State of Louisiana
Department of Natural Resources
Coastal Restoration Division and
Coastal Engineering Division

2005 Operations, Maintenance, and Monitoring Report

for

Vermilion River Cutoff

State Project Number TV-03
Priority Project List 1

June 2005
Vermilion Parish

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for
Vermilion River Cutoff (TV-03)

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Preface

The Operations, Maintenance, and Monitoring (OM&M) Report format is a streamlined approach which combines the Operations and Maintenance annual project inspection information with the Monitoring data and analyses on a project-specific basis. This report includes monitoring data collected through December 2004, and annual Maintenance Inspections through June 2005.

The 2005 report is the second in a series of reports. For additional information on lessons learned, recommendations, and project effectiveness, please refer to the 2004 Operations, Maintenance, and Monitoring Report on the Louisiana Department of Natural Resources (LDNR) web site at dnr.louisiana.gov (Thibodeaux and Juneau 2007).

I. Introduction

The Vermilion River Cutoff Project (TV-03) area consists of approximately 194.2 acres (78.6 ha) of brackish marsh and open water, located in Vermilion Parish, Louisiana (figure 1). The Vermilion River Cutoff, near Intracoastal City, La., was constructed in 1947 to connect the Vermilion River and the Gulf Intracoastal Waterway (GIWW) with Vermilion Bay for navigational purposes. A large section of the west bank of the Vermilion River Cutoff has eroded as a result of both bay-side wave action and boat wakes within the cutoff. Erosion of the west bank of the Vermilion River Cutoff, estimated at 23.3 ft/yr (7.1 m/yr) from comparisons of 1955–1985 aerial photography, has occurred to the extent that the land bridge between the cutoff and Vermilion Bay, to the west, is breached in several places. Erosion rates from 1948 to 1972 for Vermilion Bay near Onion Bayou as estimated by the Louisiana Department of Transportation and Development was 1.6 ft/yr (0.5 m/yr). The shoreline retreat from 1948 to 1972 for Vermilion Bay (Mud Point to Lake Cleodis) as estimated by the Louisiana Department of Transportation and Development was 2.6 ft/yr (0.8 m/yr). Erosion on the east bank threatens to breach the land bridge between the cutoff and Onion Lake.

The project was originally designed to stabilize the west side of the cutoff by armoring the three remaining land points adjacent to Vermilion Bay with limestone rip-rap. It was also designed to protect the east side of the cutoff from further erosion through the use of an 8,900 ft (2,713 m) freestanding rock breakwater. The original plan was redesigned due to cost overruns. This project was evaluated in the interagency 2002 Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Adaptive Management review (Raynie and Visser 2002). The continuous dike along the west bank and sediment trapping features were eliminated. The constructed project consists of 6,269 ft (1,911 m) of foreshore rock dike along the east bank of Vermilion River Cutoff. The original boundary for the project area in 1993 did not include the entire area where the shoreline structure was constructed. The official boundary for the project area was adjusted to encompass the rock dike to better evaluate the project area over time. Construction of the breakwater was complete in February 1996.

