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

2005 Operations, Maintenance, and Monitoring Report

for

Perry Ridge West Bank Stabilization

State Project Number CS-30
Priority Project List 9

June 2005
Calcasieu Parish

Prepared by:

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2005 Operations, Maintenance, and Monitoring Report
for
Perry Ridge West Bank Stabilization (CS-30)

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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 LDNR web site at dnr.louisiana.gov (Mouledous and Guidry 2007).

I. Introduction

The Perry Ridge West project is located in the Calcasieu-Sabine Basin and is included in Region 4 of the Coast 2050 Plan (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority. 1998). The major problem in this Region is marsh erosion caused by salt water intrusion, rapid water level fluctuation, and wave action (U.S. Department of Agriculture, Natural Resource Conservation Service] USDA/NRCS] 1999). Many canals have been dug to aid in navigation, mineral extraction, hunting, and fishing. The project area is located along the northern bank of the Gulf Intracoastal Waterway (GIWW) between Perry Ridge and the Sabine River and comprises 1,132 acres (458 ha) of fresh and intermediate marsh in Calcasieu Parish, Louisiana (figure 1).

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

In addition, there is no significant source of sediments in Region 4. Vertical accretion of the wetlands in this region must, therefore, be achieved predominately by organic production. Terracing and vegetative plantings are common restoration strategies that have been applied in this Region.

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

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

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

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

4. After construction, 9,400 trade-gallon size containers of *Schoenoplectus californicus* (California bullwhip) were planted along the perimeter of the constructed terraces.

