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

2004 Operations, Maintenance, and Monitoring Report

for

Cameron Prairie Refuge Protection

State Project Number ME-09
Priority Project List 1

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Cameron Parish

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For
Cameron Prairie Refuge Protection (ME-09)

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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.

The 2 mile (3.2 km) rock breakwater was constructed parallel to the existing shoreline and construction was completed in August 1994.

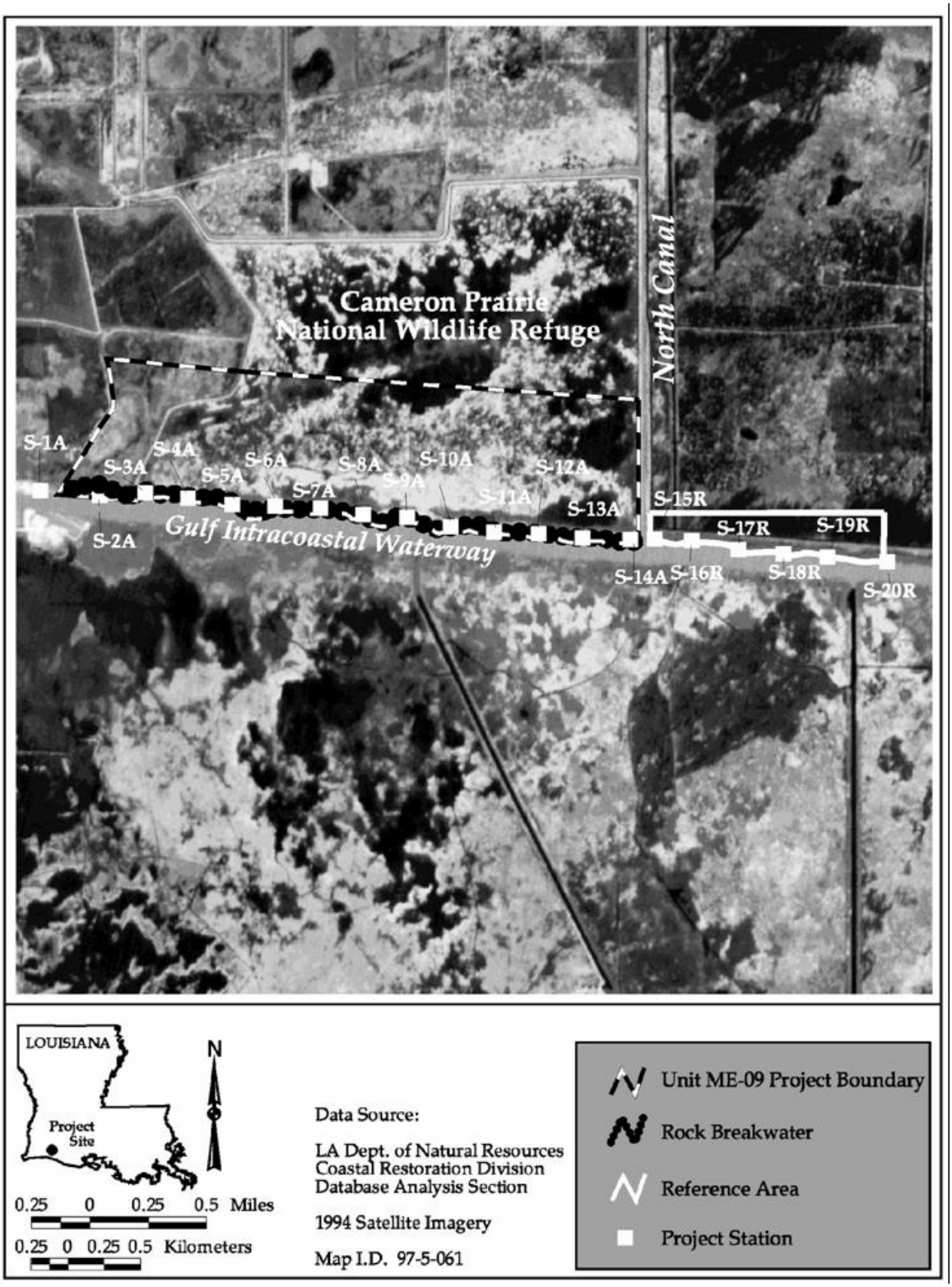

Figure 1. Cameron Prairie Refuge Protection (ME-09) project boundaries.

