Coastal Protection and Restoration Authority of Louisiana
Office of Coastal Protection and Restoration

2011 Operations, Maintenance, and Monitoring Report

for

Cote Blanche Hydrologic Restoration

State Project Number TV-04
Priority Project List 3

July 2011
St. Mary Parish

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Suggested Citation:

McGinnis, T. and S. Aucoin 2011. *2011 Operations, Maintenance, and Monitoring Report for Cote Blanche Hydrologic Restoration (TV-04), Coastal Protection and Restoration Authority of Louisiana, Office of Coastal Protection and Restoration, Lafayette, Louisiana. 49 pp.*

2011 Operations Maintenance and Monitoring Report
For
Cote Blanche Hydrologic Restoration (TV-04)

Table of Contents

I. Introduction

The Cote Blanche Hydrologic Restoration project (TV-04) area comprises 30,898 acres (12,504 ha) of freshwater and intermediate marsh located in St. Mary Parish. The project boundaries include the Gulf Intracoastal Waterway (GIWW) to the north, Highway 317 to the east, East Cote Blanche Bay (ECBB) to the south and West Cote Blanche Bay (WCBB) to the west (figure 1). The Cote Blanche marsh, and other marshes in this region, have experienced increased freshwater introduction from the GIWW and westward currents from the Atchafalaya delta (DeLaune et al. 1987). Since 1949, when the area was almost entirely brackish, the marsh type has freshened (Table 1).

Table 1. Vegetation classifications of the Cote Blanche Hydrologic Restoration project area (TV-04) from historical surveys. Vegetation Class "Other" includes water, swamp, and developed land. The data was obtained from the Coastwide Reference Monitoring System (CRMS) website (http://www.lacoast.gov/crms_viewer/) on August 04, 2011.

	Vegetation Classification (% area)					
Year	Fresh	Intermediate	Brackish	Saline	Other	Source
1949	0.12	---	92.19	6.43	1.26	O'Neil 1949
1968	20.28	35.64	42.70	---	1.38	Chabreck et al. 1968
1978	59.82	6.96	30.49	---	2.73	Chabreck and Linscombe 1978
1988	95.03	---	---	---	4.98	Chabreck and Linscombe 1988
1997	96.21	---	---	---	3.79	Chabreck and Linscombe 1997
2001	35.16	61.09	---	---	3.76	Linscombe and Chabreck n.d.
2007	65.46	30.78	---	---	3.76	Sasser et al. 2008

The GIWW and numerous oilfield canals have caused hydrologic changes within the project area. The Humble and Humble-F canals were dredged between 1937 and 1958; the British-American Canal and extensions from the Humble Canal were dredged between 1958 and 1974 (figure 1). These major canals are believed to have increased tidal action and rapid water exchange between the interior marsh and E and W CBBs. Marsh degradation was first detected in 1952 aerial photography in an area west of the British-American Canal. Canal dredging is blamed for accelerating marsh loss in the area. The average land loss rate for the project area was estimated at 73 acres/year (29 ha/yr) based on aerial photography from 1957 to 1990 (Britsch and Kemp 1990). Rapid water exchange and increased tidal fluctuations have caused breaches in spoil banks of interior canals and are likely responsible for erosion and conversion of fragmented marsh to open water as organic, marsh soils are easily eroded. Although sediment-laden water is available from the bays and the GIWW, rapid water exchange appears to inhibit sediment and nutrient deposition (Louisiana Department of Natural Resources [LDNR] 1999).

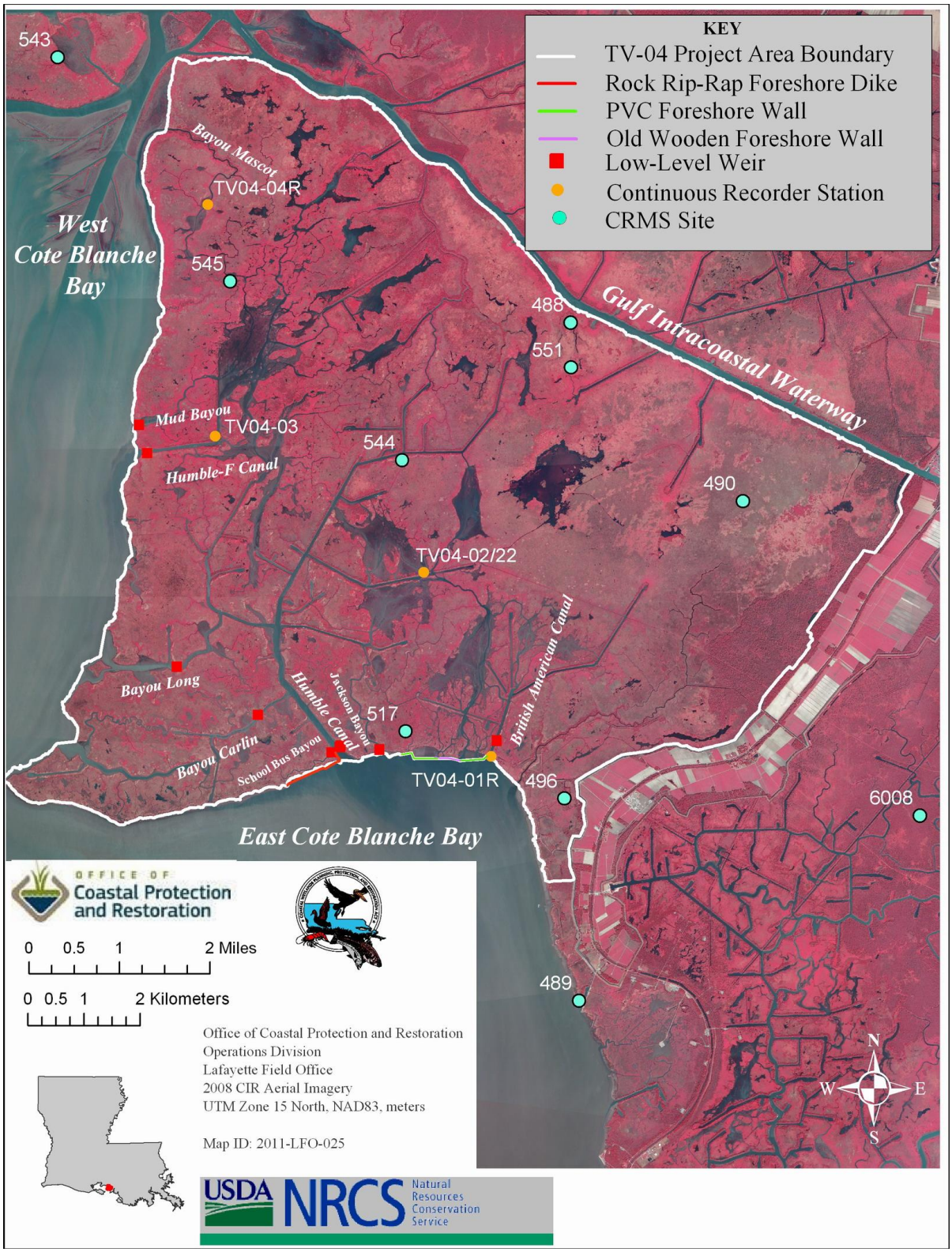

Figure 1. Cote Blanche Hydrologic Restoration (TV-04) project area boundary and features.

Shoreline erosion on the southern project boundary along ECBB resulting from wave energy and breaches in adjacent canals was evident from aerial photography as early as 1952. Shoreline erosion rates averaged 10–15 ft/yr (3.0-4.6 m/yr) from 1952-1995 according to a report from Miller Engineers & Associates. These measurements are consistent with an increase in shoreline erosion after 1978 for the entire Teche/Vermilion basin. Erosion rates averaged 10–12 ft/yr (3.0-3.7 m/yr) from 1941 to 1978 and increased to an average of 20–25 ft/yr (6.1-7.6 m/yr) from 1978 to 1983 for the basin.

The main focus of this hydrologic restoration project is to create a lower energy environment by reducing the larger openings of oil-field access canals that penetrate fragile interior marsh and act as direct conduits for increased tidal influence from E and W CBBs. Water control structures were designed to reduce cross sectional areas of major waterways thereby reducing tidal fluctuation and rapid water exchange between bays and interior fragmented marshes. Channel reduction with weirs and boat/barge bays rather than restrictive structures (e.g. flap-gated weirs or plugs) allows for continued delivery of freshwater and sediments and navigation access to the project area.

To achieve the specific goals of decreasing water level variability within the project area and decreasing the rate of marsh loss, 7 passive water control structures were constructed in seven major water exchange avenues in 1999:

1) The weir at Mud Bayou (figure 1) is constructed of steel sheet piling with rocks on each end, and the dimensions are 15 ft (4.57 m) wide and a sill elevation set at -5.5 ft (-1.68 m) North American Vertical Datum 1988 (NAVD 88).
2) The weir in Humble-F Canal consists of a combination steel sheet piling with rip rap/rock in the center. The weir crest length is 15 ft (4.57 m) and has a bottom width of 15 ft (4.57 m), and the sill elevation is set at -2.5 ft (-0.76 m) NAVD 88.
3) The weir in Bayou Long is constructed of steel sheet piling with rocks on each end. The weir crest length is 15 ft (4.57 m) and a sill elevation set at -3.5 ft (-1.07 m) NAVD 88.
4) The weir in Bayou Carlin is constructed of steel sheet piling with rocks on each end, and the weir crest length is 15 ft (4.57 m) and a sill elevation set at -3.5 ft (-1.07 m) NAVD 88.
5) The weir at the entrance of Humble Canal is constructed with steel sheet piling with a rip rap/rock center. The weir crest length is 75 ft (22.86 m) and the sill elevation is set at -7.0 ft (-2.13 m) NAVD 88 (figure 3).
6) The weir at the entrance of Jackson Bayou is constructed of steel sheet piling with rocks on each end, and the weir is 16 ft (4.88 m) and the sill elevation set at -3.5 ft (-1.07 m) NAVD 88.
7) The weir at the entrance of the British American Canal is constructed of steel sheet piling with a rip rap/rock fill, and the weir crest length is 15 ft (4.57 m) and a sill elevation of -2.5 ft (-0.76 m) NAVD 88.

