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

2005 Operations, Maintenance, and Monitoring Report

for

Cameron Prairie Refuge Protection

State Project Number ME-09
Priority Project List 1

June 2005
Cameron Parish

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Cameron Prairie Refuge Protection (ME-09)

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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 (Mouledous and Guidry 2007).

I. Introduction

The Cameron Prairie Refuge project includes a 247 ac (100 ha) area located within 1,600 ac (648 ha) of wetlands in the Cameron Prairie National Wildlife Refuge, approximately 25 mi (40 km) southeast of Lake Charles in north central Cameron Parish (figure 1). The project area borders the north bank of the Gulf Intracoastal Waterway (GIWW).

Since the construction of the GIWW (between 1935 and 1940), wave erosion on the north bank of the channel has accelerated significantly due to increased utilization by navigational vessels. This energy has enabled high river stages from the Mermentau Basin to overtop and erode the existing spoil bank, thus leaving exposed a highly organic freshwater marsh vulnerable to erosion.

To prevent further erosion, this project featured a 2 mile (3.2 km) rock breakwater that was constructed parallel to the existing shoreline in August 1994 (figure 2).

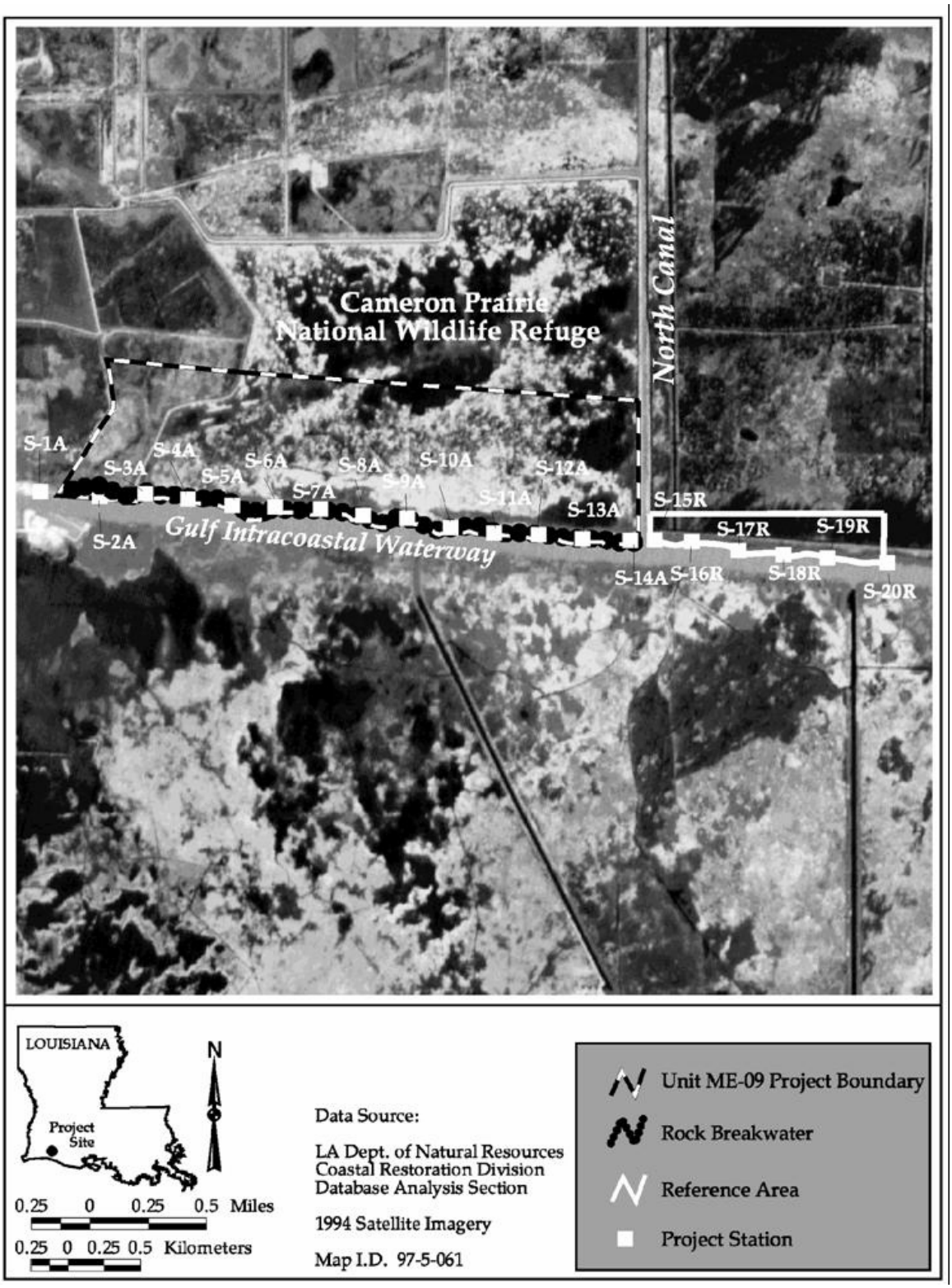


Figure 1. Cameron Prairie Refuge Protection (ME-09) project boundaries.

Figure 2. Photograph of the Cameron Prairie Refuge Protection (ME-09) project following construction in August 1994, illustrating the shoreline of the GIWW and the installed rock breakwater.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Cameron Prairie Refuge Protection Project (ME-09) 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. 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. Photographs taken during the annual inspection are presented in Appendix A. The three-year projected operation and maintenance budget is shown in Appendix B.

An inspection of the Cameron Prairie Refuge Protection Project (ME-09) was held on December 14, 2004, under clear skies and cold temperatures. In attendance were Stan Aucoin, Dewey Billodeau, and Patrick Landry of LDNR. Representatives of the U.S. Fish and Wildlilfe Service (USFWS) were invited but were unable to attend. The annual inspection began at approximately 12:15 p.m. at the western end of the rock dike along the northern bank of the Gulf Intracoastal Waterway.