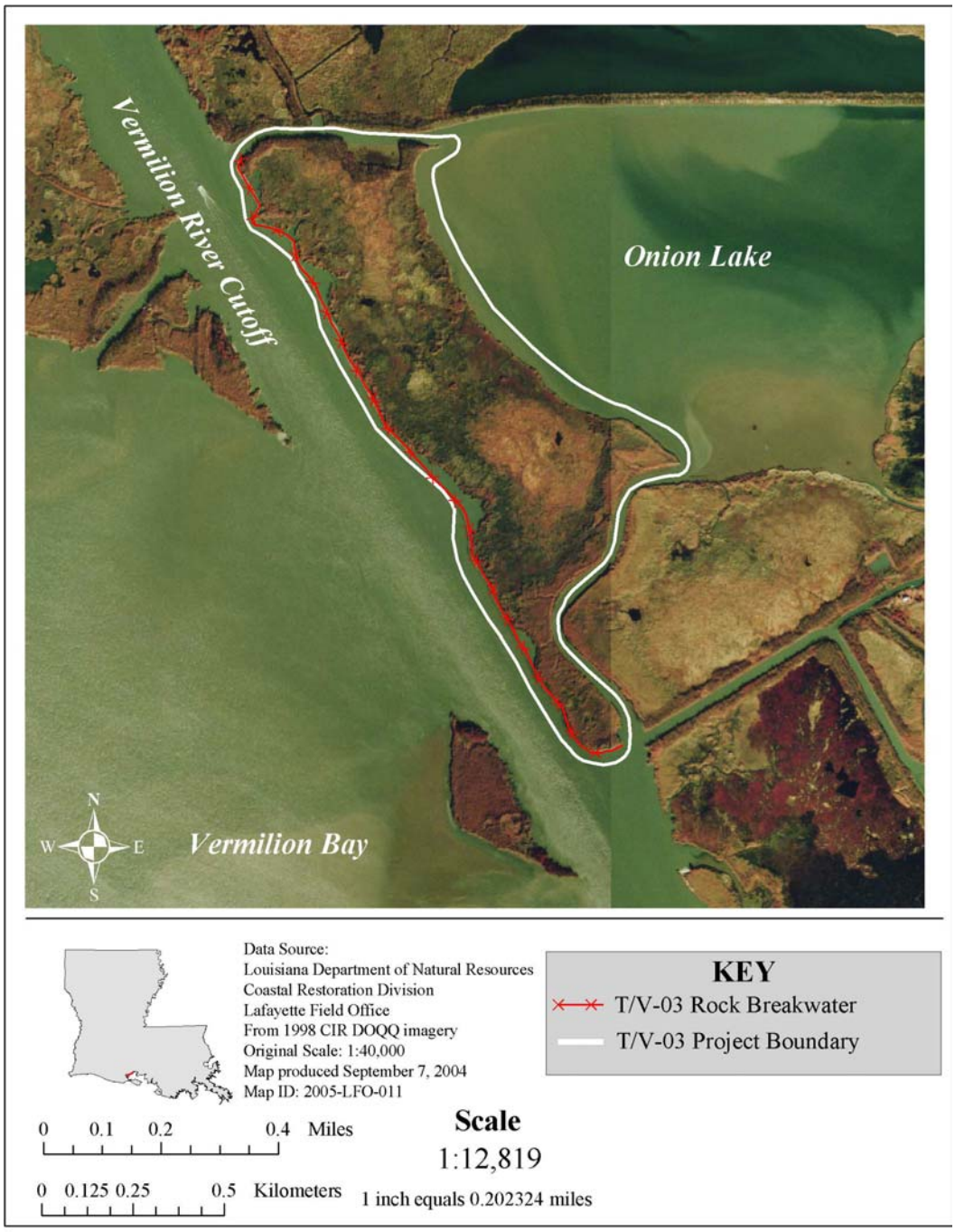

Figure 1. Vermilion River Cutoff (TV-03) project area map showing location of rock breakwater.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Vermilion River Cut-Off Project (TV-03) 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, LDNR 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. As noted in Appendices A, B, and C, initial project goals included documenting inspections with photographs, creating a three-year budget projection, and taking field inspection notes.

An inspection team consisting of two representatives of LDNR and one representative of the U.S. Army Corps of Engineers (USACE) performs annual visual inspections. If damage is apparent, LDNR and USACE assigns a team to perform a detailed inspection and report on the findings. The team documents the condition of the project features and may employ a survey party to make detailed measurements.

b. Inspection Results

No inspection was conducted in calendar year 2005 since this project is currently under a maintenance event.

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

Construction is to begin in Summer 2005 to raise dike back to approximate original construction elevation in areas as required.

ii. Programmatic/ Routine Repairs

None

d. Maintenance History

September 2005 - Luhr Brothers, Inc. Provided labor and materials to restore the rock dike to original constructed elevations. Approximately 5,573 tons of rock were placed over the sections of dike that were below permitted elevation of +3.5 NAVD88. The project was completed in September 2005.

TOTAL CONSTRUCTION COST: $130,655.45

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 actual operations were required.

IV. Monitoring Activity

Pursuant to a CWPPRA Task Force decision on August 14, 2003, to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) for CWPPRA, updates were made to the TV-03 Monitoring Plan to merge it with CRMS-*Wetlands* and provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the Breaux Act.

a. Monitoring Goals

The objectives of the Vermilion River Cutoff project are:

1. Maintain and protect approximately 67 ac (27 ha) of brackish marsh along the eastern side of the Vermilion River Cutoff that will contribute to protecting the integrity of several thousand acres of the Onion Lake wetland complex.

