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

2004 Operations, Maintenance, and Monitoring Report

for

Perry Ridge Shore Protection

State Project Number CS-24
Priority Project List 4

May 2004
Calcasieu Parish

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I. Introduction

The Perry Ridge Shore Protection project is located in the Calcasieu-Sabine Basin, which is included in Region 4 of the Coast 2050 Plan. The major problem in this Region is marsh erosion caused by salt water intrusion, rapid water level fluctuation, and wave action. Many canals have been dug in this Region to aid in navigation, mineral extraction, hunting, and fishing. The Gulf Intracoastal Waterway (GIWW) crosses the entire region and allows salt water to encroach into traditionally freshwater areas. Wave action from boat traffic is also causing bank erosion in some areas. Bank stabilization of the GIWW is, therefore, a necessary restoration strategy for Region 4. The project provides features to protect 1,203 ac (481 ha) of vegetated shoreline along the GIWW, which in turn will benefit 5,945 ac (2,378 ha) of predominantly intermediate marsh located north of the shoreline (figure 1). The project is on the north bank of the GIWW from Perry Ridge to the Vinton Drainage Canal in Calcasieu Parish, Louisiana. The project area is bounded on the north by an arbitrary line connecting the north tip of Big Island and the Gray Canal, on the south by the GIWW, on the east by the Vinton Drainage Canal and the Gray Canal, and on the west by Perry Ridge and Big Island.

Marsh loss in the vicinity of Perry Ridge has been caused by water level fluctuations and tidal scour from the GIWW as the result of breaches in the northern spoil bank (USDA.NRCS 1996). The shoreline erosion rate of the north bank of the GIWW in the vicinity of the project area is 10 ft/yr (3.05 m/yr), based on aerial photography (USDA/SCS 1992). Several factors contribute to the loss of shoreline in this area. Double-wide barges allowed in this section of the GIWW increase erosion rates due to increased water level fluctuations resulting from high wave energy. In this vicinity the GIWW is 30 ft (9.1 m) deep and allows higher salinities to reach the Perry Ridge area. The construction of the GIWW has shifted the project area from essentially non-tidal to tidally-influenced. In addition, the construction of the Calcasieu Ship Channel, deepening of Sabine Pass, the construction of the Sabine-Neches waterway, and the removal of the bar at the mouth of the Calcasieu River have all resulted in increased water current. Historically, the project area consisted of freshwater wetlands (USDA/NRCS 1996). In 1968, 1978, and 1988, Chabreck and Linscombe classified this area as an intermediate marsh (Chabreck and Linscombe 1968, 1978, 1988).

Approximately 23,300 linear ft (7.1 km) of free-standing rock dike was constructed along the north bank of the GIWW from west of Perry Ridge to the Vinton Drainage Canal. Construction of the project was completed in February 1999.