To address the second objective and the specific goal of reducing shoreline erosion along the southern project boundary between the British American Canal and Jackson Bayou, a 4,140 ft (1.26 km) foreshore wall was constructed in two sections located on either side of, and overlapping the ends of an existing wooden bulkhead. The wall is composed of polyvinyl chloride (PVC) sheet piling attached to timber wales and supported by timber soldier and batter piling. Approximately 2 yd^3 of surface coarse aggregate limestone per linear ft. (1.53 m^3 per 0.3 m) was placed on each side of the PVC sheet piling and extended out from the sheet piling approximately 15 linear feet (4.57 m). Construction on the seven weirs and the wall was completed January 20, 1999.

By 2007, ECBB had breached into School Bus Bayou, which runs parallel to ECBB and intersects Humble Canal, allowing tidal water to bypass the weir located on Humble Canal (figure 1). In response, two passive water control structures and shoreline protection was added to the project. The two control structures installed on the eastern and western side of Humble Canal where School Bus Bayou crosses are low-level, rock weirs with a bottom sill 10 feet wide and -2.0 feet NAVD deep on the eastern weir and a sill 15 feet wide and -6.0 feet NAVD deep on the western side. Approximately 3,500 linear feet of foreshore rock dike along the northern shoreline of ECBB was installed parallel to School Bus Bayou just west of the Humble Canal. Construction in the School Bus Bayou area was completed in September 2007.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Cote Blanche Hydrologic Restoration Project (TV-04) 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, if any, 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 inspection of the Cote Blanche Hydrologic Restoration Project (TV-04) was held on June 23, 2011 under mostly cloudy skies and hot temperatures. In attendance were Stan Aucoin, Darrell Pontiff and Dion Broussard of OCPR and Charles Slocum of NRCS.

The field inspection included a complete visual inspection of all features. Staff gauge readings, when available, were used to determine approximate elevations of water, rock weirs, earthen embankments, steel bulkhead structures and other project features. Photographs were

taken at each project feature (see Appendix A) and Field Inspection notes were completed in the field to record measurements and deficiencies (see Appendix C).

b. Inspection Results

Site 1—Mud Bayou

The Mud Bayou structure appears to be holding up fairly well. The coating on the sheet piles is peeling. The steel is beginning to show signs of rust and will need to be monitored. Signage is ok. Staff gauges no longer functional. (Photos: Appendix A, Photo 1).

Site 2—Humble F Canal

The warning sign, day-marker, and railing on the north side of the structure are gone and will need to be replaced. Sheet piles and rocks on the end of the structure are stable and functioning as intended. The coating on the sheet piles is rusting on this structure and will be monitored as well. The south arrow sign is missing. All signs need to be re-taped. Staff gauge reading was 1.8', but gauges are not stable and will need to be re-set. (Photos: Appendix A, Photo 2).

Site 3—Bayou Long

The warning sign/arrow signs and railing on the south end of the structure are missing and will need to be replaced. The coating on the sheet piles is rusting on this structure and will be monitored as well. Staff gauges are no longer functional. (Photos: Appendix A, Photo 3)

Site 4—Bayou Carlin

The structure is in excellent post-construction condition. The siltation on the canal between Humble Canal and the structure is no longer as evident as earlier. The Bayou Carlin structure and signage are stable. The coating on the sheet piles is rusting and will be monitored as the others. (Photos: Appendix A, Photo 4)

Site 5—Humble Canal

Rail damage on the west end of the structure will be replaced. The danger signs on both ends of the structure are still in place and reusable. The gap on the southern end of the rock dike on the eastern end of Humble Canal has worsened and will be repaired. The rest of the rock around the structure is stable and functioning. The NW coast guard sign is missing and will be replaced. Staff gauges need to be replaced. (Photos: Appendix A, Photos 5-7).

Site 6—Jackson Bayou

The warning sign mounted on the left side of the structure is gone and will be replaced. Existing signs need to be re-taped. The rock placed on both sides of the structure has stabilized the shoreline. The coating on the sheet piles is rusting on this structure and will be monitored. The west warning sign is gone and will need to be replaced. (Photos: Appendix A, Photo 12).

Site 7—British American Canal

The western (green) navigational aid marker is gone and will be replaced. The coating on the sheet piles is rusting on this structure and will be monitored as well. Warning signs and arrows will be replaced. Other signs will be re-taped. The rock on the wingwalls of the structure as well as the rock along the canal is stable. The rock between the PVC wall and the bank has settled but is still functional. (Photos: Appendix A, Photos 13-14).

Site 8—PVC Wall

The PVC shoreline protection wall and signage are stable. There are virtually no pile caps remaining, but no damage to the timber piles was noticed. Previous attempts to replace these pile caps have been unsuccessful. The piles will be monitored and should the need arise, will be painted or coated for protection. Sheet piles in several locations are missing; however, no gaps are wider than 3-4 feet. Replacement of these sheet piles may not be possible due to the rock at the base. The wall is still functioning as intended. Signs are all in place however, they will need to be re-taped. (Photos: Appendix A, Photos 15-16).

School Bus Bayou

The dike has settled to an approximate average elevation of +2.0 ft NAVD88 and will be recapped. Spoil placed behind the dike is all gone. One warning sign on the foreshore dike was leaning and will be straightened. The rock and the sign on the east end School Bus crossing is in better shape but will be addressed as well. The rock on the west end is gone from the bottom of the channel and will be replaced. The sign is ok. (Photos: Appendix A, Photos 8-11).

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None

ii. Programmatic/ Routine Repairs

The Cote Blanche Hydrologic Restoration Project is in basically good condition and functioning as designed. The repairs discussed in this inspection will be addressed in the summer/fall of 2011 and include:

- Raising/replacing rock along School Bus Bayou dike and the crossings at Humble Canal
- Replacing railing and signs at Humble F Canal, Humble Canal, and Bayou Long
- Installing miscellaneous signs, pilings, etc. as needed
- Re-taping with reflective tape all signage where necessary
- Reestablishing staff gauges in the area

d. Maintenance History

General Maintenance: Below is a summary of completed maintenance projects and operation tasks performed since January 1999, the construction completion date of the Cote Blanche Hydrologic Restoration Project.

2001 Maintenance Project – LDNR: This maintenance project included the placement of 12"-14" of paving stone spread out around the wingwalls of the weirs at Mud Bayou, Humble F Canal, Bayou Long, Humble Canal, Jackson Bayou and British American Canal 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 replacement of approximately 100 pile caps along the PVC wall, the replacement of day markers at Humble F Canal with signs mounted to the weir instead of on driven pylons, and the construction of revetment/foreshore dike along the west bank of the British American Canal from the weir to the canals convergence with Cote Blanche Bay. The costs associated with the engineering, design and construction of the Cote Blanche Maintenance Project are as follows:

Construction------	$287,919.80
E & D, construction oversight, as-builts------	$ 31,690.79
Project Total------	$319,610.59

2005 Maintenance Project – LDNR: This maintenance project included rock repair at six of the structures, replacement of warning signs and channel markers. This project was a result of damages that occurred during Hurricane Lili in 2002.

Project Cost	$84,500.00*

- This cost was reimbursed by FEMA

Navigational Light Maintenance – LDNR: Automatic Power, Inc. performed the following navigational light maintenance:

2007 Total	$5,016.20
2008 Total	$2,365
2009 Total	$2,149
2010 Total	$2,635
2011 Total	$679

2007 School Bus Bayou Maintenance – LDNR: This maintenance event consisted of the installation of approximately 3,500 linear feet of foreshore rock dike along the northern shoreline of Cote Blanche Bay just west of the Humble Canal and in the vicinity of School Bus Bayou. Also, two low level rock weirs were installed on the

eastern and western side of Humble Canal where School Bus Bayou crosses. Associated costs are as follows:

Construction	$1,500,000.00
E&D/Const. oversight	$63,328.45
Total	$1,563,328.45

III. Operation Activity

a. Operation Plan

There are no active operations associated with this project.

b. Actual Operations

There are no active operations associated with this project.

IV. Monitoring Activity

Pursuant to the CWPPRA Task Force decision on August 14, 2003 to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS) for CWPPRA project monitoring, updates were made to merge the TV-04 Monitoring Plan with CRMS and provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the Breaux Act. Three project specific data recorders were removed from the project and reference areas on March 8, 2007 following approval from the federal sponsor, NRCS (table 2, see TV-04 sondes). There are 7 CRMS-*Wetlands* sites physically located in the project area (figure 1) and other CRMS sites are available as references (table 2).

a. Monitoring Goals

The objectives of the Cote Blanche Hydrologic Restoration Project are:

1. Reduce water exchange between marshes of Cote Blanche and West and East Cote Blanche Bays to prevent scouring of interior marsh and protect approximately 30,898 ac (12,504 ha) of fresh marsh.

