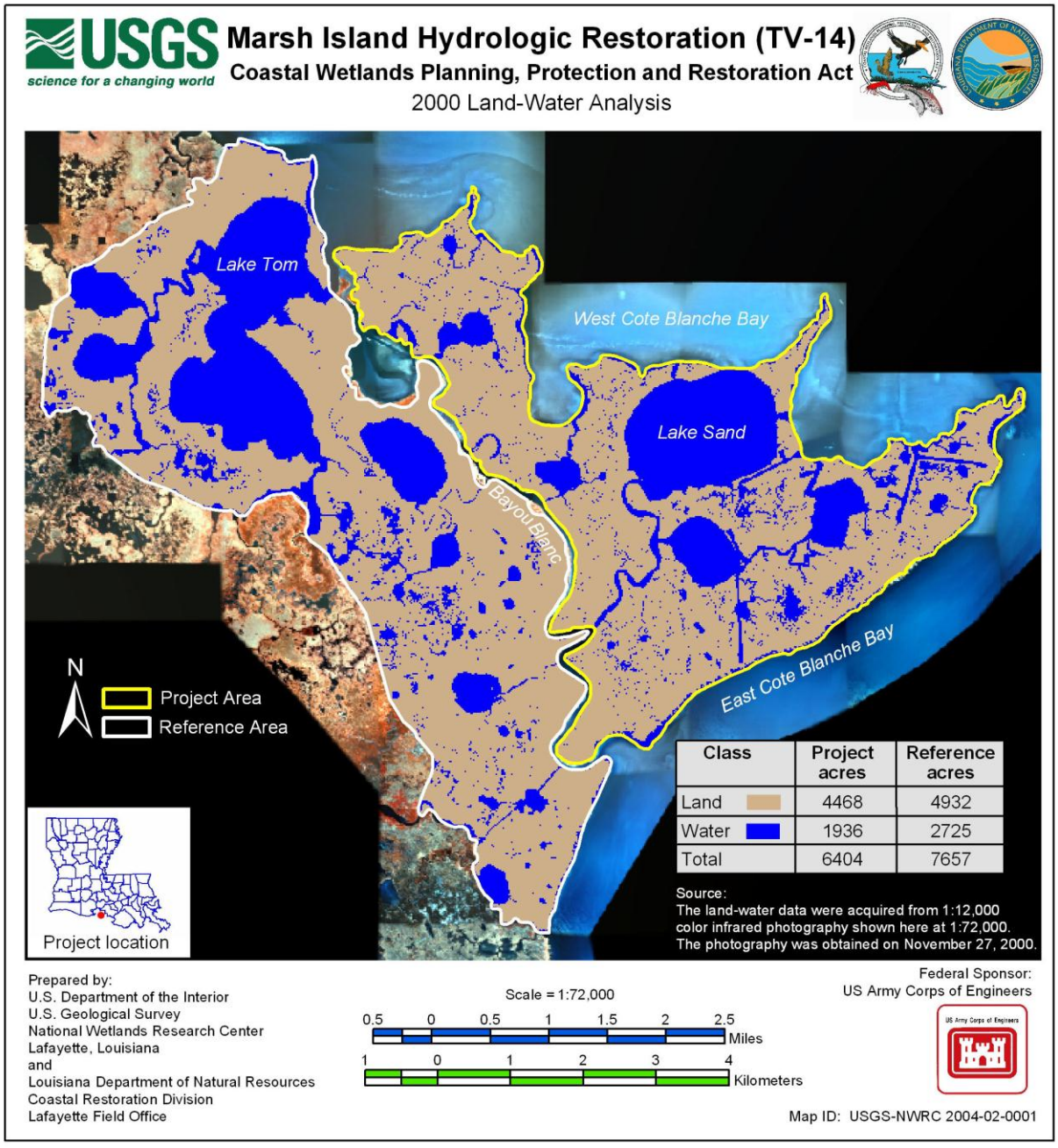

Figure 7. Results of the 2000 Land:Water GIS image classification for the TV-14 project and reference areas from aerial photography taken November 27, 2000.