2. Prevent the Vermilion River Cutoff from widening into adjacent marshes.

The following goal will contribute to the evaluation of the above objectives:

1. Decrease the rate of shoreline erosion along the east bank of the Vermilion River Cutoff adjacent to Onion Lake through the use of a rock breakwater.

b. Monitoring Elements

Aerial Photography:

To document vegetated and non-vegetated areas, near-vertical color-infrared aerial photography (1:12,000 scale with ground controls) was obtained in 1993 (pre-construction) and post-construction in 2002. The original photographs were checked for flight accuracy, color correctness, and clarity and were subsequently archived. Aerial photographs were scanned, mosaicked, and georectified by U.S. Geological Survey/National Wetlands Research Center (USGS/NWRC) personnel according to standard operating procedures (Steyer et al. 1995, revised 2000). No additional photography is scheduled.

Shoreline Change:
Shoreline movement was documented using Differential Global Positioning System (DGPS) in 1995, 1999, and 2002. DGPS is scheduled for 2006, 2011, and 2015 to provide a template for mapping shoreline changes and movement over time. Shoreline positions for 1999 were compared to historical data sets available in digitized format for 1993.

Shoreline markers were established at the vegetated marsh edge along the original shoreline adjacent to the breakwater post-construction in 1998 and direct measurements were taken from the settlement plate to the vegetated marsh edge. Measurements were also collected in 2000 and 2002 post-construction.

c. Preliminary Monitoring Results and Discussion

Aerial Photography:
The original boundary for the project area in 1993 did not include the entire area where the shoreline structure was constructed. The official boundary for the project area was adjusted to encompass the rock dike to better evaluate the project area over time. Comparison of the 1993 land to water analysis to the analysis for 2002 shows an increase in land by one acre (figures 2 and 3). Part of this increase may be due to the terraces that were constructed by a private land owner in Onion Lake.

Shoreline Change:
Shoreline change analysis from 1993 to 1999 indicates an increase of open water in the project area. Aerial photography taken in 1993 was used as a baseline for shoreline position instead of the actual DGPS shoreline positions captured in 1995. This was three years prior to construction of the Vermilion River Cutoff (TV-03) project in February 1996, which increases the probability of error in interpreting when this loss actually occurred. The data used for the 1999 shoreline position was from DGPS acquired by LDNR personnel. It is not known how much of the loss occurred from 1993 to the completion of project construction in February 1996. Analysis of baseline DGPS taken in 1995 and compared to 1999, and 2002 DGPS has not been completed (figures 4-5).

Direct shoreline measurements taken from each settlement plate (figure 6) to the vegetated edge of the marsh behind the rock breakwater in the project area indicate progradation at three of the five sites. Only one site, at settlement plate 1006, experienced a loss of approximately 0.77 ft/yr (0.23 m/yr). Settlement plate 1005 showed the greatest gain of 2.56 ft/yr (0.78m/yr) from 2000-2002, and settlement plate 1007 remained unchanged (table 1) The data from these measurements indicate the shoreline behind the rock breakwater on the three northernmost settlement plates is prograding. The loss of shoreline nearest settlement plate 1006 may be attributed to the sinking elevation of the rock breakwater at or below 2 ft NAVD 88.