2. Protect shoreline on southern boundary between Jackson Bayou and British-American canals from wave erosion.

The following goals will be evaluated to assess the above objectives:

1. Decrease variability in water level within the project area.

2. Reduce erosion rate of shoreline along southern project boundary.

3. Decrease rate of marsh loss.

b. Monitoring Elements

Water-level Variability

To assess the effectiveness of low-level, passive weirs to reduce water-level fluctuation in the project area, differences in daily water-level ranges inside and outside of the project area were analyzed (figure 1; table 2). Daily water elevation ranges, calculated from the maximum and minimum hourly data, were plotted over time. Relevant time intervals were picked based on project construction, storm disturbance, and switching from project specific to CRMS sondes. For statistical analysis, the difference in daily water-level range between reference and project sondes were calculated, and the mean and standard errors were compared among the time intervals:

$$\text{Mean Range Difference} = \frac{\Sigma_{days}(\text{Range}_{proj} - \text{Range}_{ref})}{\text{n days}}$$

Range difference calculations were limited to dates that had both the reference and project data; also, days within an acceptable range of 0.05-3.5 ft for reference sondes were used for the analysis to limit anomalous days (such as storm surge effects) and/or sonde errors. During the time of the project-specific sondes (1997-2004), range differences of project sondes were calculated from the reference sonde (Table 2). To incorporate natural variability and defend against data gaps from individual sondes during the time that CRMS sondes were used (2006-2010), four "reference" sondes were averaged from which range differences for project sondes were calculated. Although CRMS0517 is within the project area and behind the PVC wall, the bayou in which the sonde is located is directly connected to ECBB as the PVC wall is slotted to allow for water passage and is not tied-in to the shoreline. The daily range differences were grouped by time intervals of interest for each data set, TV-04 and CRMS (Table 2). The different sets of project sondes are affected by the same low-level weirs with the CRMS sondes being further interior; TV04-02/22 and CRMS0544 are behind the Humble Canal weir, and TV04-03 and CRMS0545 are behind the Humble F Canal and Mud Bayou weirs. Differences of water-level range differences between project sondes and among time intervals for each data set were analyzed using a full factorial (sonde × time interval) analysis of variance (ANOVA); differences within factors were detected with Tukey Honest Significant Differences (HSD) post tests (SAS Institute Inc. 2010).

Table 2. Time intervals of interest and sondes used to determine daily range differences for assessing water-level variability at East Cote Blanche Bay Hydrologic Restoration project (TV-04) from 1997-2010.

Time Intervals				
Date Range	Name	Sondes	Project	Reference
Jn 1997-Mr 1998	Pre Construction	TV-04	TV04-02/22, -03	TV04-01R
Fb 1999-Ag 2002	Post Construction / Pre Hurr Lili	TV-04	TV04-02/22, -03	TV04-01R
Sp2002-Nv 2004	Post Hurr Lili	TV-04	TV04-02/22, -03	TV04-01R
Nv 2006-Ag 2007	Pre SBB Structures	CRMS	CRMS0544, 0545	CRMS0489, 0493, 0517, 0543,
Sp 2007-Ag 2008	Post SBB / Pre Hurr Gustav	CRMS	CRMS0544, 0545	CRMS0489, 0493, 0517, 0543,
Sp 2008-Ag 2009	Post Hurr Gustav	CRMS	CRMS0544, 0545	CRMS0489, 0493, 0517, 0543,
Ag 2009-Dc 2010	Post All	CRMS	CRMS0544, 0545	CRMS0489, 0493, 0517, 0543,

Shoreline Change

Using differential GPS, the southern boundary shoreline along ECBB was mapped east and west of Humble Canal behind shoreline protection structures (foreshore rock dike to the east and foreshore PVC wall and pre-existing wooden bulkhead to the west) and unprotected areas (to the east and west). The wooden bulkhead is previously existing structure constructed as a shoreline protection measure in the late 1950s. Shorelines were mapped in 1998 (PVC wall construction), 2001, 2004, 2007 (rock dike construction), and 2010; and, shoreline mapping is

scheduled for 2013 and 2016. Change rates for time intervals were calculated using Digital Shoreline Analysis System (DSAS) version 4.0, an ArcGIS application. Transects spaced 20 m apart were established for the shoreline reaches from which shoreline change rates (m/y) were determined between dates of interest (Thieler et al. 2009). Shoreline change rates among shoreline reaches over time intervals 1998-2001 (initial post construction for PVC wall), 2004-2007, 2007-2010 (initial post construction for rock dike) were compared using a full factorial (shoreline reach × time interval) ANOVA; differences within factors were detected with Tukey HSD post tests. In addition, a comparison of the shoreline reaches over the life of the project to date (1998-2010) was analyzed using an ANOVA with a Tukey HSD post test (SAS Institute Inc. 2010).

Land Area Change

To document vegetated and non-vegetated areas, near vertical color-infrared aerial photography (1:24,000 scale with ground controls) were obtained pre-construction on January 11, 1997 and post construction on December 15, 2002 and December 20, 2009. The original photographs were checked for flight accuracy, color correctness, and clarity and were subsequently archived. Aerial photographs were scanned, mosaicked, and georectified by USGS/NWRC personnel according to standard operating procedures (Steyer et al. 1995, revised 2000). Final aerial photography is scheduled for 2015. Habitat analysis was performed on the 1997 and 2002 while a land and water analysis was performed on the 2009 aerial photography; therefore, 1997 and 2002 habitat classifications were lumped into land (emergent, vegetated area) and water (open water and nonvegetated mudflats). In addition a land-to-water analysis was performed from February 2 to October 16, 2002 to detail land changes caused by Hurricane Lili (October 3, 2002).

c. Preliminary Monitoring Results and Discussion

Water-level Variability

The low-level weirs are reducing water-level variability within the TV-04 area when free from hurricanes and hydrologic bypassing around the weirs. Monthly averages of daily water-level range were plotted for project and reference sondes for project-specific (TV-04) and CRMS sets with delineations for time intervals of interest (figure 2). In the TV-04 sonde set, ranges were grouped closer together during pre construction than in later time intervals as the water-level range decreased at the project sondes (figure 2A). These relationships were statistically significant as an interactive effect (sonde × time interval, $F_{1,2}$=23.7, p<0.0001). The relative difference in water-level range from the reference (TV04-01R) sonde tripled at the Humble Canal sonde (TV-02/22) and doubled at the Humble B Canal/Mud Bayou Sonde (TV04-03) after project construction. Water-level range at TV04-03 increased by ~25% after Hurricane Lili (figure 3A). Between November 2004 and November 2006, ECBB had breached into School Bus Bayou (SBB) allowing tidal water to bypass the weir located on Humble Canal which prompted construction of the SBB structures (weirs at intersection with Humble Canal and a foreshore rock dike). In the CRMS sonde set, water-level range was greater at the Humble Canal (CRMS0544) sonde than the average of reference sondes ($CRMS_{Refs}$) prior to construction of the SBB structures. Water-level ranges were typically less at project sondes than the reference following the installation of the SBB structures with the brief exception of the Humble B Canal/Mud Bayou (CRMS0545) following Hurricane Gustav (figure 2B). These relationships within the CRMS sonde set were statistically significant as an interactive effect (sonde × time interval, $F_{1,3}$=4.1, p=0.0166). Water-level variability decreased almost three fold at the Humble Canal sonde relative to the references. Water-level variability decreased substantially at both project sondes a year following Hurricane Gustav (figure 3).

Shoreline Change

Shoreline protection measures have decreased erosion relative to unprotected shorelines although erosion has increased since Hurricanes Lili (2002), Rita (2005), and Gustav and Ike (2008). The relationship among the shoreline protection types changed over the time intervals (shoreline × time, $F_{4,3}$=10.4, p<0.0001, figure 4), and shoreline change rates differed among shoreline protection types overall (1998-2010, F_4=44.1, p<0.0001, figure 5). The western unprotected shoreline erosion increased over time by 1.4 m/y (4.6 ft/y). Shoreline erosion behind the foreshore rock dike significantly decreased after installation in 2007 (‘04-‘07 > ‘07-‘10, t_1=2.5, p=0.0135; figure 4, 5, and 6) despite rock settling to below the target elevation. The eastern unprotected shoreline had similar erosion rates as the western unprotected shoreline until it decreased inexplicably during the 2007-2010 interval (figure 4 and 6). Overall since construction, the shoreline behind the foreshore PVC wall eroded significantly less than all other shoreline reaches; however, the effectiveness has decreased since Hurricane Lili as the shoreline was prograding through 2004 and then eroding thereafter. During the last interval (2007-2010), erosion behind the PVC wall was 3 times less than the western unprotected shoreline but similar to the eastern unprotected shoreline. Although the protrusion of the shoreline behind the pre-existing wooden bulkhead is quite visible (figures 1,

5, 6), it has eroded at the same rate as the west unprotected shoreline since Hurricane Lili as its condition and effectiveness becomes more dilapidated over time (figures 4, 5, 6).

Land Area Change

The rate of marsh loss has decreased by two-thirds in the TV-04 project area since construction relative to the historical (1957-1990) land loss rate (table 3; Britsch and Kemp 1990). Most of the land loss that has occurred since project construction in 1999 was the result of Hurricane Lili in 2002 (table 3; figures 7-10). Although many hurricane shear signatures from Hurricane Lili (southwest to northeast shears; figures 8 and 9) are persistent and visible in the 2009 map (figure 10), there was a net gain of land following Hurricane Lili (2003-2009). The net land gain from 2003-2009 exemplifies the areas land building potential in light of anticipated losses during Hurricanes Rita (2005) and Gustav (2008). The decrease in land loss rate of the TV-04 project area does not follow the regional trend for the Teche/Vermilion Basin in which land loss rates are greater since TV-04 construction than historically (table 3); much of the recent loss has been attributed to exacerbation of hurricane impacts (Barras 2009). The reduced tidal exchange via the low-level weirs across the large pipeline canal openings (see Water-level Variability above and figures 2 and 3) is allowing the marsh interior to recuperate following storm surge disturbances. The 2015 imagery should clarify whether or not land gains observed in 2009 are persistent.

Table 3. Land area and land area change rates of TV-04 compiled from high resolution imagery (1:24,000) collected by the USGS-National Wetlands Research Center pre- (1997) and post-construction (2002, 2009). Initial construction (low-level weirs and PVC wall) was completed in January 1999; Hurricane Lili occurred in October 2002; School Bus Bayou structures (low-level weirs and foreshore rock dike) were added in September 2007; and, Hurricane Gustav occurred in September 2008.