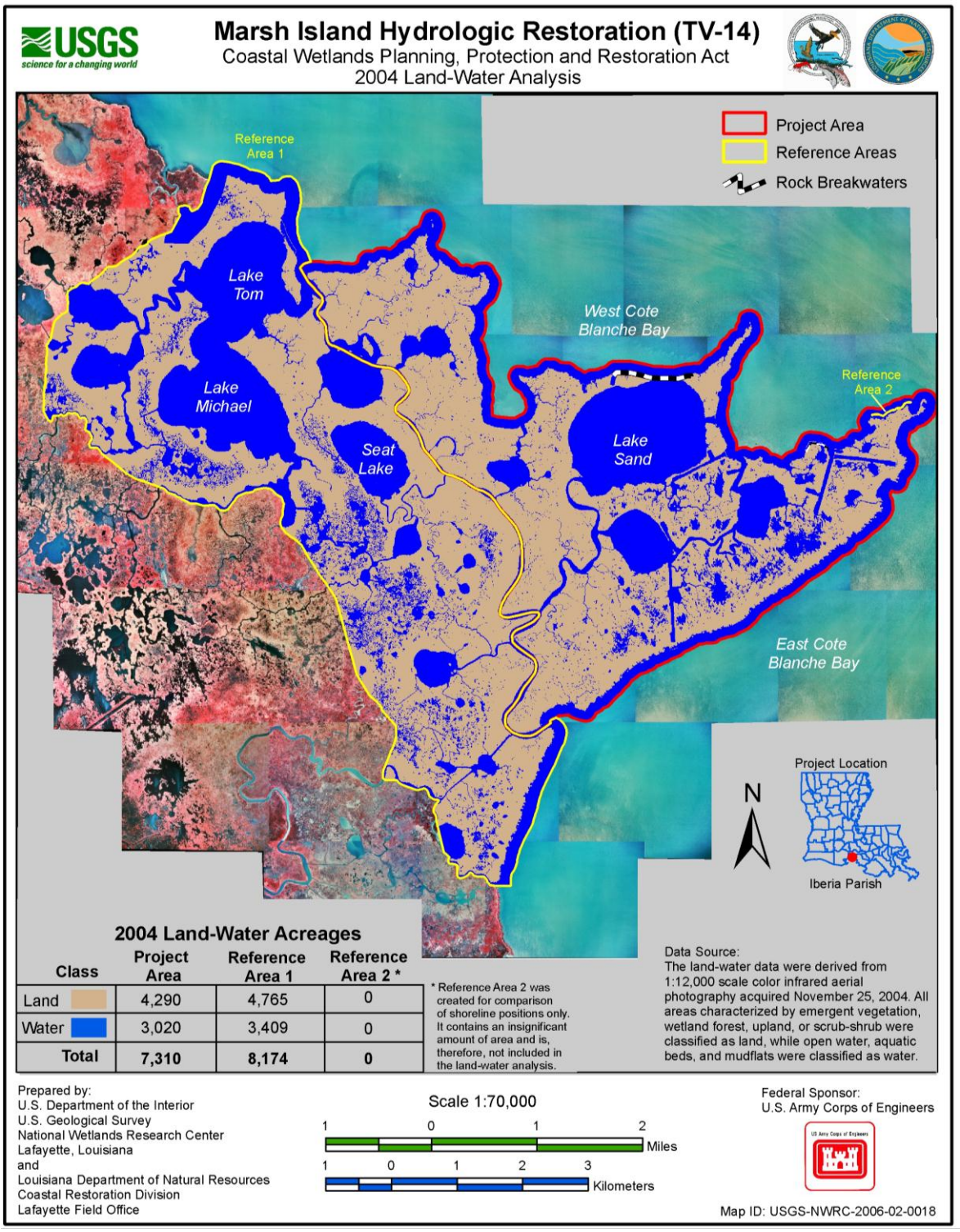

Figure 8. Results of the 2004 Land:Water GIS image classification for the TV-14 project and reference areas from aerial photography taken November 25, 2004.