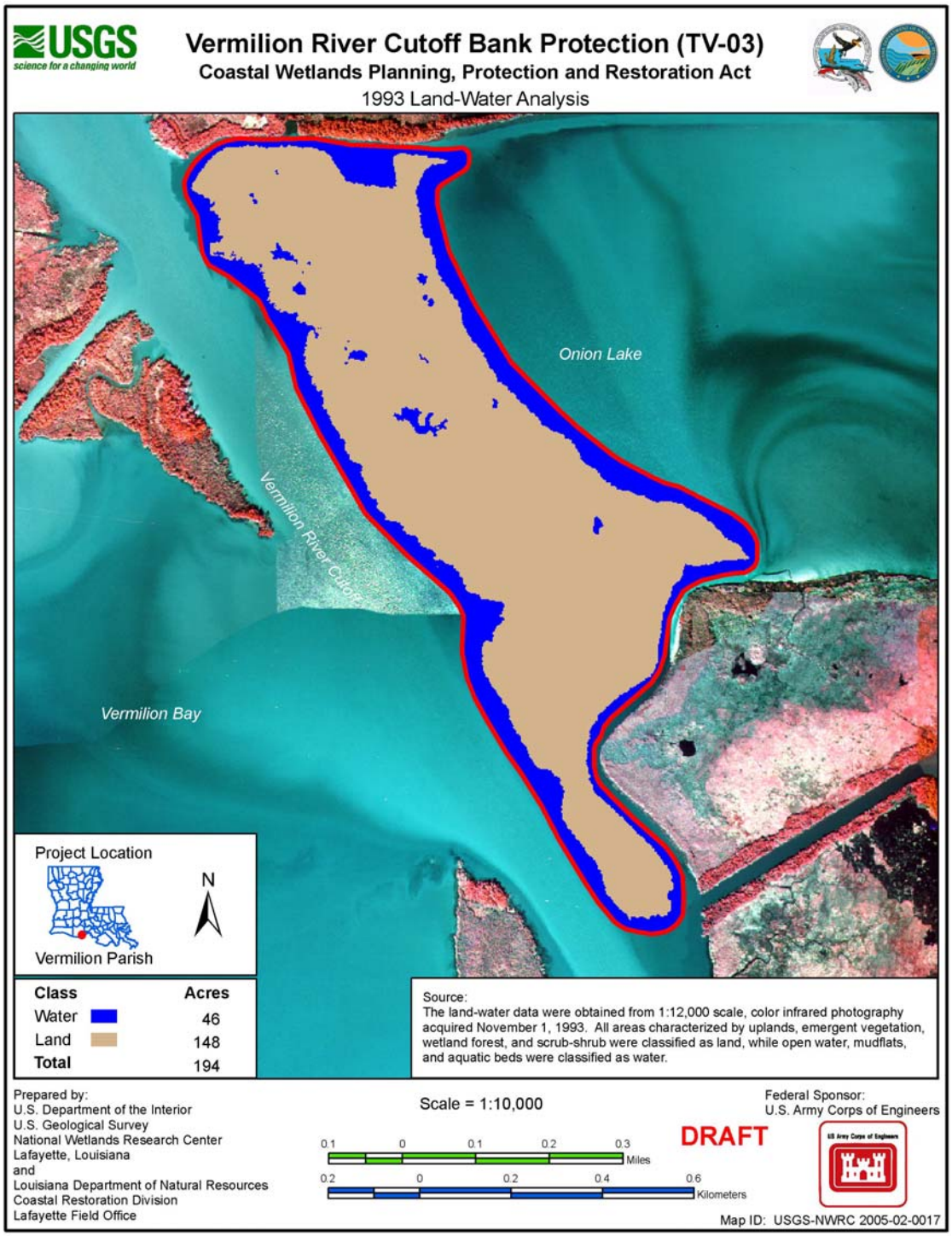

Figure 2. Pre-construction land to water analysis for Vermilion River Cutoff (TV-03) project area for 1993.