	Land Area	
Date	Acres	Percent
TV-04 Project Area		
January 1997	26,076.3	84.4
December 2002	25,360.1	82.0
December 2009	25,731.0	83.2
Post Construction Change Rate (1997-2009, /y)	-24.3	-0.08
Historical Change Rate (1957-1990, /y)[1]	-75.0	-0.24
Teche/Vermilion (TV) Basin[2]		
Post Construction Change Rate (1999-2009, /y)	N/A	-0.40
Historical Change Rate (1957-1998, /y)	N/A	-0.24

[1] Britsch and Kemp 1990

[2] Adapted from Couvillion et al. 2011

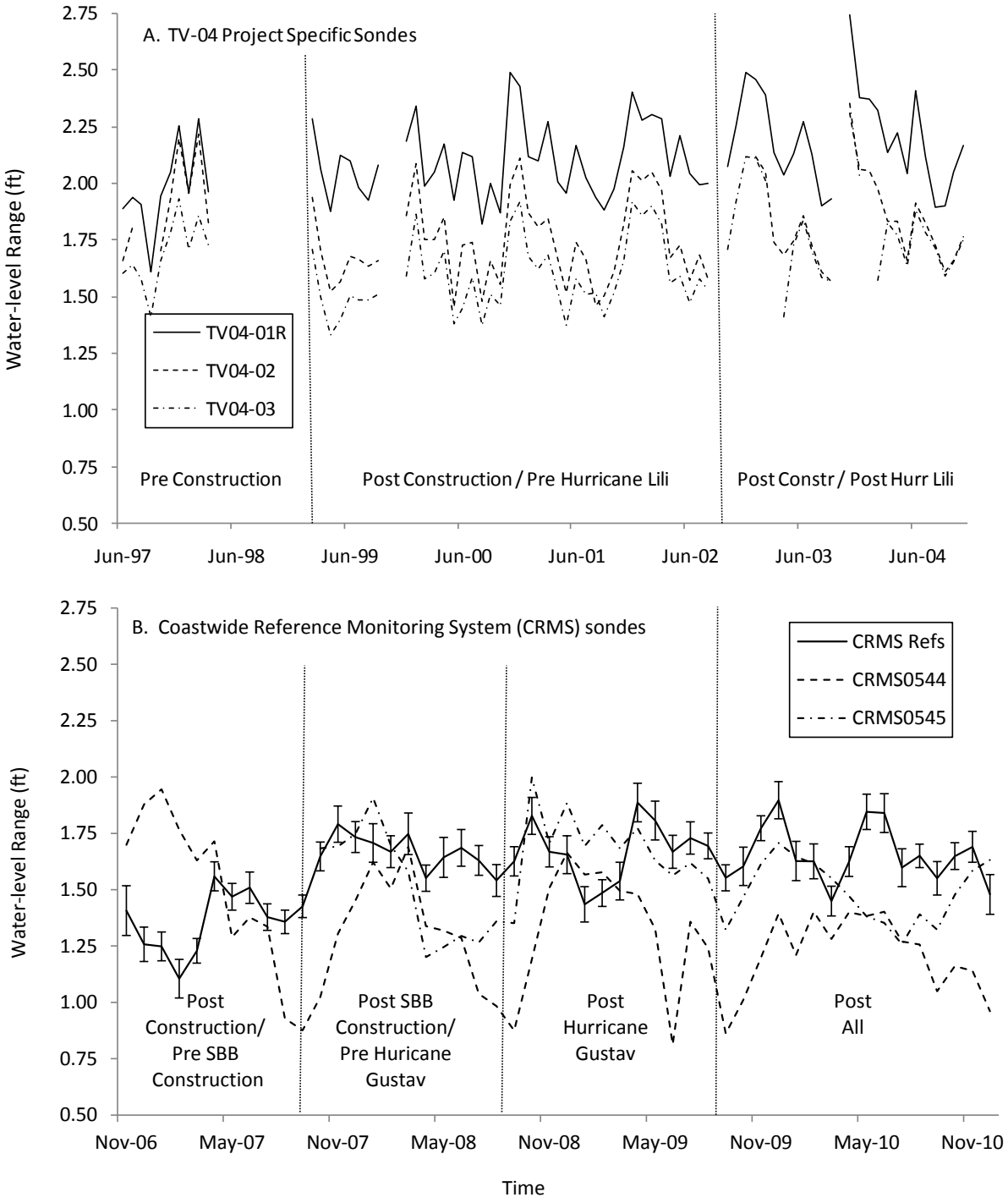

Figure 2. Water-level ranges (maximum – minimum per day) collected over time from reference and project sondes (A. TV-04 Project Specific and B. CRMS) at the Cote Blanche Hydrologic Restoration project (TV-04). Values are monthly means of daily ranges. The reference sonde has the solid line (error bars represent variability among CRMS reference sondes), and the project sondes have dashed lines. The differences in the relationship of the lines were used for statistical analyses.

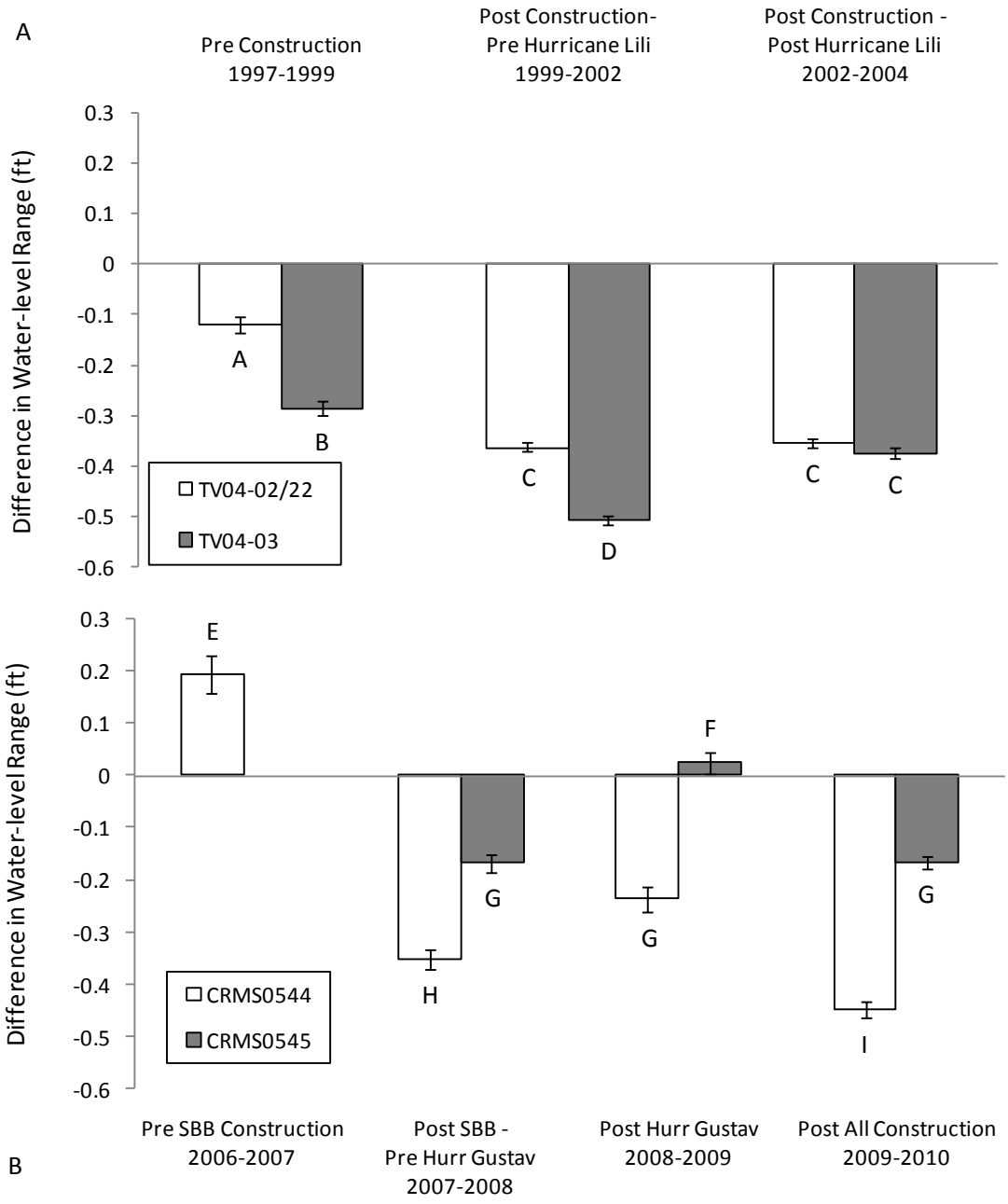

Figure 3. Difference in water-level range ($Range_{proj\ i} - Range_{ref}$) collected over time intervals from (A) TV-04 Project Specific and (B) Coastwide Reference Monitoring System (CRMS) sondes at the Cote Blanche Hydrologic Restoration project (TV-04). Values are means and standard errors of daily range differences for a time interval; a negative value is less variable while a positive value is more variable relative to the reference. Each sonde set (A and B) was analyzed separately, and both had significant interaction (sonde × time interval) effects; the different letters indicate significant differences among columns within a set.