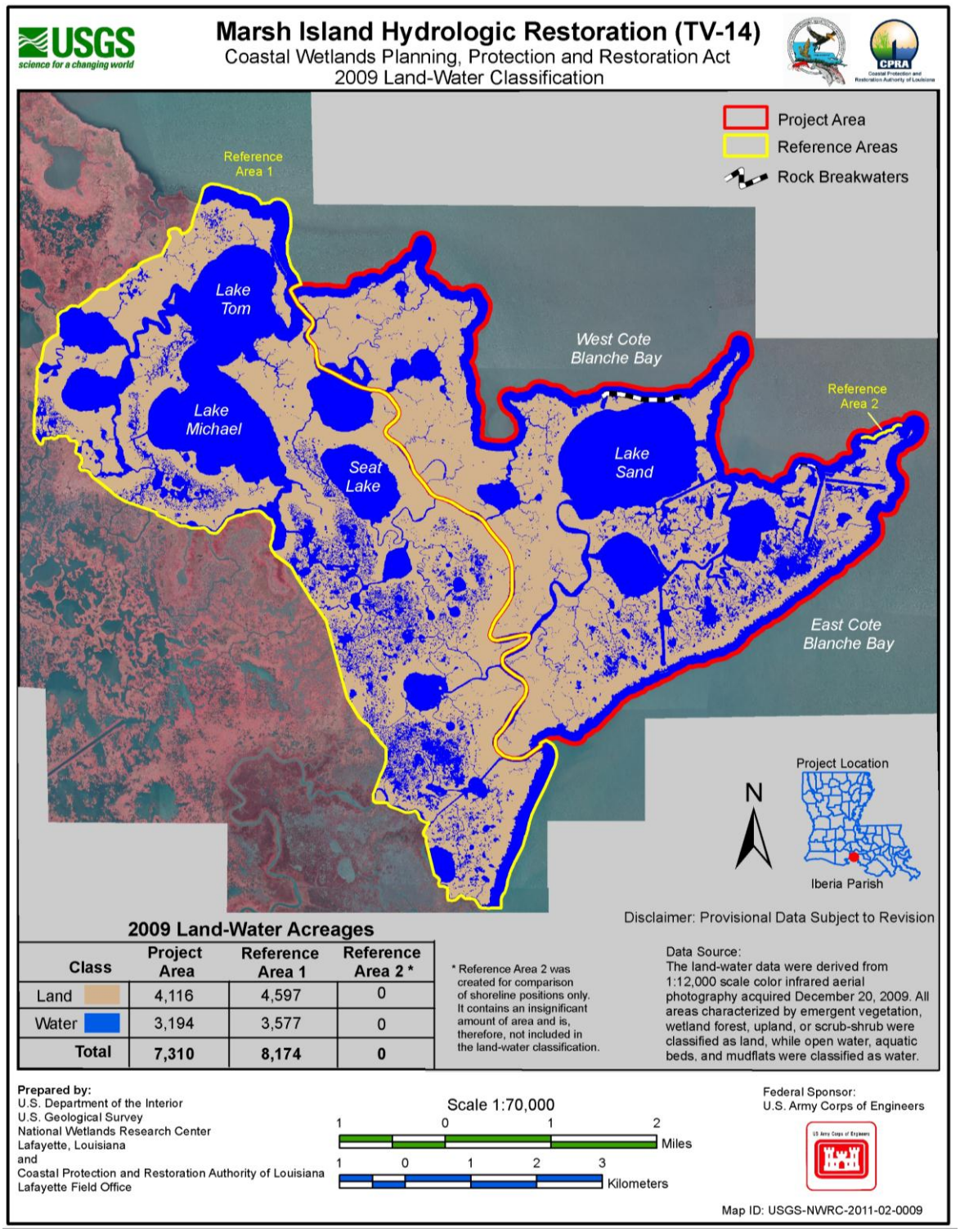

Figure 9. Results of the 2009 Land:Water GIS image classification for the TV-14 project and reference areas from aerial photography taken December 20, 2009.