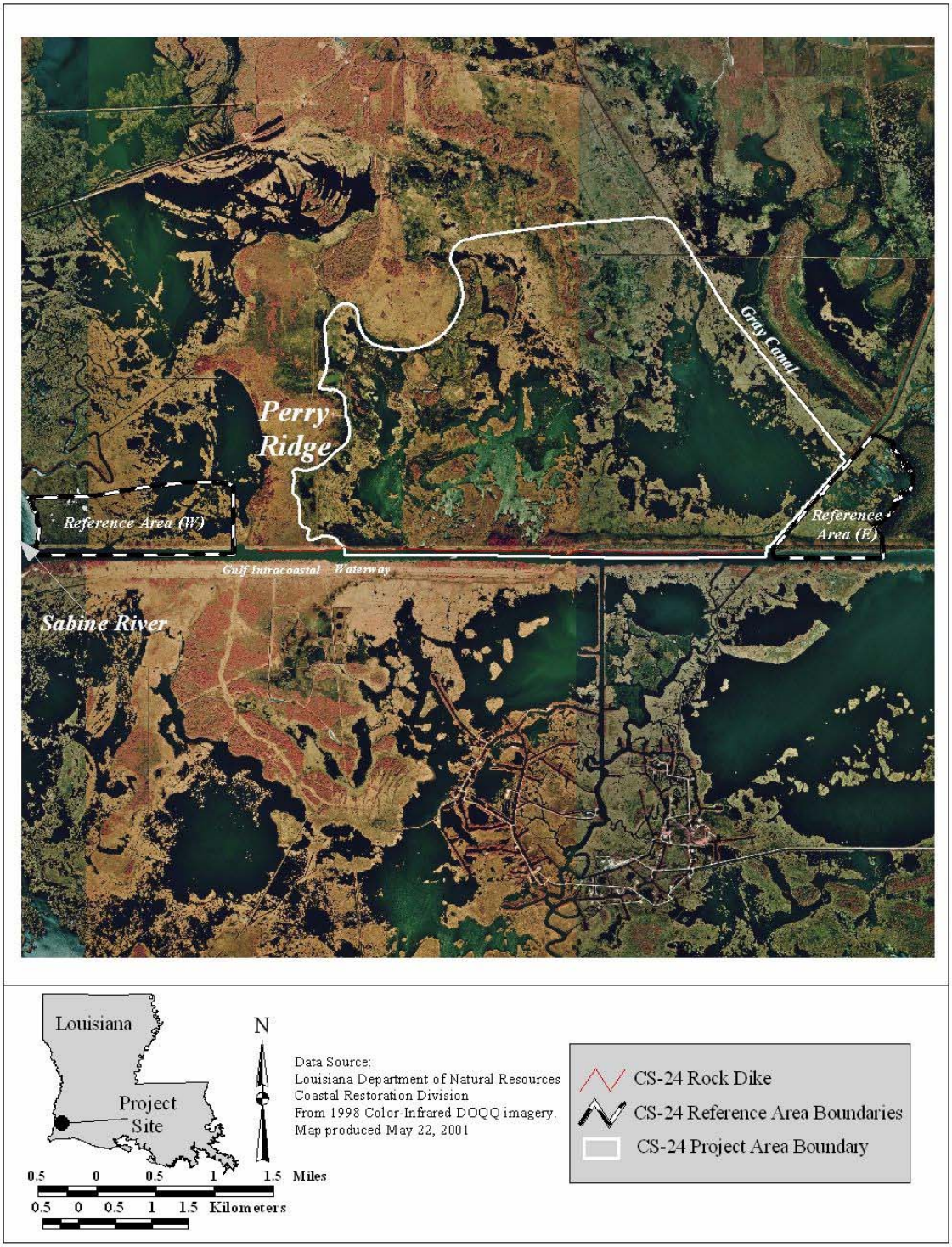

Figure 1. Perry Ridge Shore Protection (CS-24) project boundaries

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Perry Ridge Shore Protection Project (CS-24) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended any necessary 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 (LDNR 2002).

The annual field inspection included a complete visual inspection of the entire project site from water. Photographs were taken and a Field Inspection form was completed in the field to record measurements and deficiencies.

b. Inspection Results

Site 1—Foreshore rock dike

The dike is in good condition. No apparent need for any maintenance at this time. A staff gage should be installed at the beginning of the project in the Vinton Drainage Canal.

II. Maintenance Activity (continued)

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 Perry Ridge Shore Protection Project are:

1. Protect the existing emergent wetlands along the north bank of the GIWW and prevent their further deterioration from shoreline erosion and tidal scour.
2. Prevent the widening of the GIWW into the project area wetlands.
3. Reduce the occurrence of salinity spikes within the project area.

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

1. Decrease the rate of shoreline erosion along the north bank of the GIWW using a rock dike.

b. Monitoring Elements

Aerial Photography:
To document shoreline position, and land and water areas along the GIWW in the project and reference areas, near-vertical, color-infrared aerial photography (1:12,000 scale, with ground controls) was obtained once prior to construction in 1997, and in post-construction 2001, and will be obtained in 2010, and 2016. 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 (Steyer et al., 1995, revised 2000).

Shoreline Change:
To document changes in shoreline position along the GIWW, shoreline markers were placed at 12 points along the vegetated marsh edge adjacent to the rock breakwater. Twelve transects were surveyed and differentiated by shoreline type in the project and reference areas (minimum of 3 but not to exceed 1 per 1,000 ft [305 m]). On each survey transect, a PVC pole was installed to mark the vegetated edge of the bank (VEB), and a post was installed at the end point in the marsh or on the spoil bank to establish a hub for use in relocating each transect. Shoreline position relative to the shoreline markers along the survey transects were documented at the same time of the year, once as-built in 1999, and post-construction in 2001, and will be documented in 2004, 2007, 2010, 2013, and 2016. Additionally, continuous differential GPS were used to document shoreline movement. Shoreline positions were compared to historical data sets available in digitized format for 1956, 1978, 1988, and will be for any subsequent years that become available during the life of the project.

Salinity:
To determine the rock dike's effect on salinity spikes inside the project area, it was recommended that one year of salinity measurements be collected after the next significant

drought year following 1996. Accordingly, salinity data was collected in 2000 following the drought of 1999.

IV. Monitoring Activity

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Pre-construction photography, flown on November 23, 1997, indicated land to water ratios were 60.6% land and 39.4% water in the project area (figures 2 and 3). Reference area data from 1997 will be included with the next analysis which includes 2001 photography. Aerial photography flown on November 17, 2001 is currently being processed by NWRC.