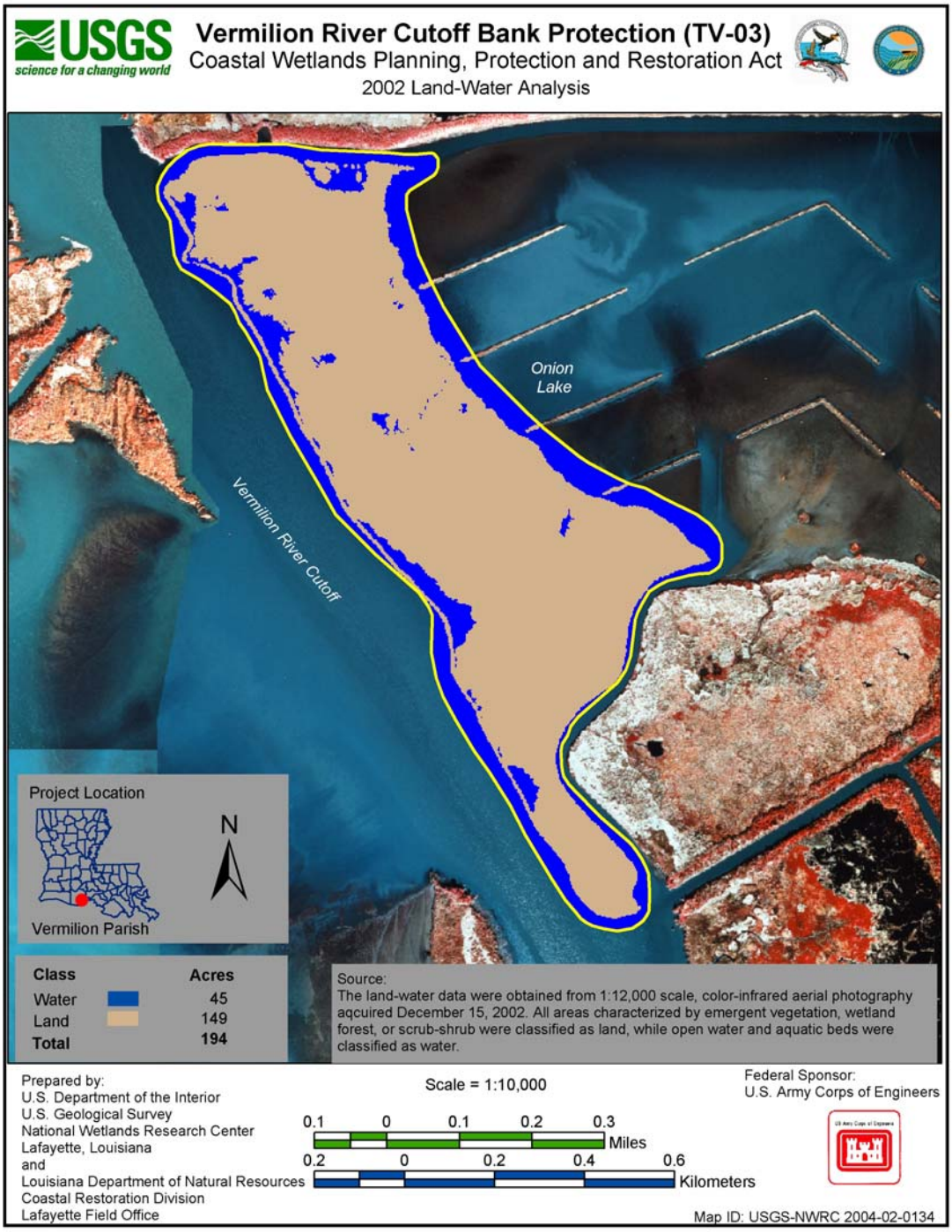

Figure 3. Land to water analysis for Vermilion River Cutoff (TV-03) project area in 2002.