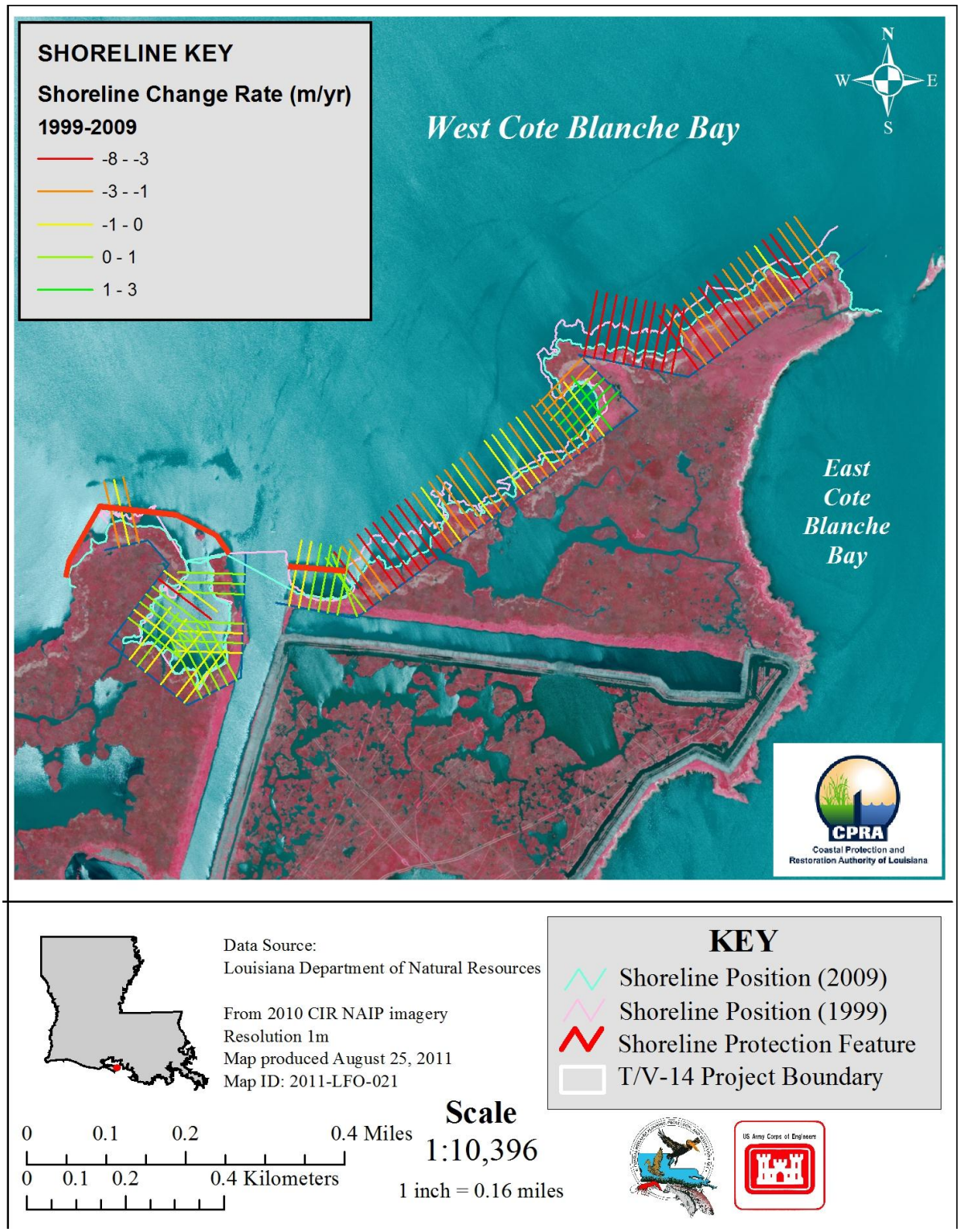

Figure 10. Marsh Island Hydrologic Restoration (TV-14) shoreline change 1999-2009.

The difference in project area and R1 water level range (variability) was significantly higher post-construction than pre-construction ($p<0.0001$) (R1 had a water level range 0.16' higher than the project area post-construction and 0.06' higher preconstruction). Water level variability in the project area was found to be significantly less than that in R1, for both the pre- and post-construction periods (figure 11). Water level variability appeared to increase following project construction in R1 and the project appears to have been successful at preventing a similar increase in the project area. It is not known what factors contributed to the increase in water level variability in R1 following project construction. However, it is not likely to be due to any effects of the project but rather variations in weather and tides. There was less variability in the project area before construction but ranges in the reference area increased relative to the project area post-construction. Thus, the project appears to have reduced water level variability as designed.

Visser (2007) determined that there was a significant decrease in flood stress based on two TV-14 project gages in an analysis of hydrologic data on CWPPRA Hydrologic Restoration projects. Because the flooding stress was so small in the TV-14 project area, Visser determined that this was not biologically significant. Flooding stress was calculated by multiplying the stress level from flood events of different durations by the percentage of time that the stress level occurred and the percentage of plant productivity.

Submerged Aquatic Vegetation (SAV):

SAV was analyzed separately for large and small ponds (Lake Sand vs. Lake Tom and small ponds in the project area vs. small ponds in R1). Analysis of Variance was conducted on frequency of occurrence data for areas (project and reference), years, and interaction between the two. For large ponds, there was a significant area year interaction that may be a project effect (figure 12). SAV abundance had been higher in the reference area than the project area and a reverse occurred. Both areas have had low SAV abundance since the hurricanes. There was no significant difference in SAV abundance in small ponds (overall or among any of the terms) (figure 12). SAV cover was low in both areas particularly after the hurricanes. The greatest abundance of SAV was in the reference ponds in 1999, 2002, and 2004 where *Myriophyllum spicatum* dominated (figure 13). Other species were occasionally present including *Vallisineria americana* in the large project pond in 2006 and *Potamogeton* in the large reference pond in 2009 but none were abundant.