Shoreline Position:

No data were collected in 2003 (figure 4). The data from the 2002 survey indicated that the majority of monitoring stations along the shoreline in the project area have prograded while the shoreline position at all reference sites continued to retreat.

Salinity:

To evaluate the project's effects on salinity, data were collected hourly at 2 stations from June 2000 through June 2001. One station was located in the project area, and the other one in the GIWW. Recorder placement and water circulation patterns within the project area caused erroneous readings on data collected. Unfortunately, by the time the problem was realized, 10 months had passed. Therefore, the effectiveness of the rock dike at reducing the occurrence of salinity spikes within the project area cannot be accurately examined due to insufficient data in the project area. There are no plans to monitor salinity spikes in the future.

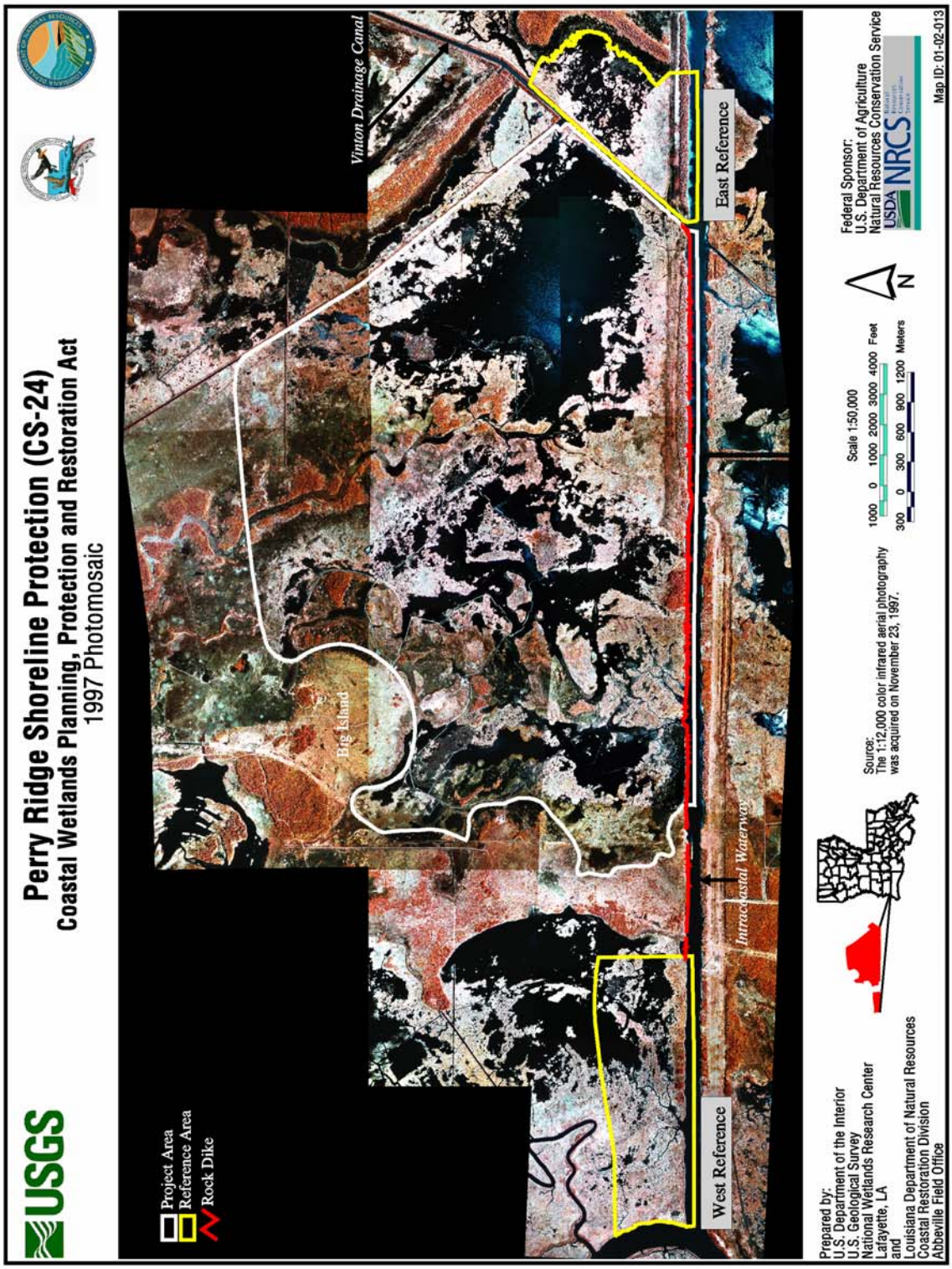

Figure 2. Photomosaic of the Perry Ridge Shore Protection (CS-24) project and reference areas from aerial photography flown November 23, 1997.