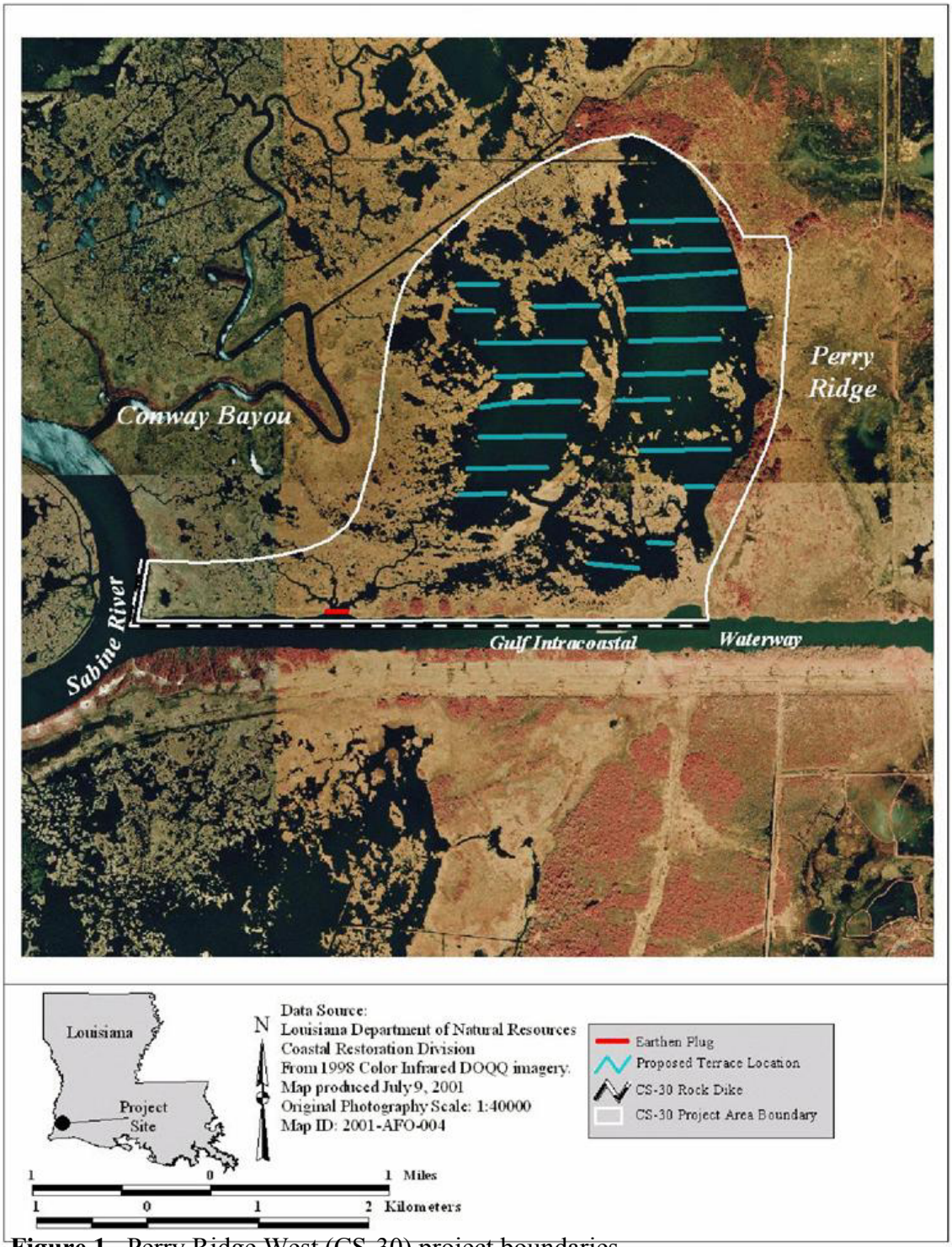

Figure 1. Perry Ridge West (CS-30) project boundaries.

II. Maintenance Activity

a. Project Feature Inspection Procedures

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

An annual O & M inspection of the GIWW Bank Stabilization (Perry Ridge to Texas) Project (CS-30) was held on April 8, 2005, under partly cloudy skies and warm temperatures. In attendance were Mel Guidry, Pat Landry, Stan Aucoin, and Darrell Pontiff of LDNR, along with Brad Sticker and Cindy Steyer representing NRCS. The field inspection included a complete visual inspection on the entire project site. Staff gauge readings and existing benchmarks were used to determine approximate water elevation and existing elevation of the foreshore rock dike and earthen terraces. Photographs were taken at each project feature (see Appendix A), a three-year projected operation and maintenance budget was prepared (Appendix B), and field inspection notes were compiled to record measurement and deficiencies (Appendix C).

b. Inspection Results

Site 1—Foreshore Rock Dike:

The dike is in excellent condition. No apparent need for any maintenance at this time.

Site 2—Earthen Terraces with Vegetative Plantings:

Approximately 800 linear feet (243.8 m) of the earthen terraces was experiencing little to no establishment of vegetation on the terraces. The area will be monitored to determine if a small vegetation maintenance project is necessary in the future. The remaining 22,152 linear feet (6752 m) is in excellent condition with dense vegetation noted throughout.

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None

ii. Programmatic/ Routine Repairs

None

II. Maintenance Activity (continued)

d. Maintenance History

There has been no maintenance performed on this project.

III. Operation Activity

a. Operation Plan

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

b. Actual Operations

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

IV. Monitoring Activity

Pursuant to a Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Task Force decision on August 14, 2003, to adopt the Coastwide Reference Monitoring System-*Wetlands* (CRMS-*Wetlands*) for CWPPRA, updates were made to the CS-30 Monitoring Plan to merge it with CRMS-*Wetlands* and provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the Breaux Act.

a. Monitoring Goals

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

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

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

b. Monitoring Elements

Aerial Photography:

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

Submerged Aquatic Vegetation:

To evaluate the effects of earthen terraces on SAV habitat, a modification of the rake method (Chabreck and Hoffpauir 1962) was used to estimate SAV occurrence. The project and reference areas were monitored along six transects divided equally among three representative shallow ponds (figure 2). Each transect has a minimum of 25 sampling stations oriented toward the prevailing wind. At each station, aquatic vegetation was sampled by dragging a garden rake on the pond bottom for about 1 second. The presence of vegetation was recorded to determine the frequency of aquatic plant occurrence (frequency = number of