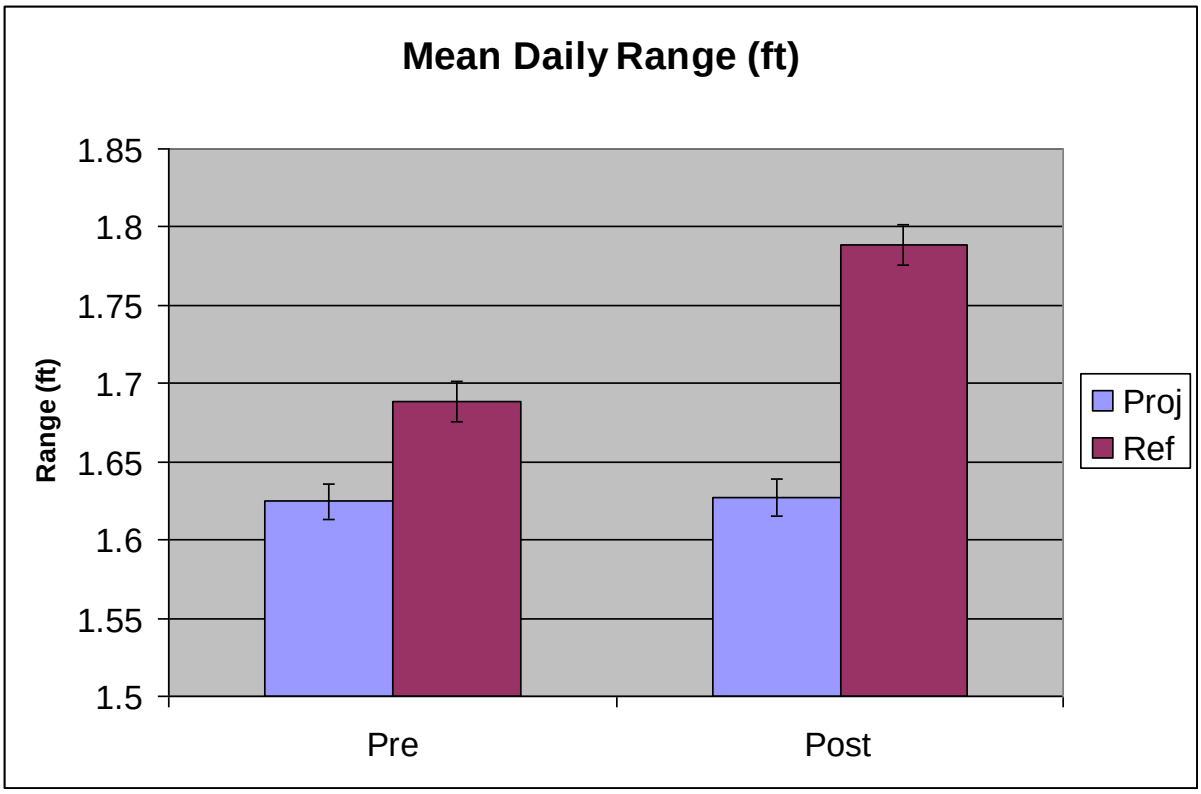

Figure 11. Mean daily water level range (variability) ± standard error during the pre- and post-construction periods for both the project and R1.

