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

2004 Operations, Maintenance, and Monitoring Report

for

Perry Ridge West Bank Stabilization

State Project Number CS-30
Priority Project List 9

May 2004
Calcasieu Parish

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Suggested Citation:

Mouledous, M. and M. Guidry 2004. *2004Operations, Maintenance, and Monitoring Report for Perry Ridge West Bank Stabilization (CS-30), Louisiana Department of Natural Resources, Coastal Restoration Division, Lafayette, Louisiana.*

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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. The major problem in this Region is marsh erosion caused by salt water intrusion, rapid water level fluctuation, and wave action (USDA/SCS 1989). 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 is comprised of 1,132 acres (458 ha) of fresh and intermediate marsh in Calcasieu Parish, Louisiana.

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; 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' NAVD 88. The rock dike was constructed as a peaked dike (no top width) to an elevation of +3.7 NAVD 88 with 2 horizontal to 1 vertical side slopes using COE 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' NAVD 88 with a 4' 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.

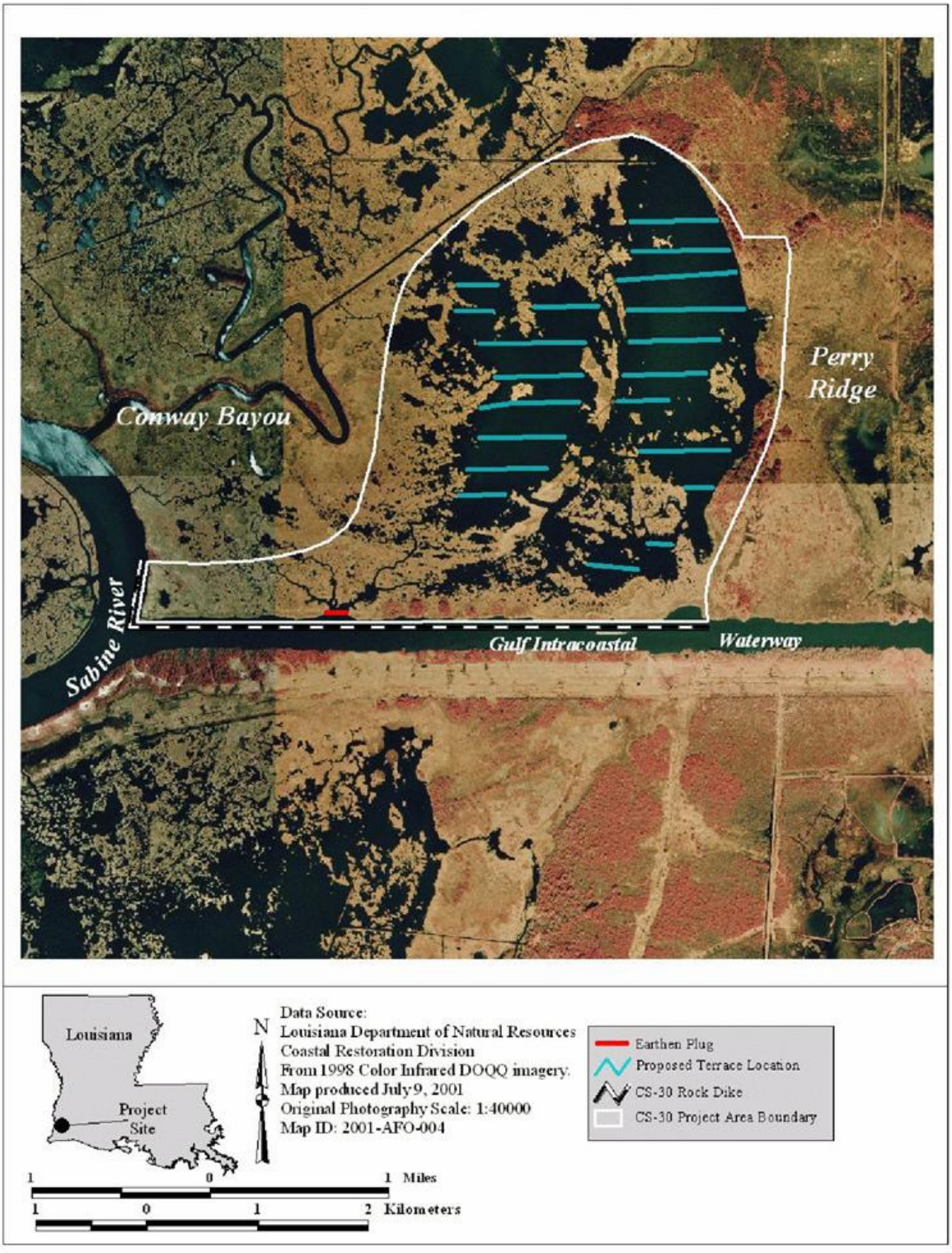

Figure 1. Perry Ridge West (CS-30) project boundaries.

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 to identify any deficiencies report detailing the condition of project features and recommend 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).

An inspection of the Perry Ridge West Bank Stabilization Project (State Project No. CS-30) was held on October 16, 2003 under partly cloudy skies and warm temperatures. In attendance were Stan Aucoin, Pat Landry, Dewey Billodeau, and Herb Juneau of LDNR. Representatives from NRCS were invited but were unable to attend. The annual inspection began on the east side of the project area near its convergence with the CS-24 project.

The field inspection included a complete visual inspection of the entire project site with the exception of the earthen vegetated terraces. Staff gauge readings and existing temporary benchmarks 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

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

The few terraces that were viewed from the land appeared to be in excellent shape and in no need of any immediate maintenance.

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 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 and reference areas, 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 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 6 transects divided equally among 3 representative shallow ponds. 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 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 postconstruction in 2003, and will be sampled in 2005, 2008, 2015, and 2020.