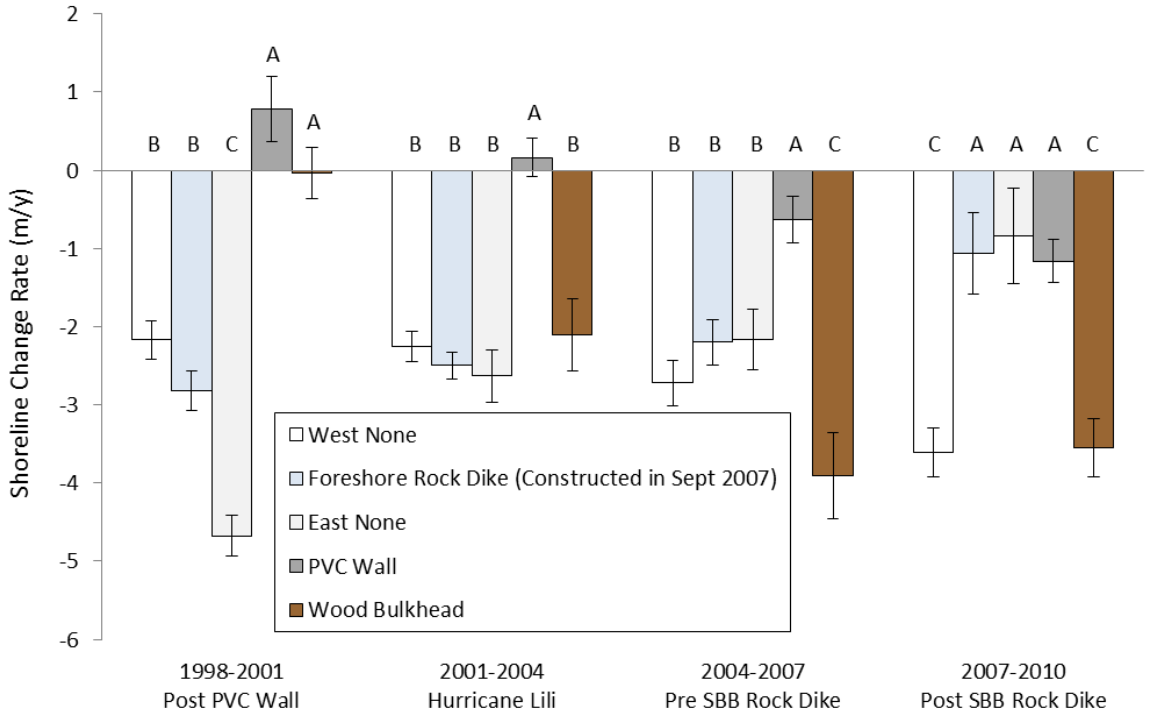

Figure 4. Intervals of shoreline change rates were calculated from shoreline mapping conducted along protected and unprotected shoreline of East Cote Blanche Bay within the TV-04 project area from 1998-2010. Significant events affecting the shoreline in the time intervals were: 1998-2001, initial post construction of the PVC wall east of Humble Canal; 2001-2004, Hurricane Lili; 2004-2007, pre construction of the foreshore rock dike parallel to School Bus Bayou and Hurricane Rita; 2007-2010, post construction of the SBB rock dike and Hurricanes Gustav and Ike. Significant differences among shoreline protection types within each time interval are indicated by different letters (Tukey's HSD post test).

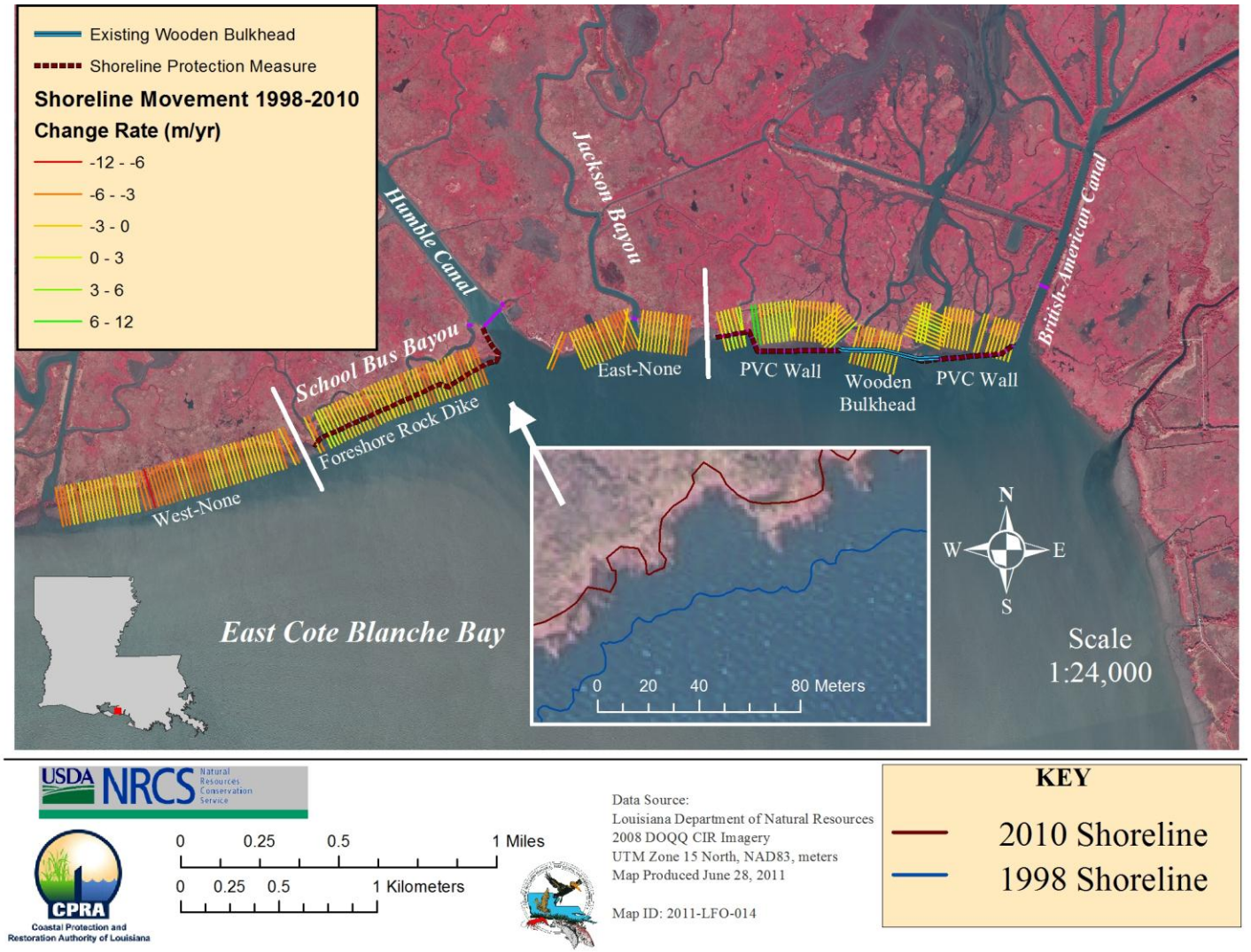

Figure 5. Cote Blanche Hydrologic Restoration (TV-04) shoreline change over the life of the project (1998-2010). The Foreshore Rock Dike was not constructed until 1997, and the Wooden Bulkhead was a pre-existing structure constructed in the late 1950s.

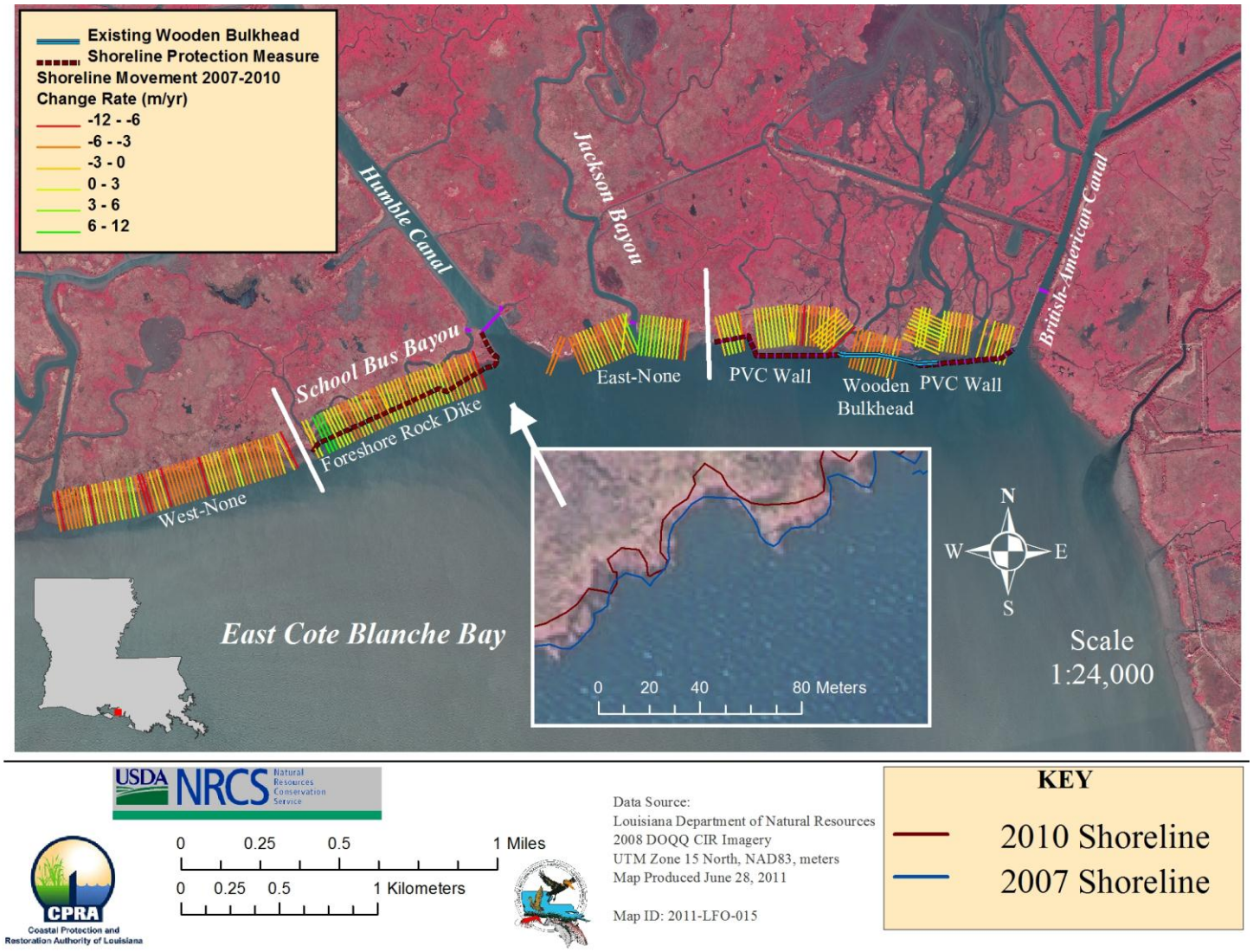

Figure 6. Cote Blanche Hydrologic Restoration (TV-04) shoreline change from 2007 to 2010. The Foreshore Rock Dike was constructed in 2007, and the Wooden Bulkhead was a pre-existing structure constructed in the late 1950s.