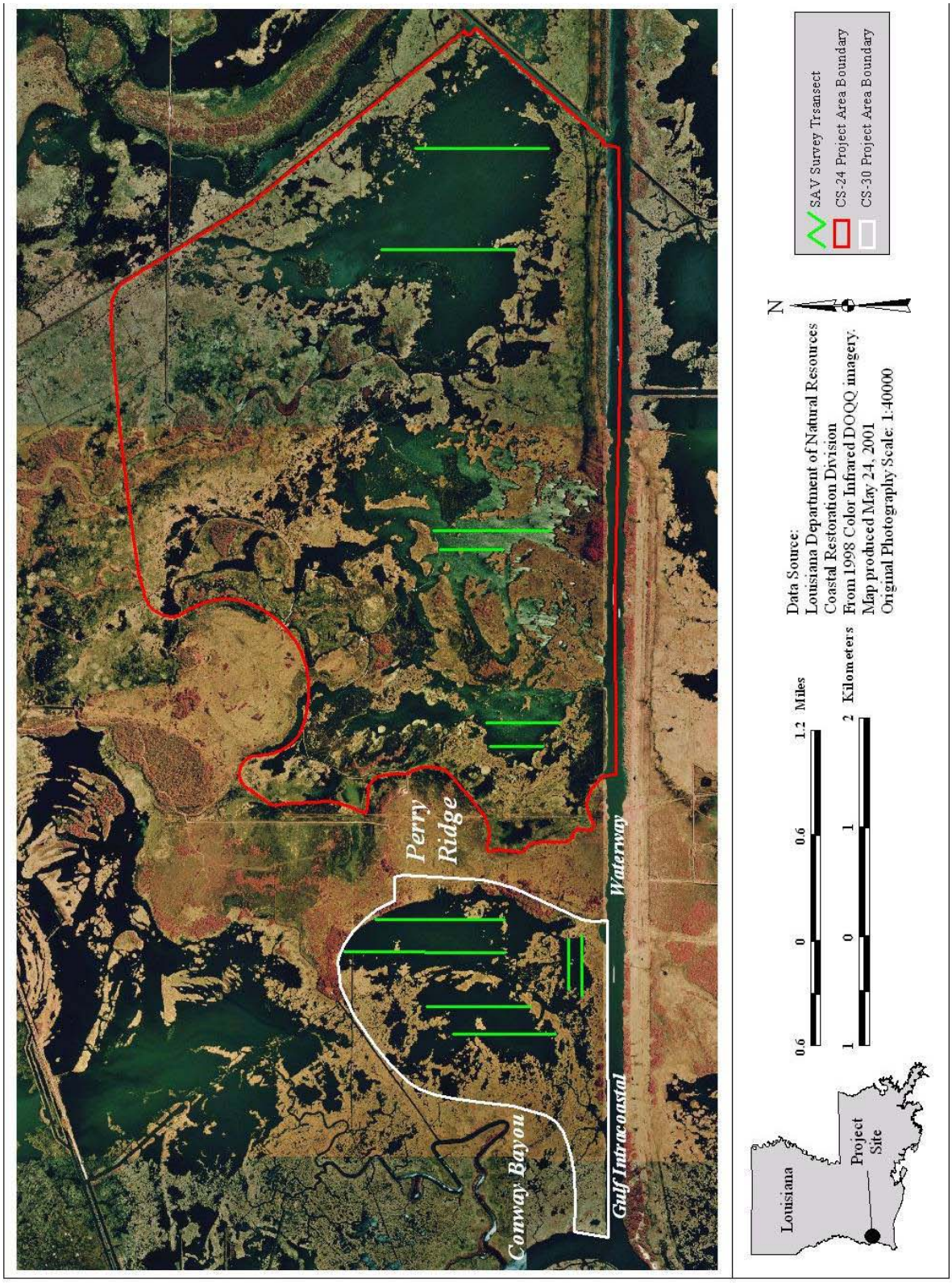

Figure 2. Location of SAV transects at the Perry Ridge West (CS-30) project.

occurrences/number of stations x 100). When vegetation is present, the species present is recorded in order to determine the frequencies of individual species (Nyman and Chabreck 1996). SAV abundance was sampled prior to construction in 2000, and post-construction in 2003, and will be sampled in 2005, 2008, 2015, and 2020.