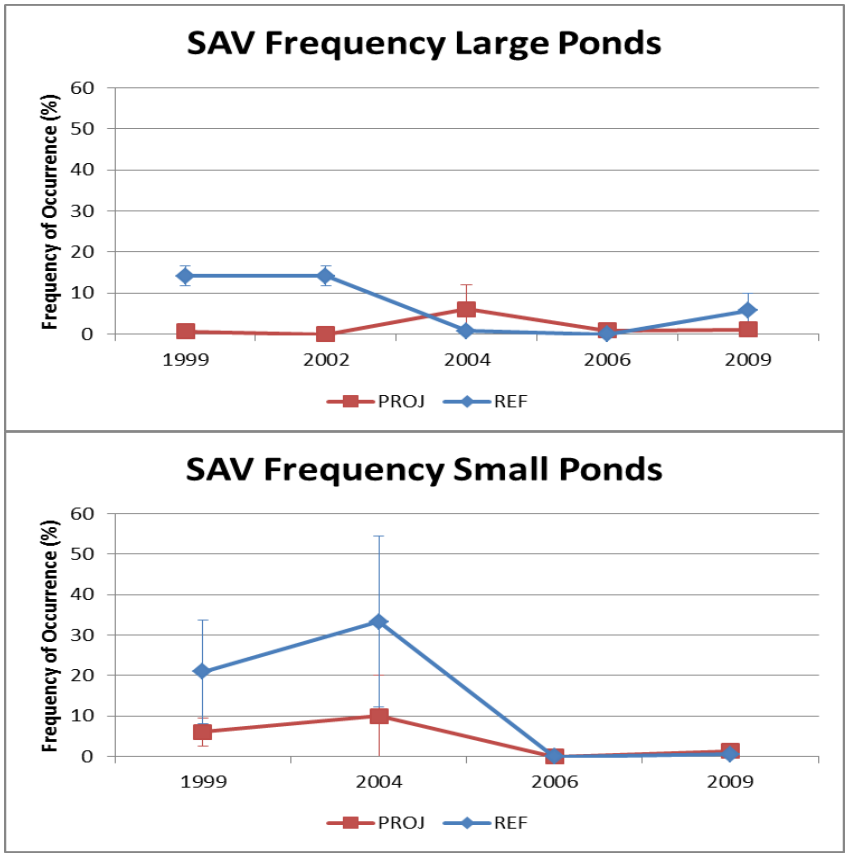

Figure 12. Submerged aquatic vegetation abundance calculated separately for small and large ponds. Mean ± SE.

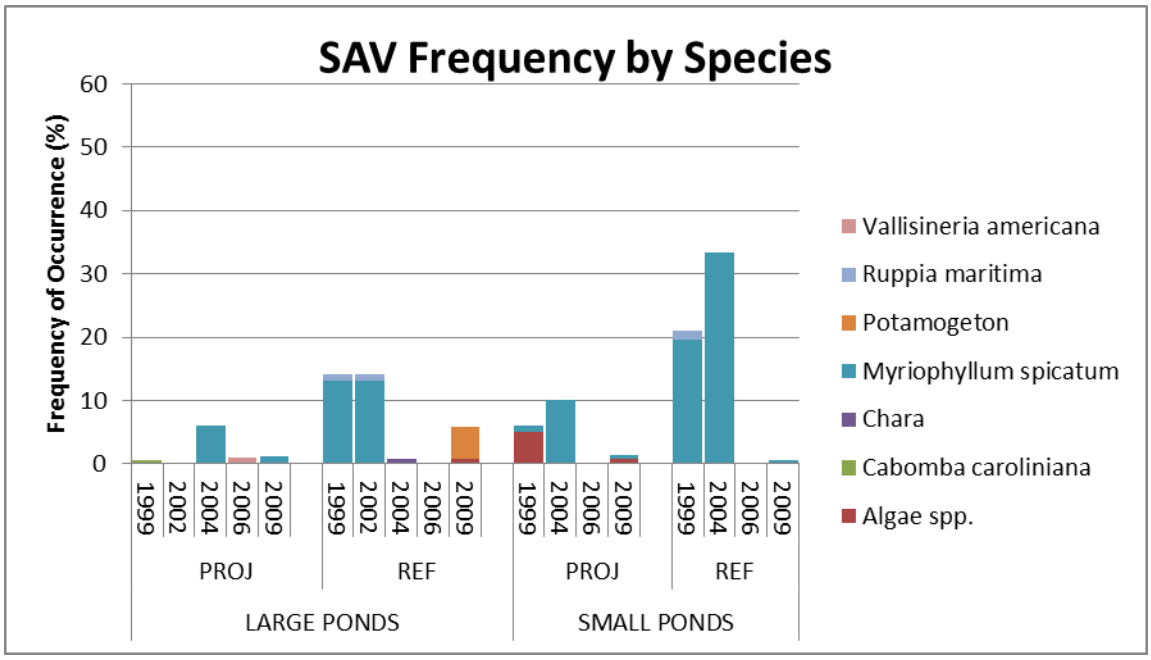

Figure 13. Submerged aquatic vegetation abundance by species for both the project and R1.

V. Conclusions

a. Project Effectiveness

The project has been effective at reducing water level variability as compared to an ecologically similar reference area (R1). Water level variability did not increase in the project area as it did in R1 post-construction. SAV occurrence was beginning to improve in the project area prior to Hurricanes Rita and Ike but it has been virtually absent in both areas since the storms.

The goal to reduce the erosion rate of the northeast shoreline was partially met. In areas that received protection from a rock dike, erosion rates were much lower than those that were unprotected. The protected areas were showing signs of accretion prior to Hurricanes Rita and Ike.

Land to water ratios in the project and reference area R1 decreased slightly from 2004 to 2009.

b. Recommended Improvements

Overall, the Marsh Island Hydrologic Restoration Project structural components are in fair condition with most features still functioning as designed. Recent maintenance events to repair breaches at several of the project features have been effective and no additional maintenance work is planned at this time.

c. Lessons Learned

The stone bank paving installed at each end of Closure No. 5 after Hurricane Lili proved to be successful in preventing erosion during the Hurricane Rita storm surge event. This application will be applied to other closure sites for bank stabilization and protection.