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.

An inspection of the Cameron Prairie Refuge Protection Project (ME-09) was held on November 18, 2003 under clear skies and cold temperatures. In attendance were Stan Aucoin, Dewey Billodeau, and Patrick Landry of LDNR. Representing USFWS was Glenn Harris and Steve Reagan. Parties met at the Cameron Prairie Refuge Headquarters and proceeded to the ME-09 project area. The annual inspection began at approximately 10:00 a.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 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 and Field Inspection notes were completed in the field to record measurements and deficiencies.

b. Inspection Results

Foreshore Rock Dike

The dike is in excellent post construction condition. No need for any maintenance in the foreseeable future.

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None.

ii. Programmatic/ Routine Repairs

None.

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

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 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 in post-construction year 1996 and will be obtained in 2009. The original photography was checked for flight accuracy, color correctness, and clarity and was subsequently archived. Aerial photography was scanned, mosaicked, and georectified by USGS/NWRC personnel according to standard operating procedures.

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). 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 1997, 2000, 2003, and will be conducted in 2006, 2009, and 2012 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 movement over time. Shoreline positions will be compared to historical data sets available in digitized format for 1956, 1978, and 1988 shorelines.

IV. Monitoring Activity

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Aerial photography was collected in November 1993 and January 1997 (figures 2-3). 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.

Shoreline Position:

Shoreline change data were collected in 1995, 1997, 2000 and 2003. Presented here is the comparison between the 2000 and 2003 surveys (figures 4-8, table 1). Mean shoreline change rate was calculated to be 13 +/- 15.4 ft/yr (4 +/- 4.7 m/yr) and -2.1 +/- 2.1 ft/yr (-0.6 +/- 0.6 m/yr) for the project and reference areas, respectively. The data indicate that the project has continued to be effective in preventing erosion at all project area stations. Shoreline position at the reference sites continued to retreat.