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Historical land loss between 1956 and 1990 was used as baseline to compare with post-project rates (figure 3). Land to water analysis was completed for the pre-construction photography collected on November 17, 2001 to serve as an initial baseline (figure 4). Results indicated 43.3% land and 56.7% water within the project area (figure 4). The first post-construction photography will be flown in the fall of 2005. Visual estimates suggest, however, that the land to water ratio has increased due to an increase of emergent marsh through successful terracing and potentially through marsh expansion. Photographs of the shoreline protection component and of the terraces are shown in figures 5 and 6, respectively.

Submerged Aquatic Vegetation:

No data were collected in 2004. Data from the 2003 sampling indicated that SAV abundance changed differentially by species from 2000 to 2003. The beginning abundance and the change over time were different between the project and reference areas, but the change trend for each species was the same in both areas. The number of SAV species increased since construction in both the project and reference areas.

Shoreline Movement:

Aerial photography will be used to monitor shoreline movement. When the 2005 aerial photography is processed, the extent of shoreline movement following construction can be determined. However, direct shoreline measurements on the adjacent CS-24 project, which has similar hydrologic conditions, have shown that that project has been effective in preventing erosion at most project area stations, while the reference area continued to retreat.

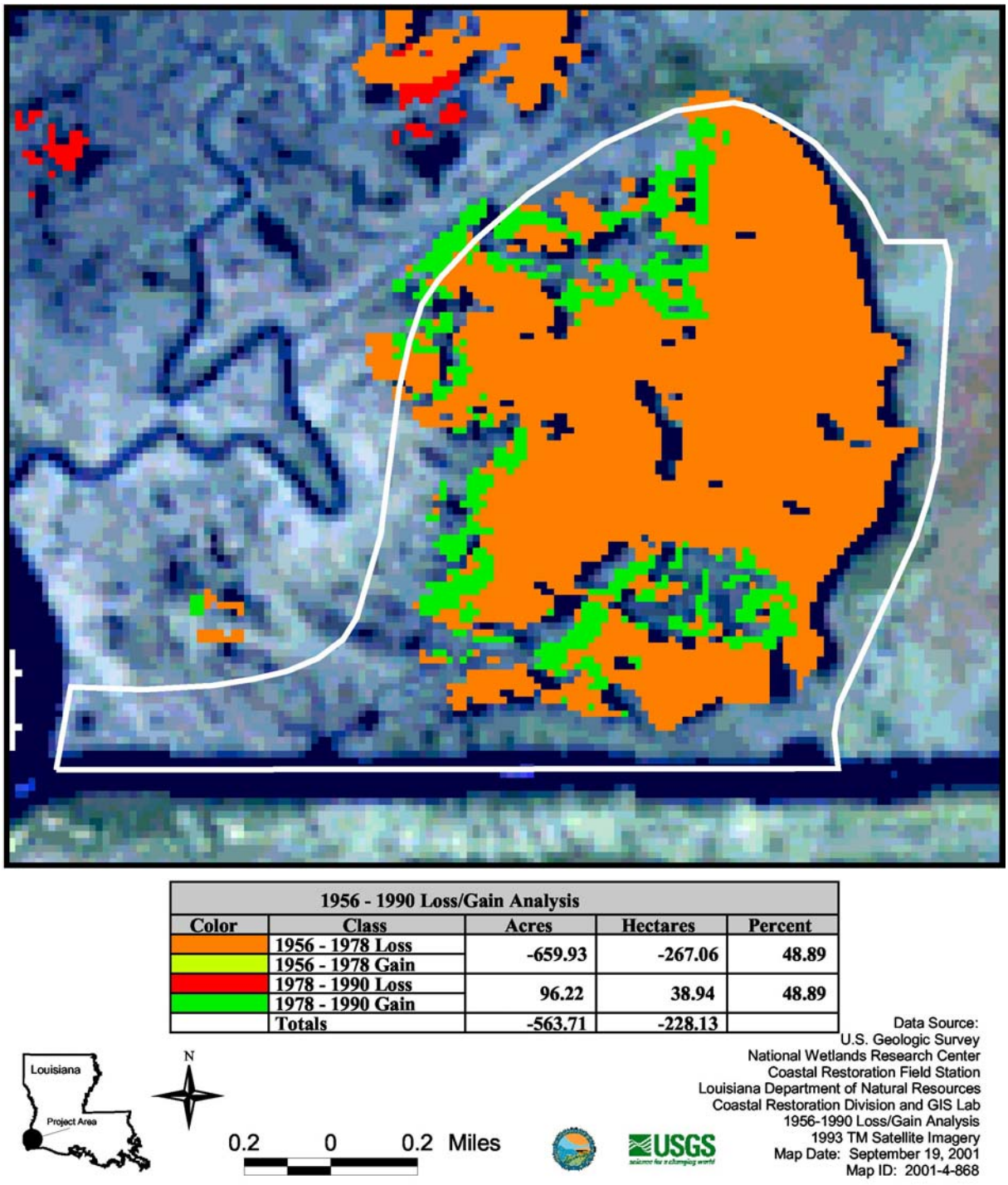

Figure 3. Perry Ridge West (CS-30) project land loss/gain analysis for the period 1956-1990.