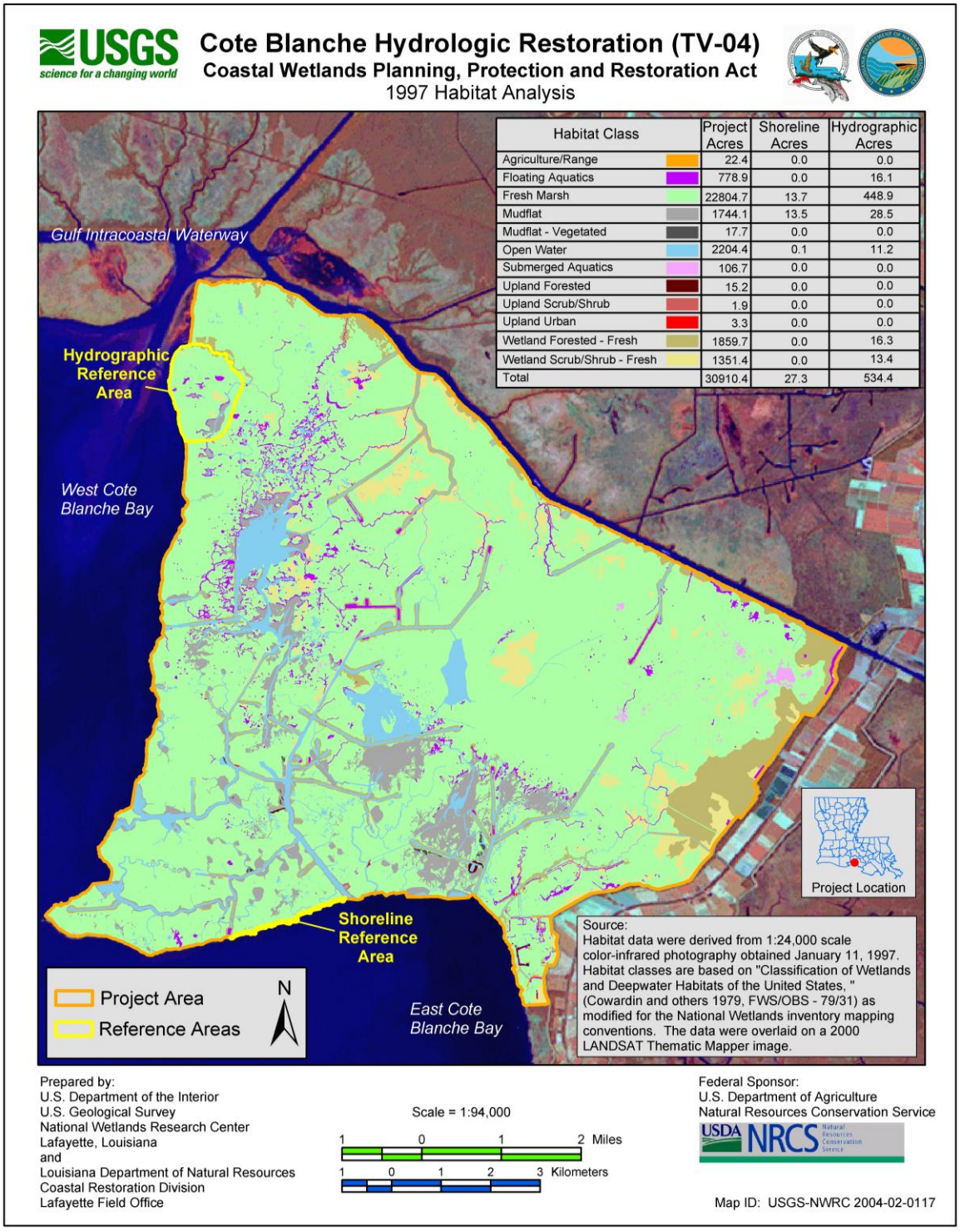

Figure 7. Cote Blanche Hydrologic Restoration (TV-04) 1997 GIS habitat analysis from photography taken January 1997.

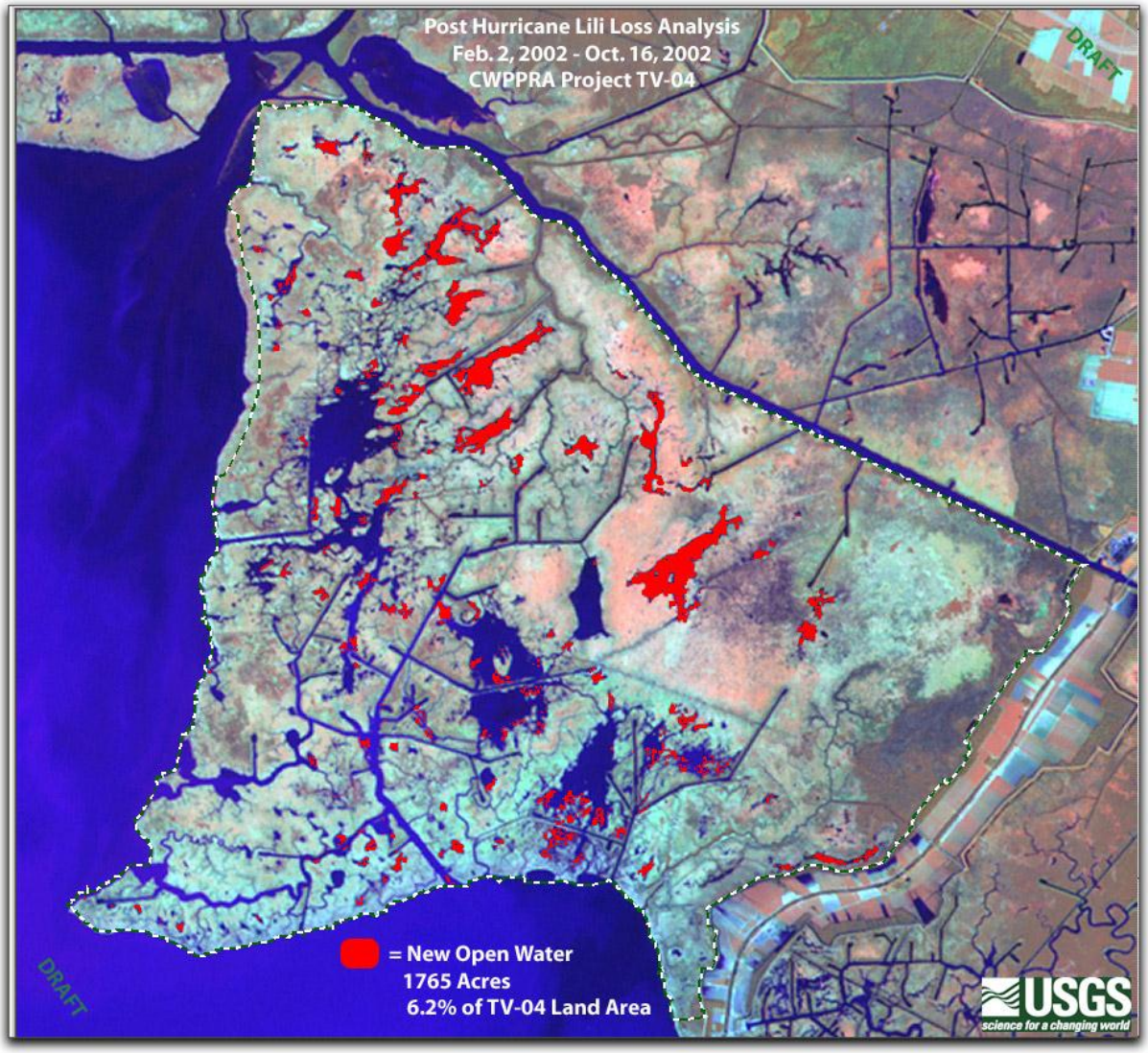

Figure 8. Land to Water change analysis (February 2002 – October 2002) resulting from Hurricane Lili (10/3/02). Satellite imagery and analysis provided by U. S. Geological Survey.