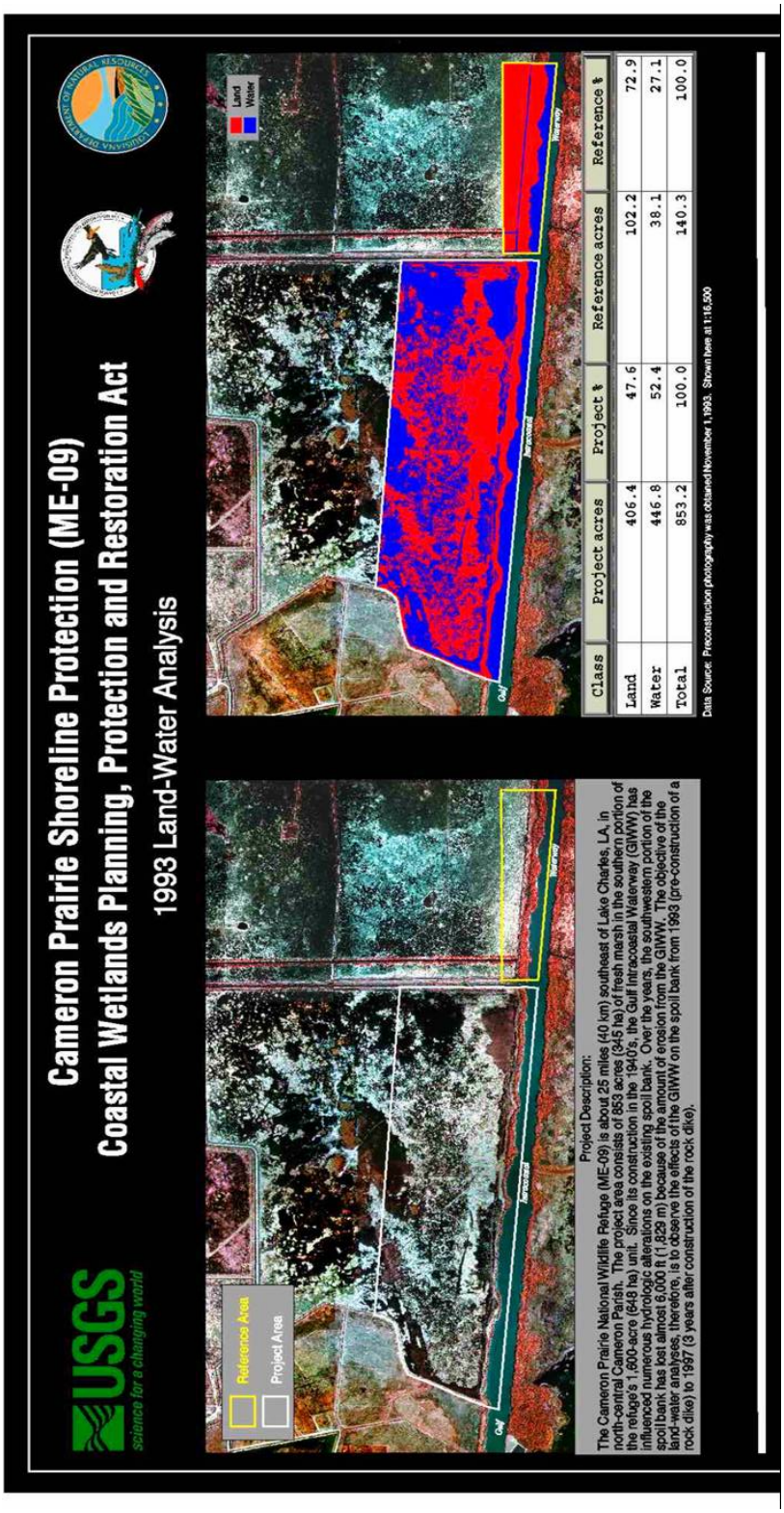

Figure 2a. Cameron Prairie (ME-09) land/water analysis from photography flown November 1, 1993.