The field inspection included a complete visual inspection of all features. Staff gauge readings were not available to be used to determine approximate elevations of water and rock dikes. 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

<u>Foreshore Rock Dike:</u>

The dike is in excellent post construction condition. No need for any maintenance in the foreseeable future. (Photos: Appendix A, Photos 1 - 5)

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None.

ii. Programmatic/ Routine Repairs

None.

d. Maintenance History

2001 – Warning Sign Addition (USACE):
The U.S. Army Corps of Engineers (USACE) added warning signs along the northern boundary of the project in August 2001 in response to complaints from the commercial traffic traveling along the GIWW. This is not a project feature to be maintained through the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

III. Operation Activity

a. Operation Plan

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

b. Actual Operations

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

IV. Monitoring Activity

Pursuant to a CWPPRA Task Force decision on August 14, 2003, to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) for CWPPRA, updates were made to the ME-09 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 Cameron Prairie Refuge Protection Project are:

1. Protect the emergent wetlands of the Cameron Prairie National Wildlife Refuge (NWR) adjacent to the GIWW and prevent the loss of approximately 247 ac (100 ha) of marsh.
2. Prevent the widening of the GIWW into the NWR.

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

1. Decrease the rate of spoil bank erosion along the south boundary of the 247 ac (100 ha) area adjacent to the GIWW within the Cameron Prairie NWR management unit.
2. Restore and maintain approximately 2 miles (3.2 km) of levee along the north bank of the GIWW by constructing a rock dike along the refuge/GIWW boundary.

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 prior to construction in 1993 and post-construction in 1997 and 2002. The original photography was checked for flight accuracy, color correctness, and clarity and was subsequently archived. Aerial photography was 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 will be obtained.