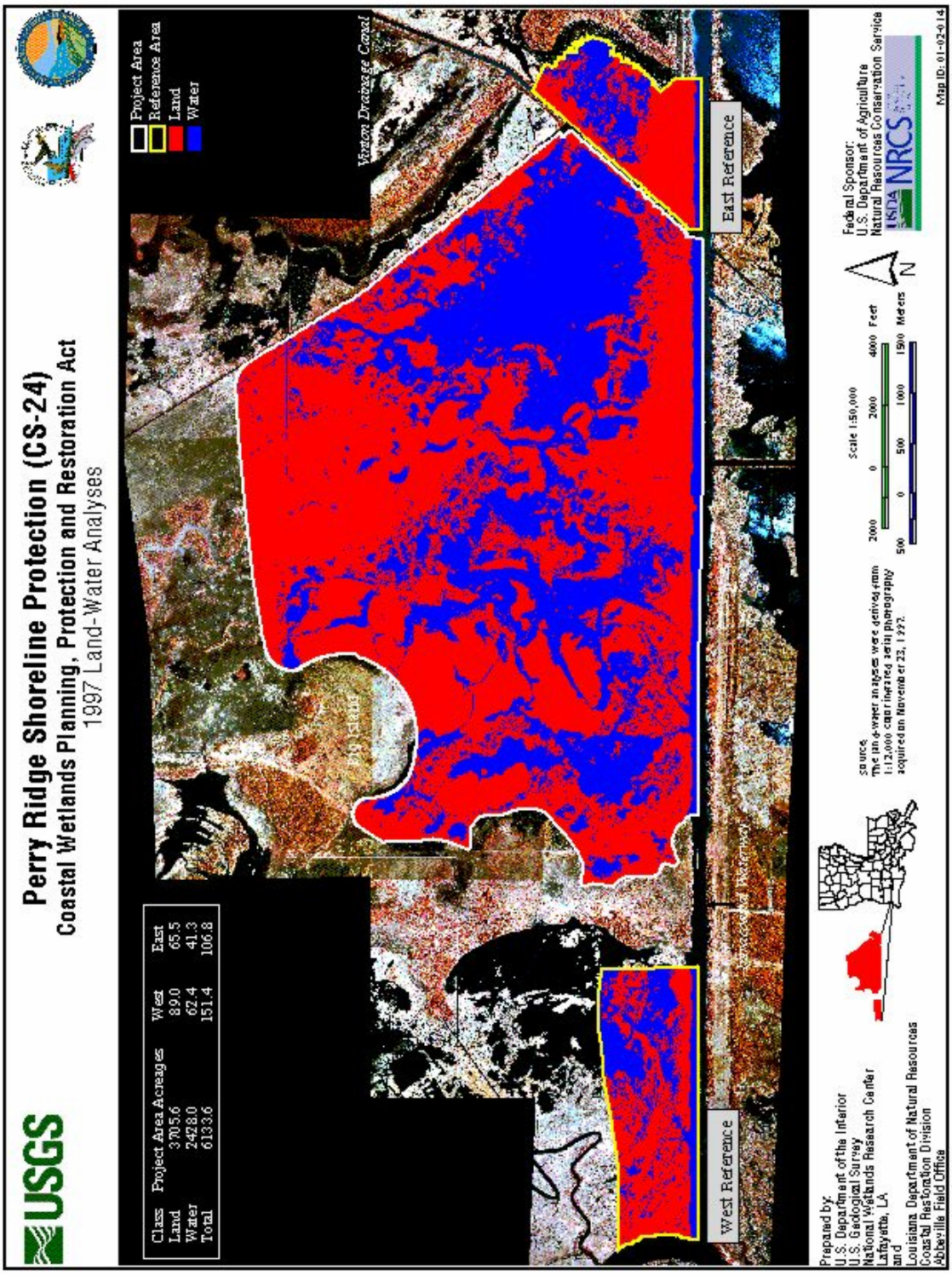

Figure 3. Land:water analysis of the Perry Ridge Shore Protection (CS-24) Project and Reference areas from aerial photography flown November 23, 1997.

Figure 4. Perry Ridge Shore Protection (CS-24) shoreline marker station locations.

V. Conclusions

a. Project Effectiveness

According to the monitoring data, the project has been effective at preventing shoreline erosion. The shoreline in the reference area, however, continues to retreat. No monitoring activity occurred on this project in 2003. The pre-construction 2001 aerial photography is currently being processed. Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline

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 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.

V. Literature Cited

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