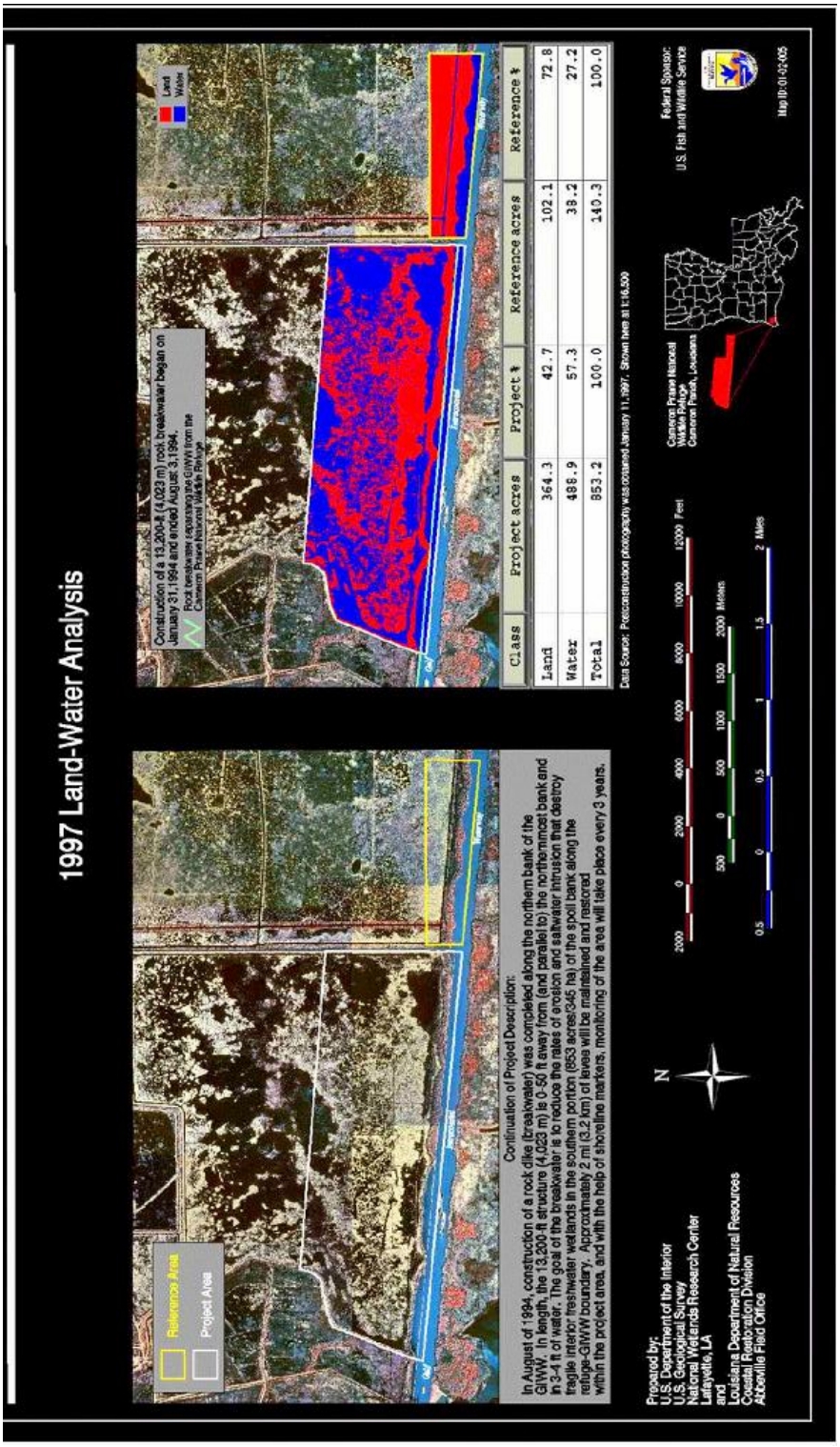

Figure 2b. Cameron Prairie (ME-09) land/water analysis from photography flown January 11, 1997.