Shoreline Change:
To document shoreline movement, shoreline markers were placed at 30 points along the vegetated marsh edge adjacent to the rock breakwater, the western refuge boundary, and a reference located one mile (1.6 km) east of the proposed breakwater at a maximum interval of 500 ft (152 m) (figure 3). Position of the shoreline relative to the shoreline markers and the rock breakwater was documented initially by a professional surveyor in 1995. Post-construction surveys were conducted in years

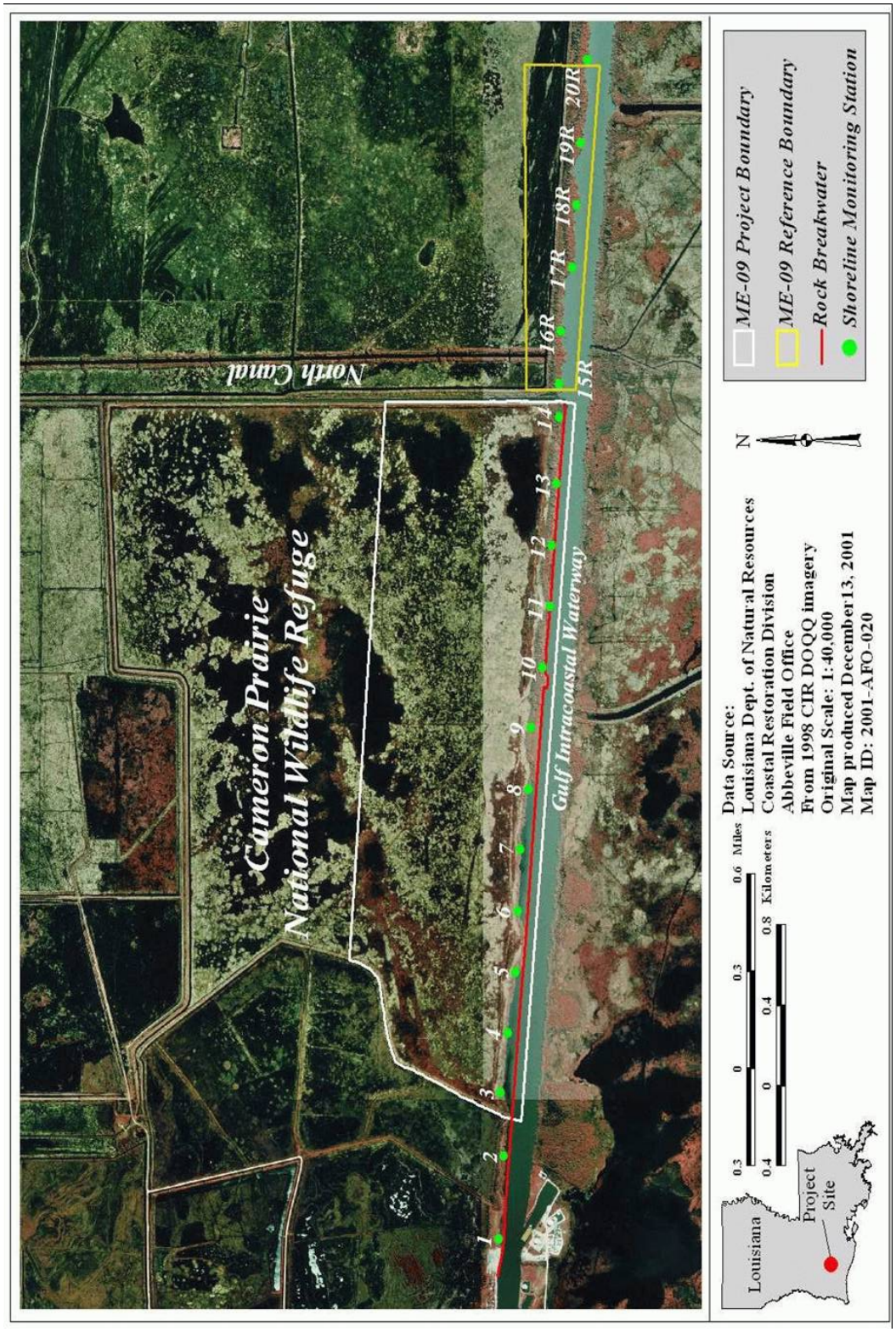


Figure 3. Location of shoreline marker stations at the Cameron Prairie Refuge Protection (ME-09) project.