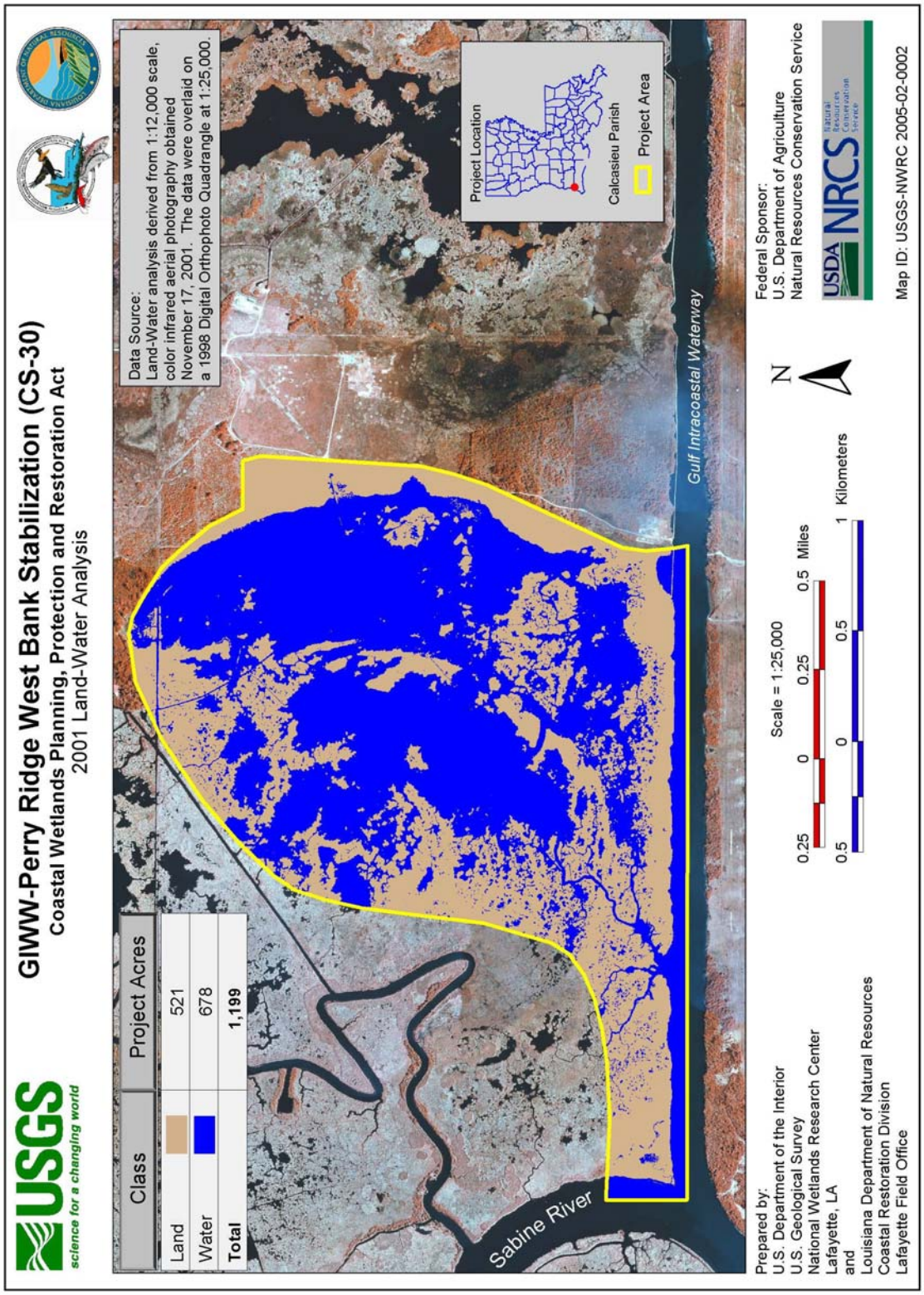

Figure 4. Perry Ridge West (CS-30) project 2001 land/water analysis.

Perry Ridge West Bank Stabilization (CS-30)

Figure 5. View of the Perry Ridge West rock dike taken October 21, 2003. The photograph is facing west. Photographs from the 2005 inspection are included in Appendix A.

Perry Ridge West Bank Stabilization (CS-30)