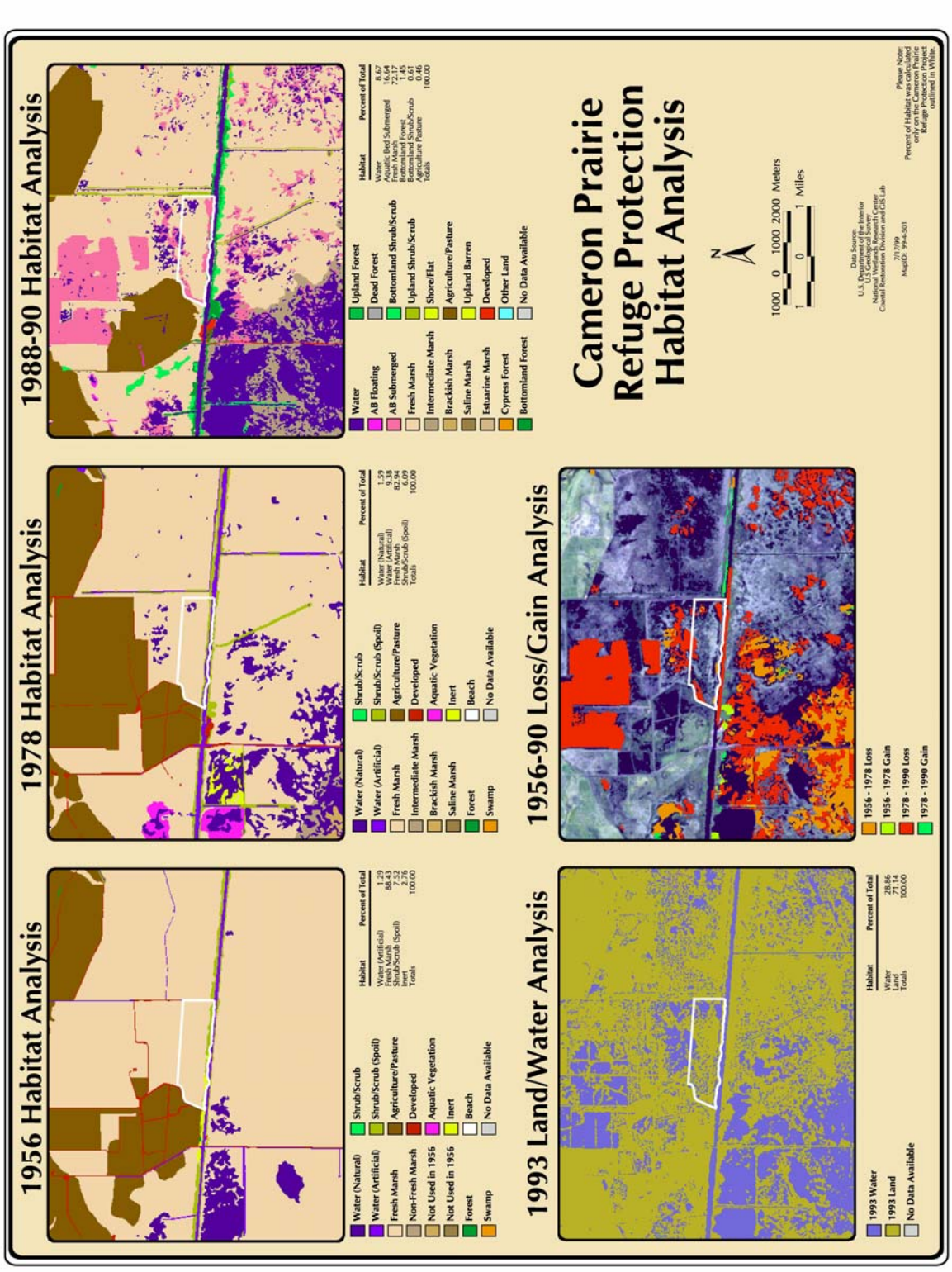

Figure 3. Cameron Prairie (ME-09) 1956-90 habitat analysis.