1997, 2000, and 2003 by direct measurements using a differential GPS. Aerial photography (1:12,000 scale) and GPS will also be used to document shoreline movement and provide a template for mapping shoreline position and shoreline position over time. Shoreline positions will be compared to historical data sets available in digitized format for 1956, 1978, and 1988 shorelines. No additional shoreline surveys are scheduled since the project has been effective.

c. Preliminary Monitoring Results and Discussion

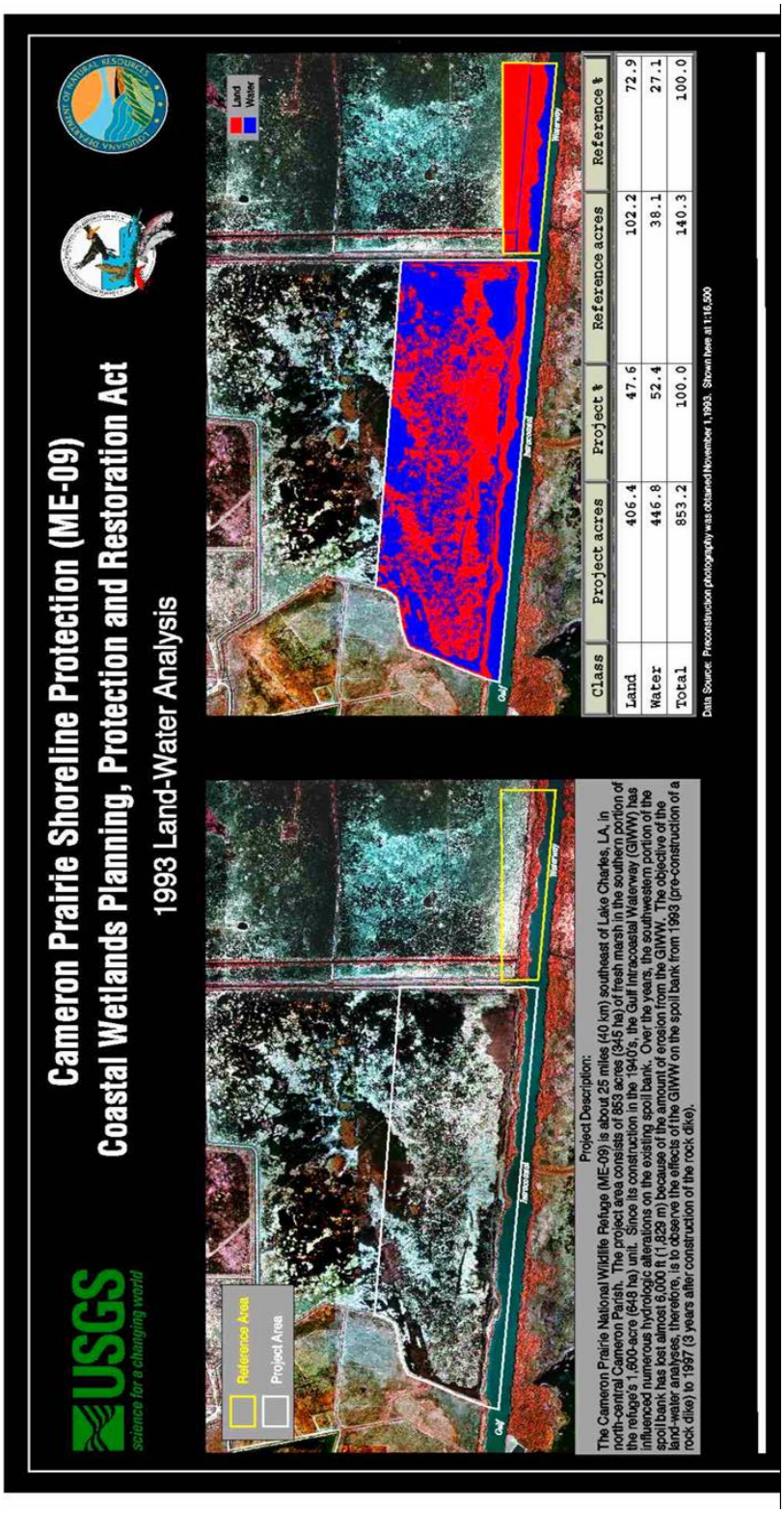
Aerial Photography:

Aerial photography was collected in November 1993 and January 1997 (figures 4-5). Pre-construction (1993) land:water classification indicated 47.6 % land and 52.4 % water within the project area. The reference area classification indicated 72.9 % land and 27.0 % water. Post-construction (1997) land:water classification indicated 42.7 % land and 57.3 % water within the project area. The reference area classification indicated 72.8 % land and 27.2 % water. GIS land and water analysis comparing pre-construction and post-construction photography revealed only small changes in the reference area; the project area showed a marked increase in the ratio of water to land. Because the photography was taken at different times of the year, this change is likely attributed to water level and/or seasonal effects and not the result of subsidence and erosional processes.

The project area boundary was changed in 2002, due to the original project area boundary excluding a portion of the constructed rock breakwater, resulting in an additional 140 acres. The post-construction photography with the new project boundaries will not be analyzed.

Shoreline Position:

No new shoreline data were collected in 2004.



Class	Project acres	Project %	Reference acres	Reference %
Land	406.4	47.6	102.2	72.9
Water	446.8	52.4	38.1	27.1
Total	853.2	100.0	140.3	100.0

Figure 4. Cameron Prairie (ME-09) land:water analysis from photography flown November 1, 1993.

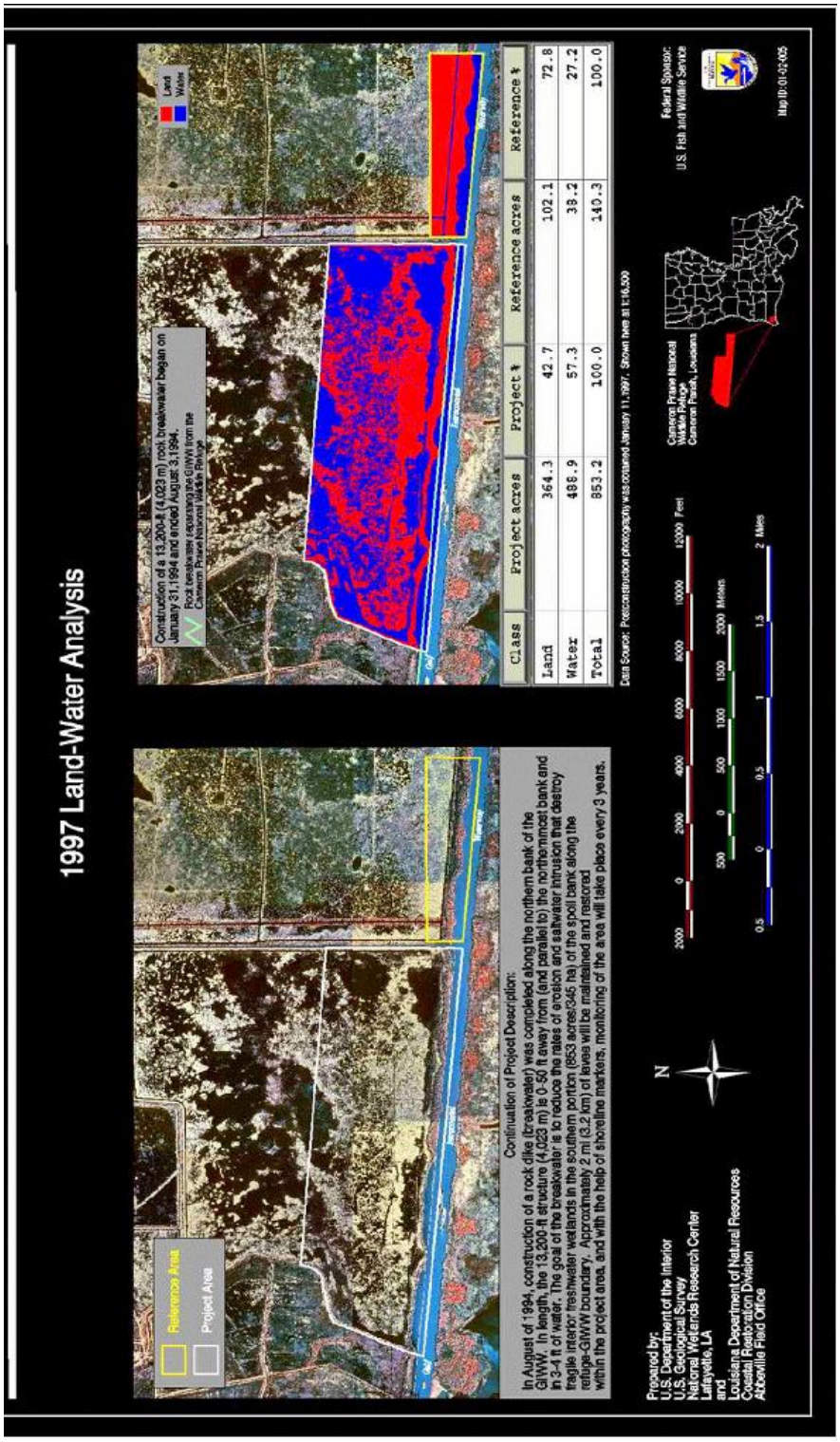


Figure 5. Cameron Prairie (ME-09) land:water analysis from photography flown January 11, 1997.

V. Conclusions

a. Project Effectiveness