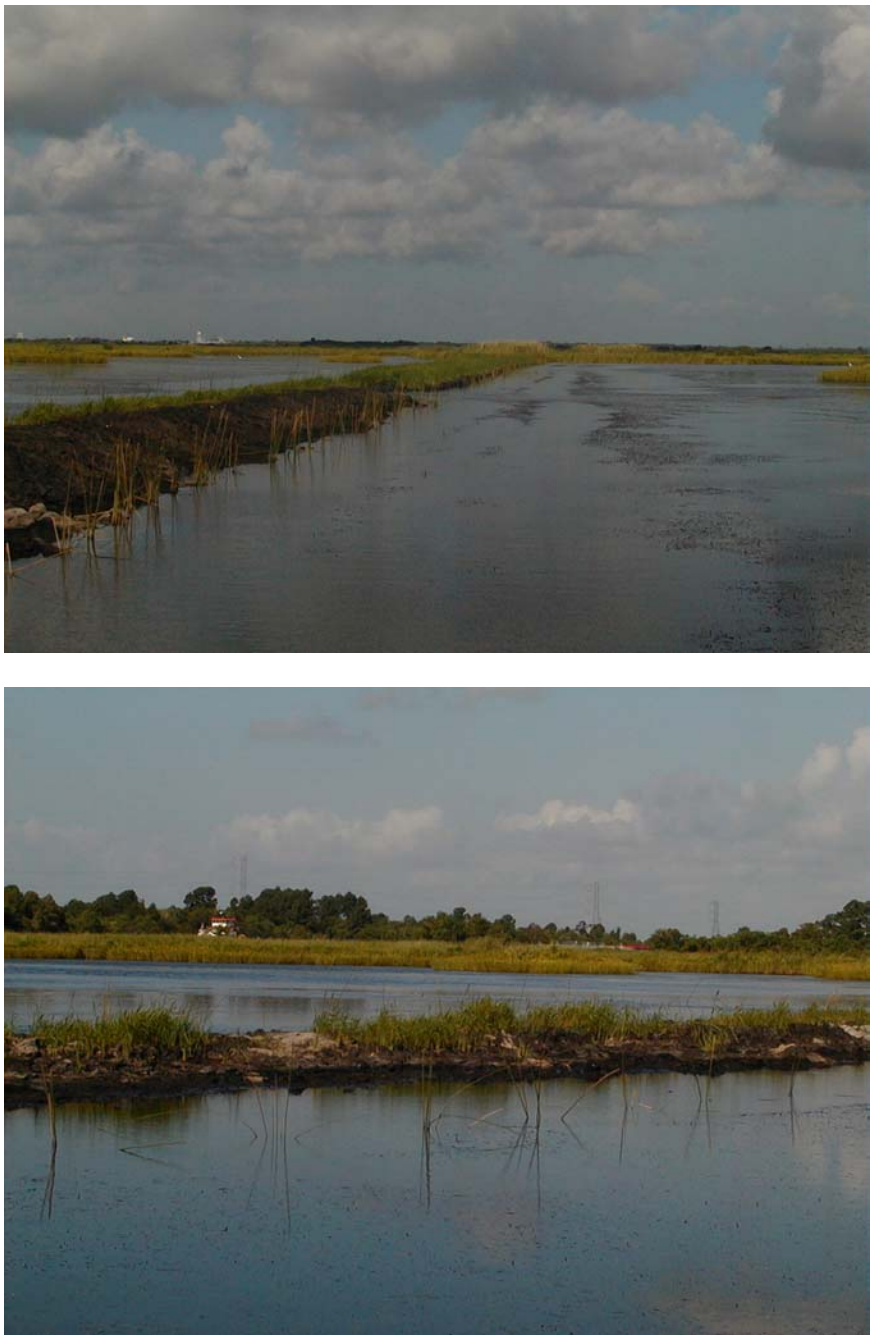

Figure 6. Views of the *Schoenoplectus californicus* plantings taken July 2002. The photograph on the top is facing southwest, and on the bottom is facing south. Photographs from the 2005 inspection are included in Appendix A.

V. Conclusions

a. Project Effectiveness

No monitoring activity occurred on this project in 2004. Aerial photography for shoreline change will be flown and SAV abundance data will be collected in fall 2005.

Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline. Assuming that at least some of the terraces persist until the 2005 aerial photography, there should be a gain in land area in the project. There was an increase in the number of SAV species from 2000 to 2003 in the project and reference areas. SAV sampling in future years will help to determine the project effect on this monitoring element.

b. Recommended Improvements

In order to evaluate dike settlement, stability of the rock structure, toe scour, and any vertical accretion on the land side of the rock structure, a structural assessment survey performed by a licensed engineering/ land surveying firm is recommended within the first 5 years of construction. The date of the assessment survey is to be agreed upon by the state and federal sponsor at the annual maintenance inspection.

c. Lessons Learned

Based on multiple O & M Inspections, the foreshore rock dike has proven to be 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 (NAVD 88) contour of the GIWW with no crown, 2:1 side slopes, and 650 lb. stone gradation.

VI. REFERENCES

Chabreck, R.H. and C.M. Hoffpauir 1962. The use of weirs in coastal marsh management in coastal Louisiana. Proceedings of the annual conference of the Southeastern Association of Game and Fish Commissioners 16:103-112.

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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 plan. Open-file series 95-01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division.