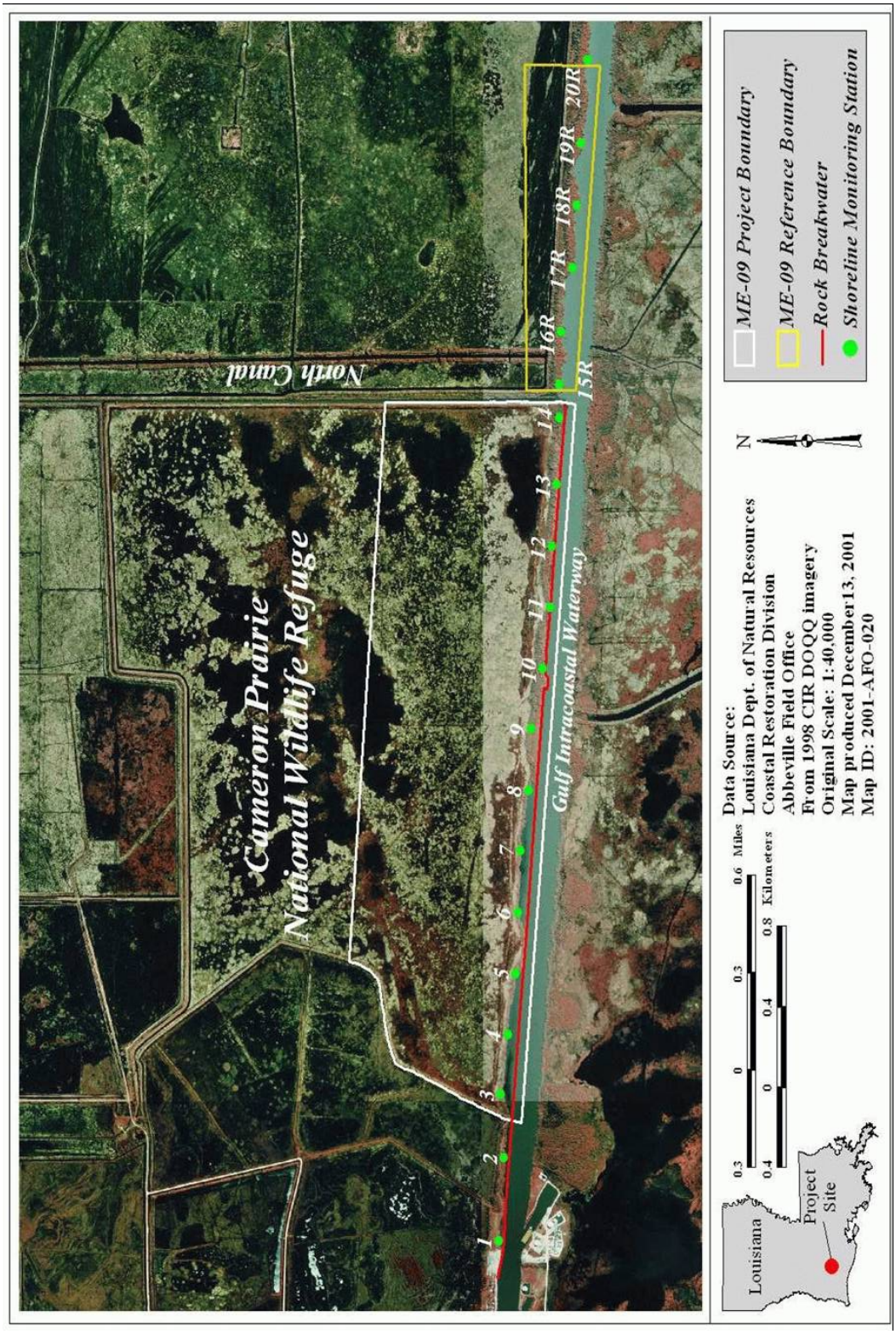

Figure 4. Location of shoreline marker stations at the Cameron Prairie Refuge Protection (ME-09) project.

Cameron Prairie Refuge Protection (ME-09)