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APPENDIX A
(Inspection Photographs)

Appendix A
(Inspection photographs)

Photo No.1, Closure No.1, view showing silt build-up on East and West side of closure

Photo No. 2, Closure No. 2

Photo No. 3, Closure No. 3

Photo No. 4, Closure No. 4 bank paving east side

Photo No. 5, Closure No. 4 looking west

Photo No. 6, Closure No. 5

Photo No. 7, Closure No. 6

Photo No. 8, Structure No. 7 East side of rock dike

Photo No. 9, Structure No. 7, marsh creation behind rock dike starting to vegetate

Photo No. 10, Closure No. 8, marsh creation behind rock dike starting to vegetate

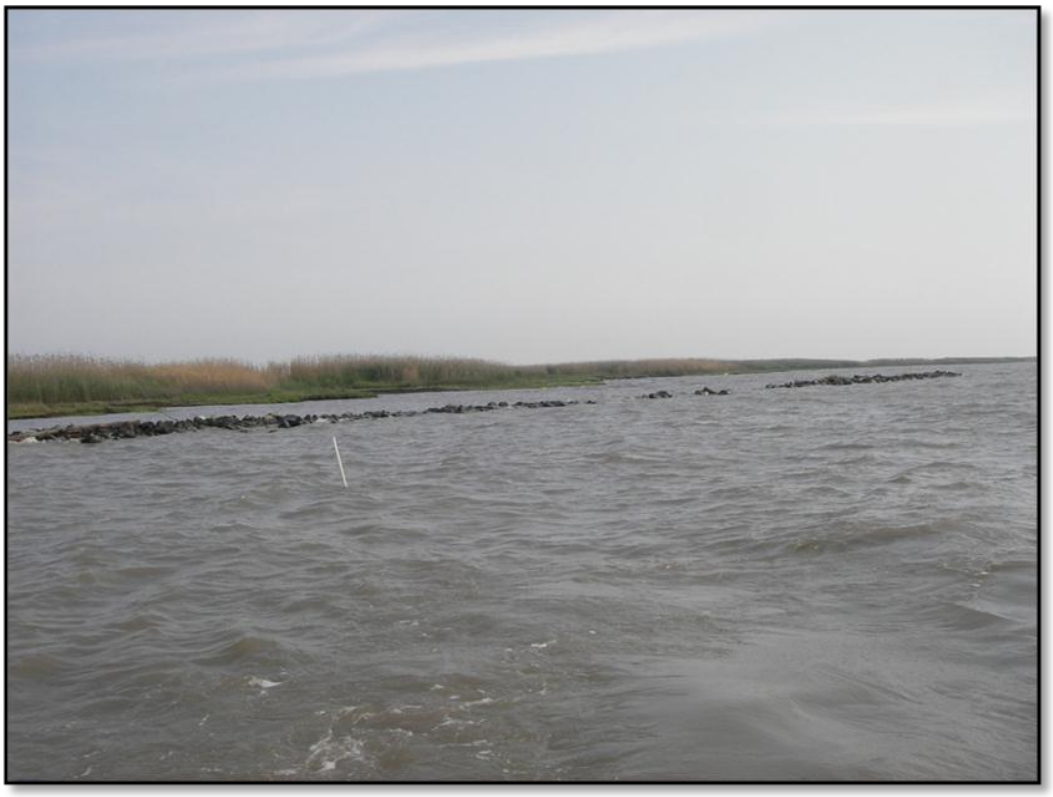

Photo No. 11, Structure No. 9 rock dike, view showing some settlement of rock dike

Photo No. 12, Structure No. 9, view showing canal plugged and vegetation developing

Photo No. 13, Aerial view of Structure No. 9 and plugged pipeline canal

APPENDIX B
(Three Year Budget Projection)

Appendix B
(Three Year Budget Projection)
MARSH ISLAND/ TV-14 / PPL 6
Three-Year Operations & Maintenance Budgets 07/01/2011 - 06/30/14

Project Manager	O & M Manager	Federal Sponsor	Prepared By
Darrell Pontiff	*Stan Aucoin*	*COE*	*Stan Aucoin*

	2011/2012 (-10)	2012/2013 (-11)	2013/2014 (-12)
Maintenance Inspection	$ 6,086.00	$ 6,269.00	$ 6,457.00
Structure Operation			
Administration			$ -
Maintenance/Rehabilitation			