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Appendix A
(Inspection Photographs)

Photo 1—west tie in (April, 2005)

Photo 2—typical section of dike (April, 2005)

Photo 3—typical terrace (April, 2005)

Photo 4—typical vegetation on terraces (April, 2005)

Appendix B
(Three-Year Budget Projection)
GIWW - PERRY RIDGE WEST BANK STABILIZATION / CS30 / PPL9
Three-Year Operations & Maintenance Budgets 07/01/2005 - 06/30/08

Project Manager	O & M Manager	Federal Sponsor	Prepared By
		NRCS	

	2005/2006	2006/2007	2007/2008
Maintenance Inspection	$ 4,995.00	$ 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	**$ 4,995.00**	**$ 5,119.00**	**$ 5,288.00**

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

PERRY RIDGE WEST BANK STABILIZATION/CS-30/PPL9

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	$0.00
	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: **$4,955.00**

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

PERRY RIDGE WEST BANK STABILIZATION/CS-30/PPL9

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

PERRY RIDGE WEST BANK STABILIZATION/CS-30/PPL9

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)

FIELD INSPECTION CHECK SHEET

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

Date of Inspection: 4/8/2005 Time: AM

Structure No.

Inspector(s): Stan Aucoin, Pat Landry, Darrell Pontiff, Melvin Guidry Brad Sticker, Cindy Syeyer

Structure Description: Rock Dike/Terraces

Water Level: Inside: Outside: 2.1'

Type of Inspection: Annual O & M

Weather Conditions: Clear, cool

Item	Condition	Pysical 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/Support	N/A				
Rip Rap(fill)					
Earthen Terraces	Good	Approximately 800 L.F. of terraces are not yet vegetated, the remainder is in good condition.			
Foreshore Dike	Good				

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?

Note: Water level taken at Black Bayou Cut-Off