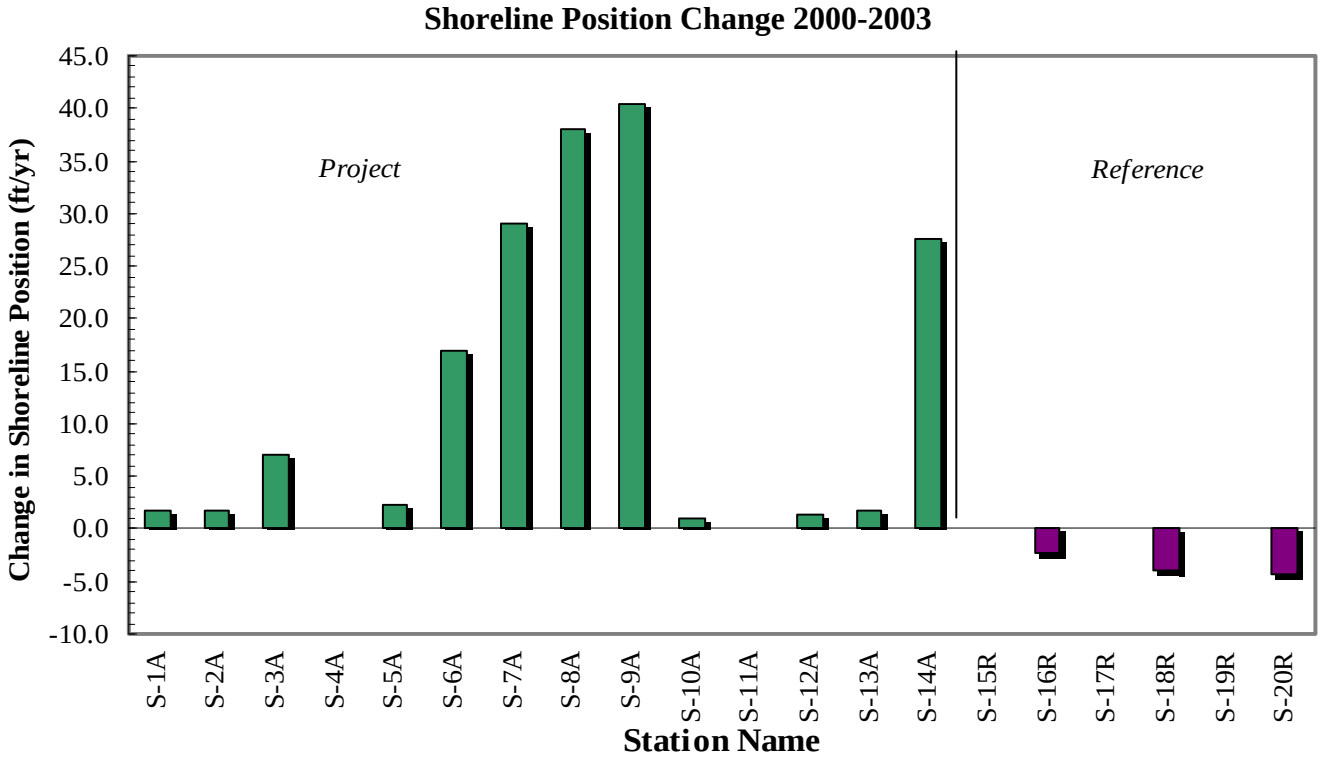

Figure 5. Shoreline position change within the Cameron Prairie (ME-09) project and reference areas for 2000-2003 in feet/year.

Figure 6. 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.

Figure 7. 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 8. 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.

Cameron Prairie Refuge Protection (ME-09)

Table 1. Measurements (feet) from survey hub to vegetated edge of the bank within project and reference areas for September 2000 and August 2003.

Project Number	Station #	Group		Distance to VE - from hub (ft)	
				2000	2003
ME-09	ME09-01A	Project		76.0	81.0
ME-09	ME09-02A	Project		92.0	97.0
ME-09	ME09-03A	Project		100.0	121.0
ME-09	ME09-04A	Project		24.0	No hub
ME-09	ME09-05A	Project		134.0	141.0
ME-09	ME09-06A	Project		51.0	102.0
ME-09	ME09-07A	Project		43.0	130.0
ME-09	ME09-08A	Project		35.0	149.0
ME-09	ME09-09A	Project		58.0	179.0
ME-09	ME09-10A	Project		44.0	47.0
ME-09	ME09-11A	Project		15.0	15.0
ME-09	ME09-12A	Project		46.0	50.0
ME-09	ME09-13A	Project		40.0	45.0
ME-09	ME09-14A	Project		16.0	99.0
ME-09	ME09-15R	Project		33.0	33.0
ME-09	ME09-16R	Reference		31.0	24.0
ME-09	ME09-17R	Reference		No hub	No hub
ME-09	ME09-18R	Reference		55.0	43.0
ME-09	ME09-19R	Reference		45.0	45.0
ME-09	ME09-20R	Reference		29.0	16.0

V. Conclusions

a. Project Effectiveness

The project has been effective at preventing shoreline erosion at all project area stations, while the shoreline in the reference area stations continued to retreat. Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline.

The land:water analysis indicated that the project area lost land following construction. Because the preconstruction photography was taken in early November and the postconstruction photography was taken in January, it is difficult to determine whether this was true loss or if it was related to water level and/or seasonal effects.

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

Ensure aerial photography is taken at the same time of the 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 type projects implemented in freshwater areas should include navigation warning signs in the initial construction contract.