07/08 Description: Hurricane Rita Repairs/Bank Paving

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

08/09 Description :

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

09/10 Description:

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

	2007/2008	2008/2009	2009/2010
Total O&M Budgets	**$ 6,086.00**	**$ 6,269.00**	**$ 6,457.00**

O &M Budget (3 yr Total)	**$ 18,812.00**
Unexpended O & M Budget	**$ 511,049.00**
Remaining O & M Budget (Projected)	**$ 492,237.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 07/01/2011 - 06/30/2012

MARSH ISLAND / PROJECT NO. TV-14 / PPL NO. 6

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$6,086.00	**$6,086.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations Contract	LUMP	1	$0.00	**$0.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	1	$0.00	$0.00
FEDERAL SPONSOR Admin.	LUMP	1	$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	2	$500.00	$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: Hurricane RITA repairs, bank paving at ends of closures.

Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
Rock Dike	0	0.0	0	$65.00	$0.00
Bank Paving	0	0.0	0	$60.00	$0.00
	0	0.0	0	$0.00	$0.00

Filter Cloth / Geogrid Fabric	SQ YD	0	$8.00	$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	$150,000.00	$0.00
Contingency	LUMP	0	$49,083.71	$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: **$6,086.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 07/01/2012 - 06/30/2013

MARSH ISLAND / PROJECT NO. TV-14 / PPL NO. 6

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$6,269.00	**$6,269.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations Contract	LUMP	1	$0.00	**$0.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	1	$0.00	$0.00
FEDERAL SPONSOR Admin.	LUMP	1	$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 Dike	0	0.0	0	$0.00	$0.00
Bank Paving	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	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$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: **$6,269.00**

OPERATION AND MAINTENANCE BUDGET WORKSHEET 07/01/2013 - 06/30/2014

MARSH ISLAND / PROJECT NO. TV-14 / PPL NO. 6

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$6,457.00	**$6,457.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1	$0.00	**$0.00**
Operations Contract	LUMP	1	$0.00	**$0.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	1	$0.00	$0.00
FEDERAL SPONSOR Admin.	LUMP	1	$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: Hurricane RITA repairs, bank paving at ends of closures.

Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
Rock Dike	0	0.0	0	$0.00	$0.00
Bank Paving	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	1	$0.00	$0.00
Materials		LUMP	1	$0.00	$0.00
Mob / Demob		LUMP	1	$0.00	$0.00
Contingency		LUMP	1	$0.00	$0.00
General Structure Maintenance		LUMP	1	$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: **$6,457.00**

APPENDIX C
(Field Inspection Notes)

Appendix C
(Field Inspection Notes)

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 12:00 pm

Structure No. 1

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy 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)	Good			1	Looks Good. Good silt deposition occuring on east and west side of closure.
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 11:50 am

Structure No. 2

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy 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)	Good			2	Looks good
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 11:40 am

Structure No. 3

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy 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)	Good			3	Looks good
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 11:30 am

Structure No. 4

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy 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)	Good			4, 5	Lake Sand looks good. The rock cap is holding well.
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 11:10 am

Structure No. 5

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy and warm

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	Good			6	
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)	Good			6	Looks good. No change since previous inspection. Bank paving is holding up well.
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 10:50 am

Structure No. 6

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly Cloudy 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)	Good			7	Looks good. No change from previous inspection.
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 10;45 am

Structure No. 7

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Dike

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy 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)	Good			8, 9	Looks good. Grass establishing nicely in the two (2) marsh creation cells just east of the plug.
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 10:40 am

Structure No. 8

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy 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)	Good			10	Looks good. Grass establishing nicely in the two (2) marsh creation cells.
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name:TV-14 Marsh Island Hydrologic Restoration

Date of Inspection: March 29, 2011 Time: 10:30 am

Structure No. 9

Inspector(s): Darrell Pontiff, Dion Broussard (OCPR), Billy Hicks (USACE)
Edmond Mouton, Tim Marcantel, Jill Jordan (LDWF)

Structure Description: Rock Plug

Water Level Inside:_____ Outside: _____

Type of Inspection: Annual

Weather Conditions: Partly cloudy 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)	Fair			11, 12	Dike is settling in some areas. Breach is closed and shoreline looks good since the TV-21 project.
Earthen Embankment	N/A				

What are the conditions of the existing levees?
Are there any noticeable breaches?
Settlement of rock plugs and rock weirs?
Position of stoplogs at the time of the inspection?
Are there any signs of vandalism?