The project has been effective at preventing shoreline erosion at all project area stations and has caused progradation of the shoreline at many stations (figures 6-7). There is no evidence of shoreline progradation at the reference stations, and most show shoreline retreat. Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline

b. Recommended Improvements

A structural assessment survey performed by a licensed engineering/land surveying firm is recommended to evaluate settlement and stability of the rock structure along with any evidence of accretion on the land side of the structure.

c. Lessons Learned

Project supervisors should ensure that aerial photography is taken at the same time each year under similar water level conditions.

Based on multiple O & M inspections, the rock dike has proven to be very effective in reducing shoreline erosion along the GIWW, while experiencing no deterioration and requiring no recommended maintenance. The foreshore rock dike was constructed on the -1.0 ft (NAVD88) contour of the GIWW with no crown, 2:1 side slopes, and 650 lb. stone gradation.

As a result of the accretion occurring behind the rock dike, natural freshwater vegetation has colonized behind and over the rock dike. The colonization of the vegetation created a navigation hazard for marine vessels traveling the GIWW at night and during low visibility situations. In 2001, the U.S. Army Corps of Engineers addressed the hazard by installing pilings with navigation warning signs. In the future, similar projects implemented in freshwater areas should include navigation warning signs in the initial construction contract.

Figure 6. View of the Cameron Prairie rock dike taken August 4, 2003. Note the healthy condition of the *Phragmites australis* and other native vegetation colonizing the dike itself.