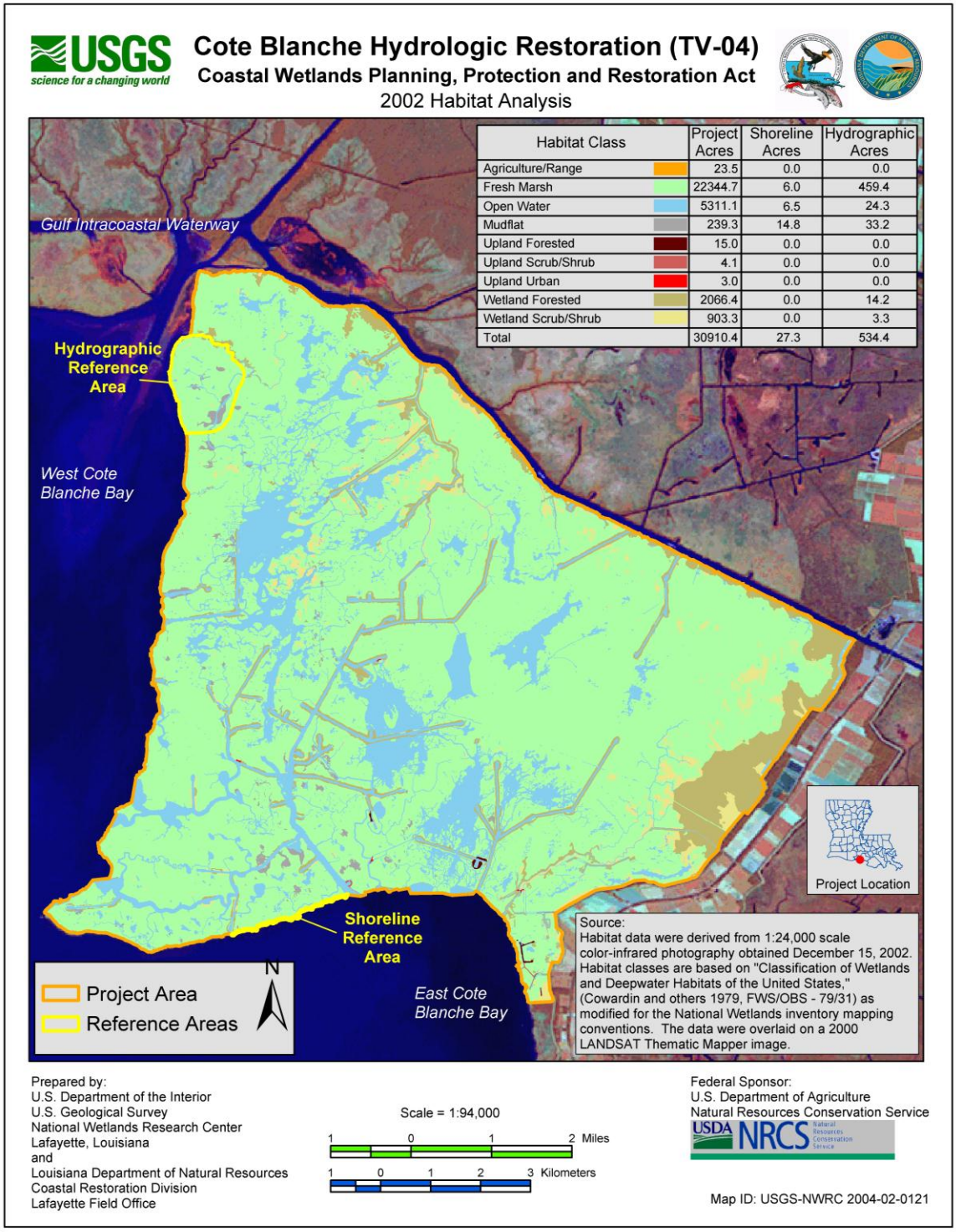

Figure 9. Cote Blanche Hydrologic Restoration (TV-04) 2002 GIS habitat analysis from photography taken December 2002 (after Hurricane Lili).

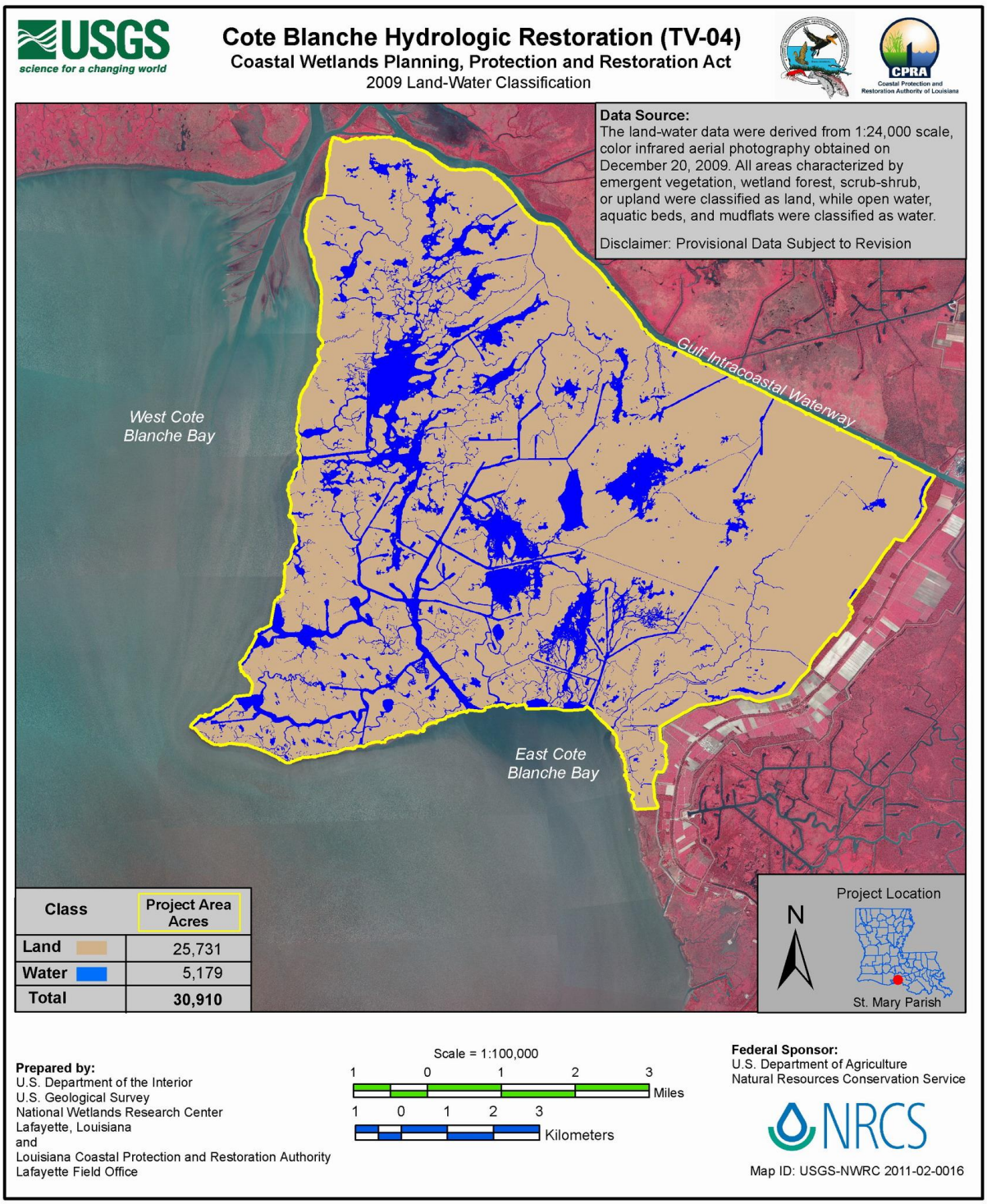

Figure 10. Cote Blanche Hydrologic Restoration (TV-04) 2009 land and water analysis from photography taken December 2009.

V. Conclusions

a. Project Effectiveness

Cote Blanche Hydrologic Restoration (TV-04) project has been successful at achieving the specific goals of decreasing water level variability within the project area and decreasing the rate of marsh loss, thus far (1999-2010). The reduced tidal exchange via the low-level weirs across the large pipeline canal openings is decreasing daily hydraulic energy which reduces daily export of vulnerable organic soils and allows the marsh interior to recuperate following storm-surge disturbances.

The low-level weirs are decreasing water-level variability within the TV-04 area when surrounding conditions are within the design specification such as being free from hurricanes and water not bypassing around the weirs. Given the design of the submerged weirs, most of the decreased water-level variability is associated with the low tides.

Shoreline protection measures have significantly reduced erosion relative to unprotected shorelines. Prior to Hurricane Lili, the shoreline was prograding behind the PVC wall; although at a significantly lower rate than unprotected shoreline reaches, the shoreline behind the PVC wall has begun to erode since hurricanes in 2002 (Lili), 2005 (Rita), and 2008 (Gustav and Ike). Shoreline erosion behind the foreshore rock dike, which was constructed in 2007 to protect School Bus Bayou, decreased after installation despite settling to below the target elevation.

The rate of marsh loss has decreased by two-thirds in the TV-04 project area since construction relative to the historical (1957-1990) land loss rate. Most of the land loss that has occurred since project construction in 1999 was the result of Hurricane Lili in 2002, and a net gain of land followed Hurricane Lili (2002-2009).

b. Recommendations

The Cote Blanche Hydrologic Restoration Project is in basically good condition and functioning as designed. The repairs discussed in this inspection were addressed in the summer/fall of 2011 and include:

- Raising/replacing rock along School Bus Bayou dike and the crossings at Humble Canal
- Replacing railing and signs at Humble F Canal, Humble Canal, and Bayou Long
- Installing miscellaneous signs, pilings, etc. as needed
- Re-taping with reflective tape all signage where necessary
- Reestablishing staff gauges in the area

A land-to-water change analysis would identify locations of land loss and gain relative to project structures.

c. Lessons Learned

Protect water control structures from bypass breaches by hardening the bank at each wingwall with rock. Rock should be placed at an elevation that allows extremely high tidal events to pass around the structure without scouring the banks.

Although the rock dike at School Bus Bayou settled to below design specifications, it still reduced erosion relative to unprotected shoreline reaches.

VI. Literature Cited

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APPENDIX A
(Inspection Photographs)

Photo 1—signage at Mud Bayou

Photo 2— Missing sign, nav-aid marker, and railing @ Humble F Canal (on left)

Photo 3 – Bayou Long, missing railing and sign (right side)

Photo 4—Bayou Carlin Structure and signage

Photo 5—missing sign and Nav-Aid lights at Humble Canal (top left)