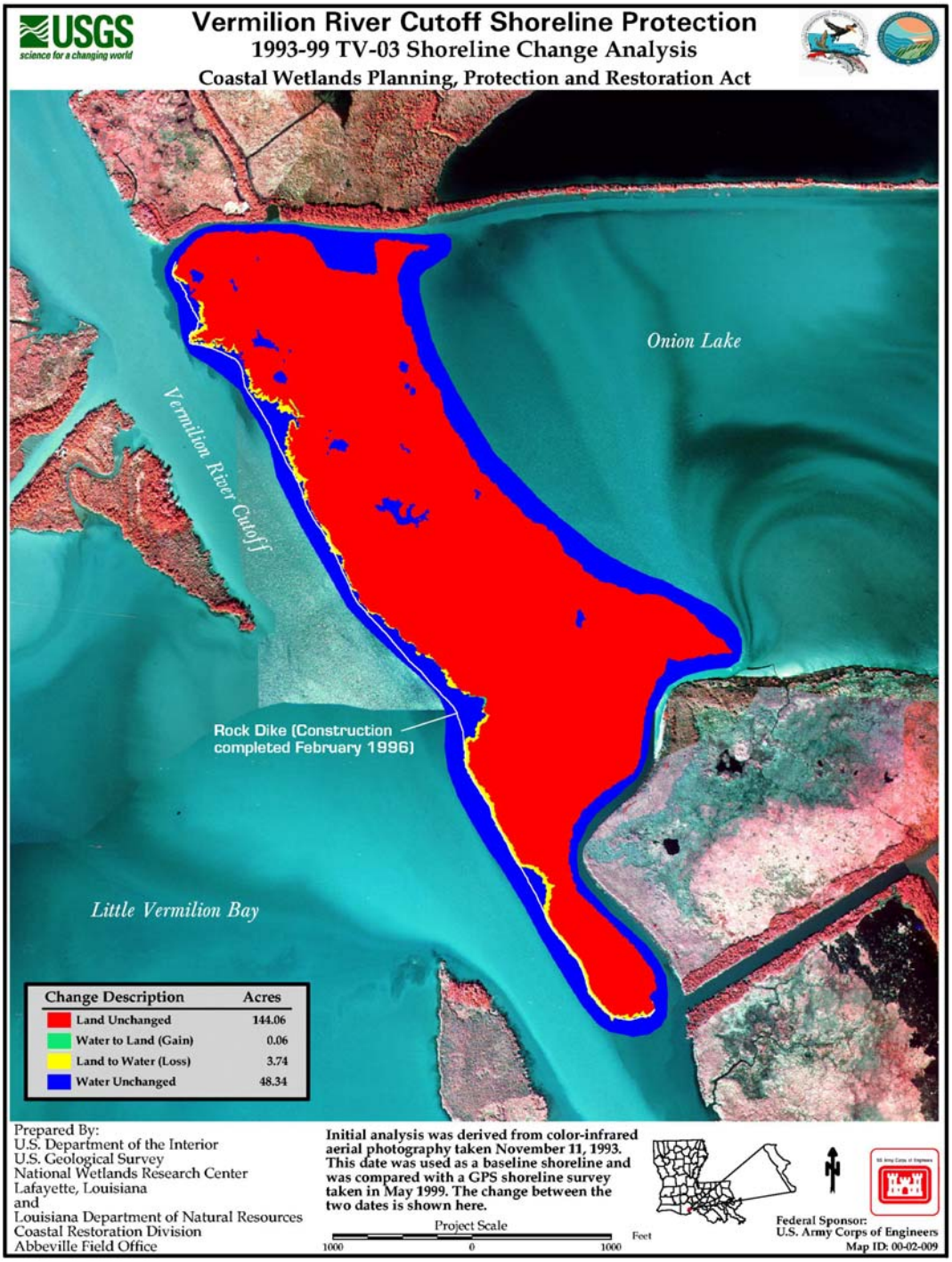

Figure 4. Shoreline change analysis for Vermilion River Cutoff (TV-03) project from 1993 to 1999.