Figure 7. View of the Cameron Prairie rock dike showing naturalized vegetation colonizing the dike itself and the accreted marsh behind the dike. The red paint was used to mark the location of the shoreline marker for the DGPS survey.

VI. REFERENCES

Mouledous, M. and M. Guidry 2007. 2004 Operations, maintenance and monitoring report for Cameron Prairie Shore Protection Project (ME-09). Louisiana Department of Natural Resources, Coastal Restoration Division and Coastal Engineering Division, Lafayette, LA.

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 series no. 95–01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division.

Appendix A
(Inspection Photographs)

Photo 1—west tie in

Photo 2—signs installed by USACE

Photo 3—typical section of dike covered in vegetation

Photo 4—build-up behind dike

Photo 5—tie in on North Prong Canal

Appendix B
(Three-Year Budget Projection)
CAMERON PRAIRIE SP / ME09 / PPL 1
Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08

Project Manager	O & M Manager	Federal Sponsor	Prepared By
		FWS	

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

05/06 Description:

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

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	**$ 4,955.00**	**$ 5,119.00**	**$ 5,288.00**

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

CAMERON PRAIRIE SP/ME-09/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	**$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	0.0	0	$0.00
		0	0.0	0	$0.00
	Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00
	Navagation Aid		EACH	0	$0.00
	Signage		EACH	0	$0.00
	General Excavation / Fill		CU YD	0	$0.00
	Dredging		CU YD	0	$0.00
	Sheet Piles (Lin Ft or Sq Yds)			0	$0.00
	Timber Piles (each or lump sum)			0	$0.00
	Timber Members (each or lump sum)			0	$0.00
	Hardware		LUMP	1	$0.00
	Materials		LUMP	1	$0.00
	Mob / Demob		LUMP	1	$0.00
	Contingency		LUMP	1	$0.00
	General Structure Maintenance		LUMP	1	$0.00
	OTHER				$0.00
	OTHER				$0.00
	OTHER				$0.00
				TOTAL CONSTRUCTION COSTS:	**$0.00**

TOTAL OPERATIONS AND MAINTENANCE BUDGET: **$4,955.00**

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

CAMERON PRAIRIE SP/ME-09/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	0.0	0	$0.00
		0	0.0	0	$0.00
	Filter Cloth / Geogrid Fabric		SQ YD	0	$0.00
	Navagation Aid		EACH	0	$0.00
	Signage		EACH	0	$0.00
	General Excavation / Fill		CU YD	0	$0.00
	Dredging		CU YD	0	$0.00
	Sheet Piles (Lin Ft or Sq Yds)			0	$0.00
	Timber Piles (each or lump sum)			0	$0.00
	Timber Members (each or lump sum)			0	$0.00
	Hardware		LUMP	1	$0.00
	Materials		LUMP	1	$0.00
	Mob / Demob		LUMP	1	$0.00
	Contingency		LUMP	1	$0.00
	General Structure Maintenance		LUMP	1	$0.00
	OTHER				$0.00
	OTHER				$0.00
	OTHER				$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

CAMERON PRAIRIE SP/ME-09/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)

MAINTENANCE INSPECTION REPORT CHECK SHEET

Project No. / Name: ME-09 Cameron Prairie

Date of Inspection: December 14, 2004 Time: 12:15 p.m.

Structure No. 1

Inspector(s): LDNR-Stan Aucoin, Dewey Billodeau & Patrick Landry

Structure Description: Foreshore Rock Dike

Water Level N/A

Type of Inspection: Annual

Weater Conditions: Clear & cold

Item	Condition	Pysical Damage	Corrosion	Photo #	Observations and Remarks
Steel Bulkhead / Caps					
Steel Grating					
Stop Logs					
Hardware					
Timber Piles					
Timber Wales					
Galv. Pile Caps					
Cables					
Signage /Supports	Good				
Rip Rap (fill) (foreshore dike)	Excellent				
Eathern Embankment					

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