Photo 6—damaged rail/sign on Humble Canal

Photo 7—breach in rock on east side of Humble Canal

Photo 8—western weir at School Bus Bayou

Photo 9— eastern weir at School Bus Bayou

Photo 10—leaning sign and typical section of School Bus dike rock

Photo 11—typical section of School Bus dike

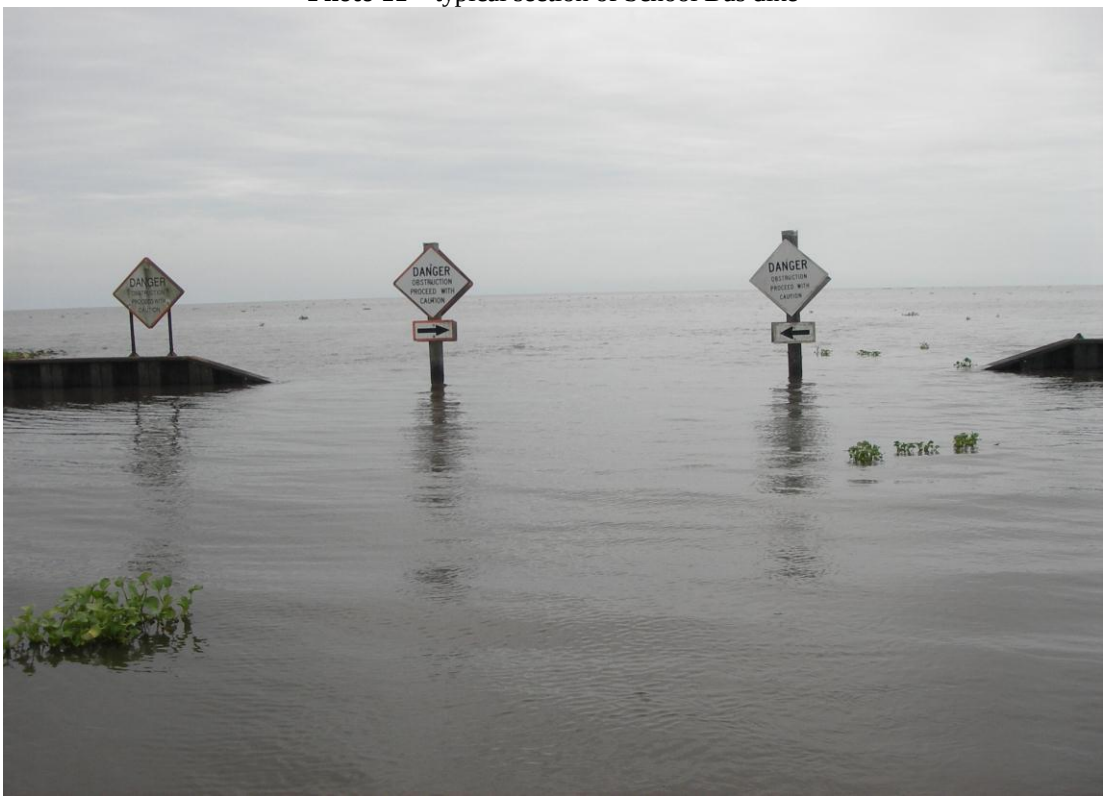

Photo 12— Jackson Bayou (missing sign on right)

Photo 13— British American Canal missing signs, arrows, Nav-aid

Photo 14—rock along British American Canal

Photo 15—Typical section of PVC wall

Photo 16—Sign/section of PVC wall

APPENDIX B
(Three Year Budget Projection)

COTE BLANCHE/ TV-04 / PPL 3

Three-Year Operations & Maintenance Budgets 07/01/2011 - 06/30/2014

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

	2011/2012 (-13)	2012/2013 (-14)	2013/2014 (-15)
Maintenance Inspection	$ 6,086.00	$ 6,269.00	$ 6,457.00
Nav. Aid Inspections	$ 5,000.00	$ 5,000.00	$ 5,000.00
Administration	$ 5,000.00	$ -	
Maintenance/Rehabilitation			

08/09 Description: Replace two staff gages, replace one nav.aid sign

E&D	$ 2,000.00
Construction	$ 714,780.00
Construction Oversight	$ 61,500.00
Sub Total - Maint. And Rehab.	$ 778,280.00

09/10 Description:

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

10/11 Description:

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

	2011/2012 (-13)	2012/2013 (-14)	2013/2014 (-15)
Total O&M Budgets	**$ 794,366.00**	**$ 11,269.00**	**$ 11,457.00**

O &M Budget (3 yr Total)	**$ 817,092.00**
Unexpended O & M Budget	**$ 599,633.00**
Remaining O & M Budget (Projected)	**$ (217,459.00)**

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

COTE BLANCHE HR/ PROJECT NO. TV-04 / PPL NO. 3

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	$2,000.00	**$2,000.00**
Navigational Aid Inspection	LUMP	1	$5,000.00	**$5,000.00**
Construction Oversight	LUMP	1	$61,500.00	**$61,500.00**

ADMINISTRATION

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

MAINTENANCE / CONSTRUCTION

SURVEY

SURVEY DESCRIPTION:	Verify staff gages				
	Secondary Monument	EACH	0	$0.00	$0.00
	Staff Gauge / Recorders	EACH	2	$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:	Replace Nav. Aid sign at Humble Canal.					
	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	1	$0.00	$0.00
	Signage		EACH	1	$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	0	$0.00	$0.00
	Contingency		LUMP	0	$0.00	$0.00
	General Structure Maintenance		LUMP	1	$714,780.00	$714,780.00
	OTHER				$0.00	$0.00
	OTHER				$0.00	$0.00
	OTHER				$0.00	$0.00
					TOTAL CONSTRUCTION COSTS:	**$714,780.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$794,366.00**

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

COTE BLANCHE HR /TV-04/PPL3

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**
Navigational Aid Inspection	LUMP	1	$5,000.00	**$5,000.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	1	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0		$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	
	0	0.0	0	$0.00	$0.00
	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
Navagation Aid		EACH	1	$0.00	$0.00
Signage		EACH		$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: **$11,269.00**

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

COTE BLANCHE HR/TV-04/PPL3

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**
Navigational Aid Inspection	LUMP	1	$5,000.00	**$5,000.00**
Construction Oversight	LUMP	1	$0.00	**$0.00**

ADMINISTRATION

LDNR / CRD Admin.	LUMP	1	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	1	$0.00	$0.00
SURVEY Admin.	LUMP	1	$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	
	0	0.0	0	$0.00	$0.00
	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
Navagation 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: **$11,457.00**

APPENDIX C
(Field Inspection Notes)

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: TV-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 11:35 am

Structure No. 7 British American Canal

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (OCPR)
Charles Slocum (NRCS)

Structure Description: Fixed crest weir, rock on banks and canal

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	good			13, 14	Some initial post construction rusting. No action needed.
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	good				
Timber Piles	N/A				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	good				Navigational Aid, Arrows, and Warning Signs missing. Existing Signs need to be re-taped.
Rip Rap (fill)	good				Rock between PVC wall and shoreline has settled but is still functional.
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-04 Cote Blanche

Date of Inspection: April 1, 2008 Time:

Structure No. 2 Humble F Canal

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (OCPR)
Charles Slocum (NRCS)

Structure Description: Fixed crest weir, rock paving on bank

Water Level Inside: Outside: 1.8

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	good			2	Structure in good condition. Some slight rusting of pile caps.
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	good				
Timber Piles	good				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	fair				Warning sign, day marker, arrow sign, and railing on north side are missing.
Rip Rap (fill)	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-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 12:10 pm

Structure No. 5 Humble Canal

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (DNR)
Charles Slocum (NRCS)

Structure Description: Fixed crest weir, rock on banks and canal

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	good				Some initial post construction rusting. No action needed.
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	fair				
Timber Piles	N/A				
Timber Wales	N/A				
Galv. Pile Caps	good				
USCG Lights	poor			5	NW nav-aid sign is missing and needs replacement.
Signage /Supports	poor			6	The railing needs to be replaced. Warning signs are reusable.
Rip Rap (fill)	fair			7	Breach has occurred on the southern end of the location 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-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 11:45 am

Structure No. 8 PVC wall

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (OCPR)
Charles Slocum (NRCS)

Structure Description: approximately 3800 linear feet of PVC wall

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
PVC sheet piling / Caps	fair			15, 16	PVC wall appears to be in post construction condition and holding up well. Some piles have been broken or displaced. No gaps are wider than 3-4 feet however, and the wall is still functioning.
Steel Grating					
Stop Logs					
Hardware	good				
Timber Piles	good				Some pile caps missing again. Attempts to replace them has been unsuccessful. Condition of piles will be monitored.
Timber Wales	good				
Galv. Pile Caps					
Cables					
Signage /Supports	good				All signs in place. Some retaping with reflective tape is required.
Rip Rap (fill)	good				Rock placed along the inside and outside of the PVC wall is still in place and functional. No action necessary.
Earthen Embankment					

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-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 12:35 pm

Structure No. 3 Bayou Long

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (OCPR)
Charles Slocum (NRCS)

Structure Description: Fixed crest weir

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	good				
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	good				
Timber Piles	good				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	good			3	Warning sign, arrow sign and railing are missing on the south end of the structure and needs to be replaced.
Rip Rap (fill)	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-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 12:50

Structure No. 1 Mud Bayou

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (DNR)
Charles Slocum (NRCS)

Structure Description: Fixed crest weir, rock paving on bank

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	good			1	Structure in good condition and functioning as intended. Rust continues to be monitored. Staff gauges need to be replaced.
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	good				
Timber Piles	good				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	good				
Rip Rap (fill)	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-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 12:00 pm

Structure No. 6 Jackson Bayou

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (OCPR)
Charles Slocum (NRCS)

Structure Description: Fixed crest weir

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	good			12	Some slight rusting of pile caps. No immediate action necessary.
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	good				
Timber Piles	poor				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	good				Warning sign on left side of structure is gone and needs to be replaced. Existing signs need to be retaped with reflective tape.
Rip Rap (fill)	good				Shoreline has been stabalized by the placement of rock.
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-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 12:25 pm

Structure No. 4 Bayou Carlin

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (DNR)
Charles Slocum (NRCS)

Structure Description: Fixed crest weir

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

Item	Condition	Physical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps	good			4	Structure in pristine post-construction condition. Some slight rusting of pile caps. No immediate action necessary.
Steel Grating	N/A				
Stop Logs	N/A				
Hardware	good				
Timber Piles	good				
Timber Wales	N/A				
Galv. Pile Caps	N/A				
Cables	N/A				
Signage /Supports	good				
Rip Rap (fill)	N/A				
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-04 Cote Blanche

Date of Inspection: June 23, 2011 Time: 12:05 pm

Structure No. School Bus Bayou SP

Inspector(s):Stan Aucoin, Dion Broussard, Darrell Pontiff (OCPR)
Charles Slocum (NRCS)

Structure Description: Foreshore Rock Dike & Weirs

Water Level Inside: Outside:

Type of Inspection: Annual

Weather Conditions: Cloudy and Hot

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	Good			10	One sign is down and needs to be replaced. Others need reflective tape.
Rip Rap (fill)	Good			11	Settlement of rock dike has become significant and will need to be raised. Tie-ins stable.
School Bus Bayou Low Level Weirs	Good			8, 9	Rock at bottom of each wier will be addressed.
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?