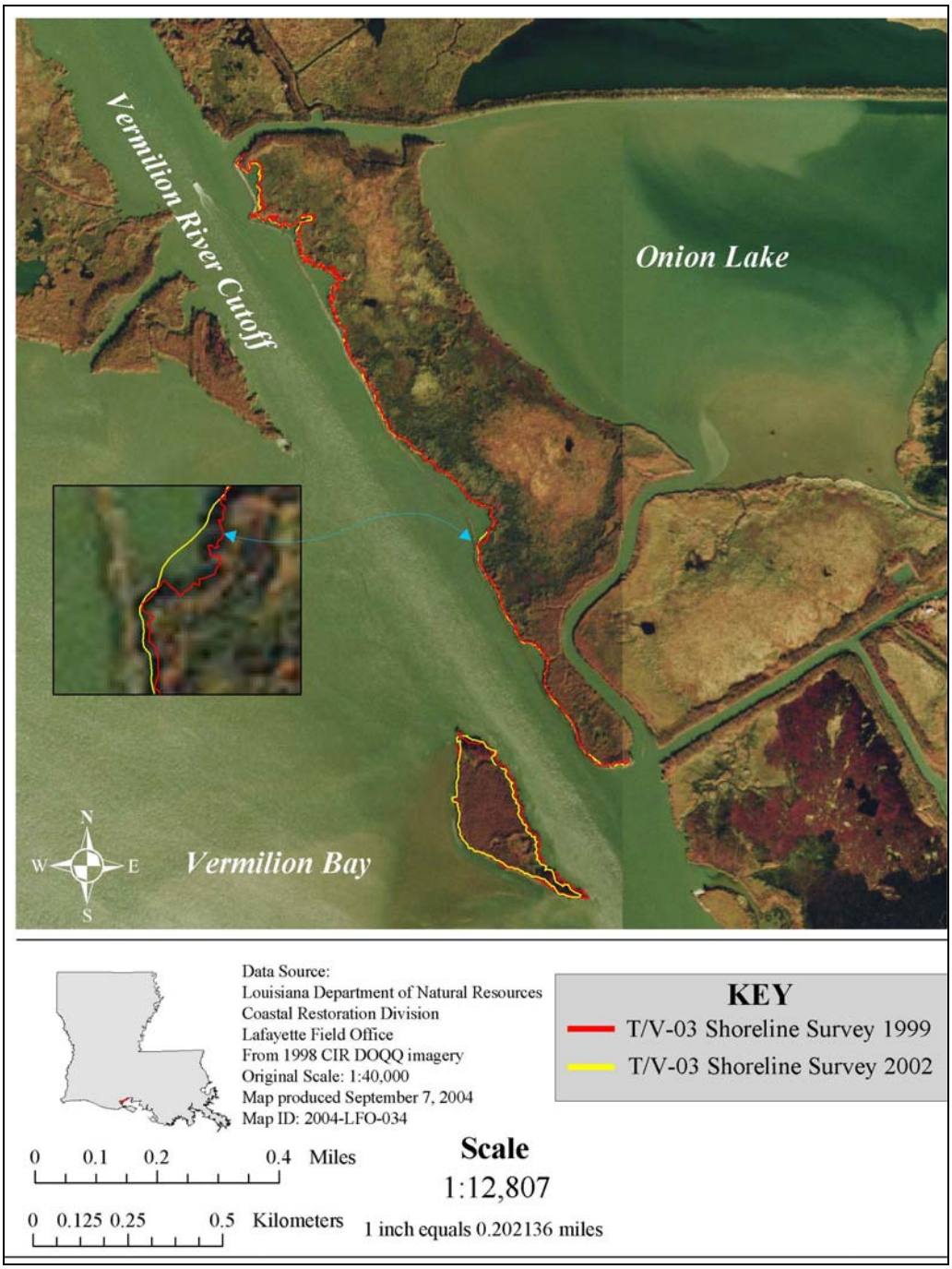

Figure 5. Location of shoreline surveys for 1999 and September 2001 of Vermilion River Cutoff (TV-03) project and surrounding shoreline.

Table 1. Shoreline changes at the settlement plates along the east bank of the Vermilion River Cutoff behind the project rock breakwater for the periods beginning February 25, 1998, February 1, 2000, and July 9, 2002.

Settlement Plate	Distance ft *(m)* February 25, 1998	Distance ft *(m)* February 1, 2000	1998-2000 Change in Distance ft *(m)*	Distance ft *(m)* July 9, 2002	2000-2002 Change in Distance ft *(m)*	Shoreline Change Rate ft/yr *(m/yr)*
1003	63.40 *(19.32)*	63.40 *(19.32)*	0.00	50.1 *(15.27)*	13.3 *(4.05)*	2.27 *(0.69)*
1004	40.85 *(12.45)*	40.85 *(12.45)*	0.00	36.85 *(11.23)*	4 *(1.22)*	0.68 *(0.21)*
1005	70.60 *(21.52)*	65.15 *(19.86)*	5.45 *(1.66)*	55.60 *(16.95)*	15 *(4.57)*	2.56 *(0.78)*
1006	23.35 *(7.12)*	23.35 *(7.12)*	0.00	27.85 *(8.49)*	-4.5 *(-1.37)*	-0.77 *(0.23)*
1007	13.90 *(4.24)*	11.95 *(3.64)*	1.95 *(0.59)*	13.90 *(4.24)*	0.00	*

* No change

Figure 6. Photograph of rock breakwater and vegetation growth at settlement plate 1005 (upper) and water overtopping rock breakwater at settlement plate 1006 (lower).

Figure 7. Aerial photograph of Vermilion River Cutoff (TV-03) shoreline protection project showing the Onion Lake complex on the right side of the rock breakwater.

V. Conclusions

a. Project Effectiveness

No additional data were collected in 2004. The shoreline behind the foreshore rock dike prograded at two of five sites 2 years post-construction and at three of five sites 4 years post-construction. Interpretations from the land to water analysis are inconclusive due to the uncertainty of land loss prior to actual construction of the project in late 1995 and the addition of the terraces that have increased the land to water acreage in the 2002 aerial photography; however, small interior ponds appear to have partially filled in. The next shoreline survey is scheduled for 2006.

b. Recommended Improvements

A maintenance construction contract is currently being developed to address an area of the foreshore dike that has deteriorated below acceptable standards. Construction is scheduled for Summer 2005.

c. Lessons Learned

Interpreting land loss and shoreline position should be performed using only data of the same type. Data acquired from DGPS should only be compared to other DGPS data sets. Substitution of aerial photography for baseline shoreline position introduces error in interpretation.

Early project boundary locations for this project were produced in a manner that is not consistent with newly developed projects. Analysis of earlier projects, such as Vermilion River Cutoff, may benefit from revising the project boundaries to accommodate newly developed data analysis programs.

VI. REFERENCES

Raynie, R. C. and J. M. Visser 2002. CWPPRA Adaptive management review final report, submitted to the CWPPRA Planning and Evaluation Subcommittee, Technical Committee and Task Force. Louisiana Department of Natural Resources, Baton Rouge. 47 pp.

Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E. Swenson 1995, revised 2000. Quality management plan for Coastal Wetlands Planning, Protection, and Restoration Act monitoring program. Open-file report no. 95-01. Baton Rouge, La.: Louisiana Department of Natural Resources, Coastal Restoration Division.. 97 pp., plus appendices.

Thibodeaux, C. and H. Juneau 2007. 2004 Operations, Maintenance, and Monitoring Report for Vermilion River Cutoff Shoreline Protection Project (TV-03). Louisiana Department of Natural Resources, Coastal Restoration Division and Coastal Engineering Division, Lafayette. 24 pp.

Appendix A
(Inspection Photographs)

No inspection was conducted in calendar year 2005 because this project is currently under a maintenance event, therefore no photographs are available.

Appendix B
(Three-Year Budget Projection)

VERMILION RIVER CUTOFF / TVO3 / PPL1
Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08

Project Manager	O & M Manager	Federal Sponsor	Prepared By
		COE	

	2005/2006	2006/2007	2007/2008
Maintenance Inspection	$ 4,955.00	$ 5,119.00	$ 5,288.00
Structure Operation	$ -	$ -	$ -
Administration	$ 10,000.00	$ -	$ -
Maintenance/Rehabilitation			

05/06 Description:Cap existing rock dike

E&D	$ -
Construction	$ 125,351.20
Construction Oversight	$ 10,000.00
Sub Total - Maint. And Rehab.	$ 135,351.20

06/07 Description

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

07/08 Description:

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

	2005/2006	2006/2007	2007/2008
Total O&M Budgets	**$ 150,306.20**	**$ 5,119.00**	**$ 5,288.00**

OPERATION AND MAINTENANCE BUDGET 07/01/2005-06/30/2006

VERMILION RIVER CUT-OFF / TV-03/ PPL1

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$4,955.00	**$4,955.00**
General Structure Maintenance	LUMP	1	$0.00	**$0.00**
Engineering and Design	LUMP	1		**$0.00**
Operations Contract	LUMP	1	$0.00	**$0.00**
Construction Oversight	LUMP	1		**$10,000.00**

ADMINISTRATION

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

MAINTENANCE / CONSTRUCTION

SURVEY

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

GEOTECHNICAL

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

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	4830	2.15	5,328	$21.65	$115,351.20
	0	0	0	$0.00	$0.00
	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	$10,000.00	$10,000.00
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:	**$125,351.20**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$150,306.20**

OPERATION AND MAINTENANCE BUDGET 07/01/2006-06/30/2007

VERMILION RIVER CUTOFF/TV-03/PPL1

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$5,119.00	**$5,119.00**
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	0	$0.00	$0.00
FEDERAL SPONSER Admin.	LUMP	0	$0.00	$0.00
SURVEY Admin.	LUMP	0	$0.00	$0.00
OTHER				$0.00
			TOTAL ADMINISTRATION COSTS:	**$0.00**

MAINTENANCE / CONSTRUCTION

SURVEY

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

GEOTECHNICAL

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

CONSTRUCTION

CONSTRUCTION DESCRIPTION:					
Rip Rap	LIN FT	TON / FT	TONS	UNIT PRICE	
	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: **$5,119.00**

OPERATION AND MAINTENANCE BUDGET 07/01/2007-06/30/2008

VERMILION RIVER CUTOFF/TV-03/PPL1

DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	ESTIMATED TOTAL
O&M Inspection and Report	EACH	1	$5,288.00	**$5,288.00**
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 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: **$5,288.00**

Appendix C
(Field Inspection Notes)

No inspection was conducted in calendar year 2005 because this project is currently under a maintenance event, therefore no field inspection notes are available.