Vegetative Plantings:
Due to the problem of having insufficient resources for an evaluation of all anticipated project benefits, vegetative plantings will be monitored via visual inspections by CED during O&M

surveys and CRD during SAV sampling. Any variation from expected results will be documented and evaluated.

IV. Monitoring Activity

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

Land to water analysis was completed for the pre-construction photography collected on November 17, 2001 (figures 2-5). Results indicated 43.3% land and 56.7% water within the project area (figures 2-5).

Submerged Aquatic Vegetation:

Data were collected along 12 transects in open water ponds pre-construction in November 2000 and post-construction in October 2003 (figures 6-8, table 1). The frequency of occurrence of SAV remained the same between the pre-construction and post-construction surveys in both project and reference areas. However, the number of species present increased between 2000 and 2003. Within the project area, the dominant species changed from *Ruppia maritima* (wigeongrass), *Potamogeton* sp (pondweed), and *Chara* sp. (chara) in 2000 to *Vallisneria americana* (American eelgrass), *Myriophyllum spicatum* (spike watermilfoil) and *Utricularia* sp. (bladderwort) in 2003. Within the reference area, *Chara* and *M. spicatum* remained dominant between years. *R. maritima*, however, dropped from 45% in 2000 to 5% in 2003 and *Utricularia* increased to 27% from 0.

Shoreline movement:

Aerial photography will be used to monitor shoreline movement. However, direct shoreline measurements on the adjacent CS-24 project, which has similar hydrologic conditions, have shown that the project has been effective in preventing erosion at most project area stations, while the reference area continued to retreat.

Vegetative Plantings:

The plantings are in excellent shape at this time. They cover the terraces and are green and healthy.

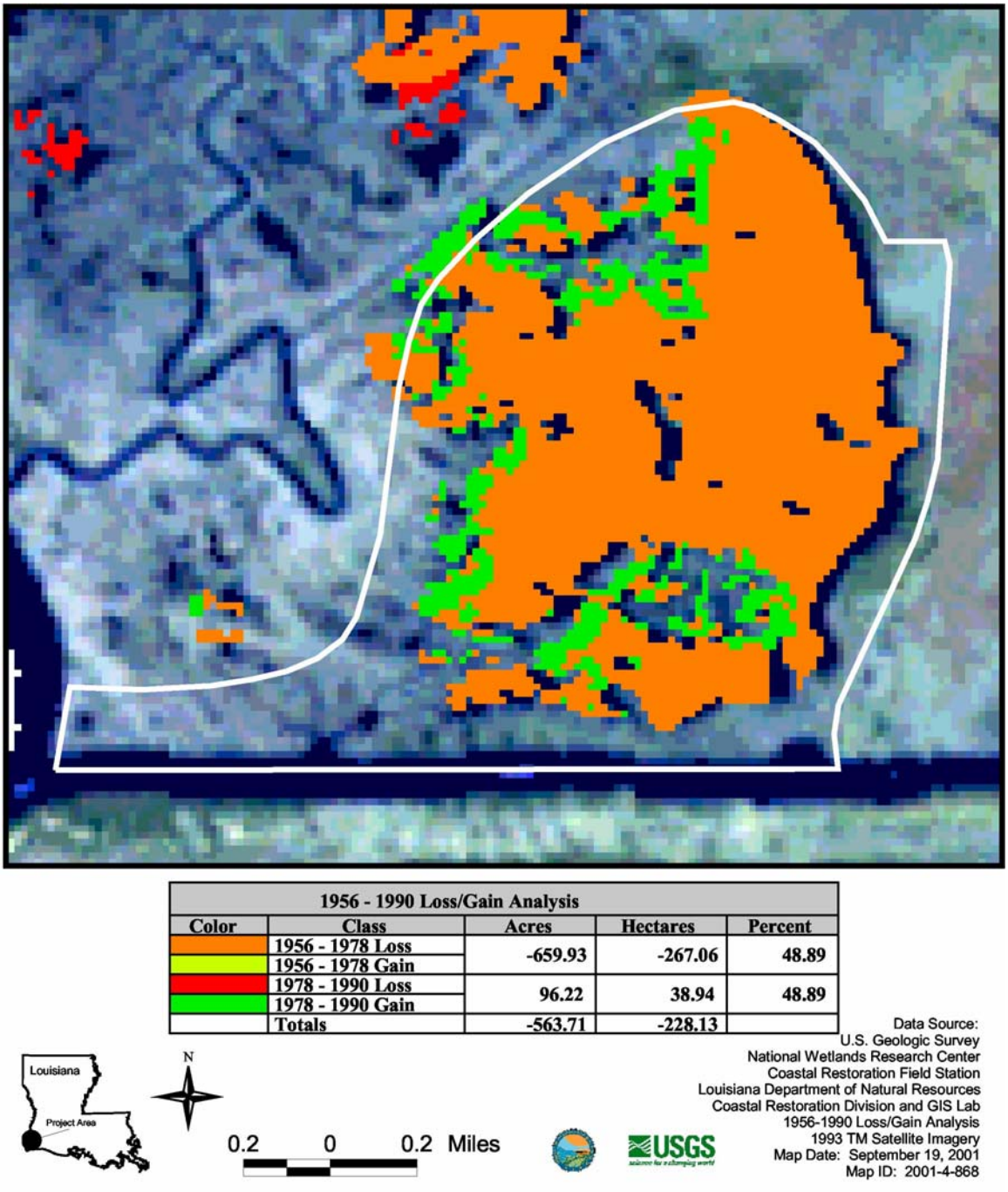

Figure 2. Perry Ridge West (CS-30) project land loss/gain analysis for the period 1956-1990.

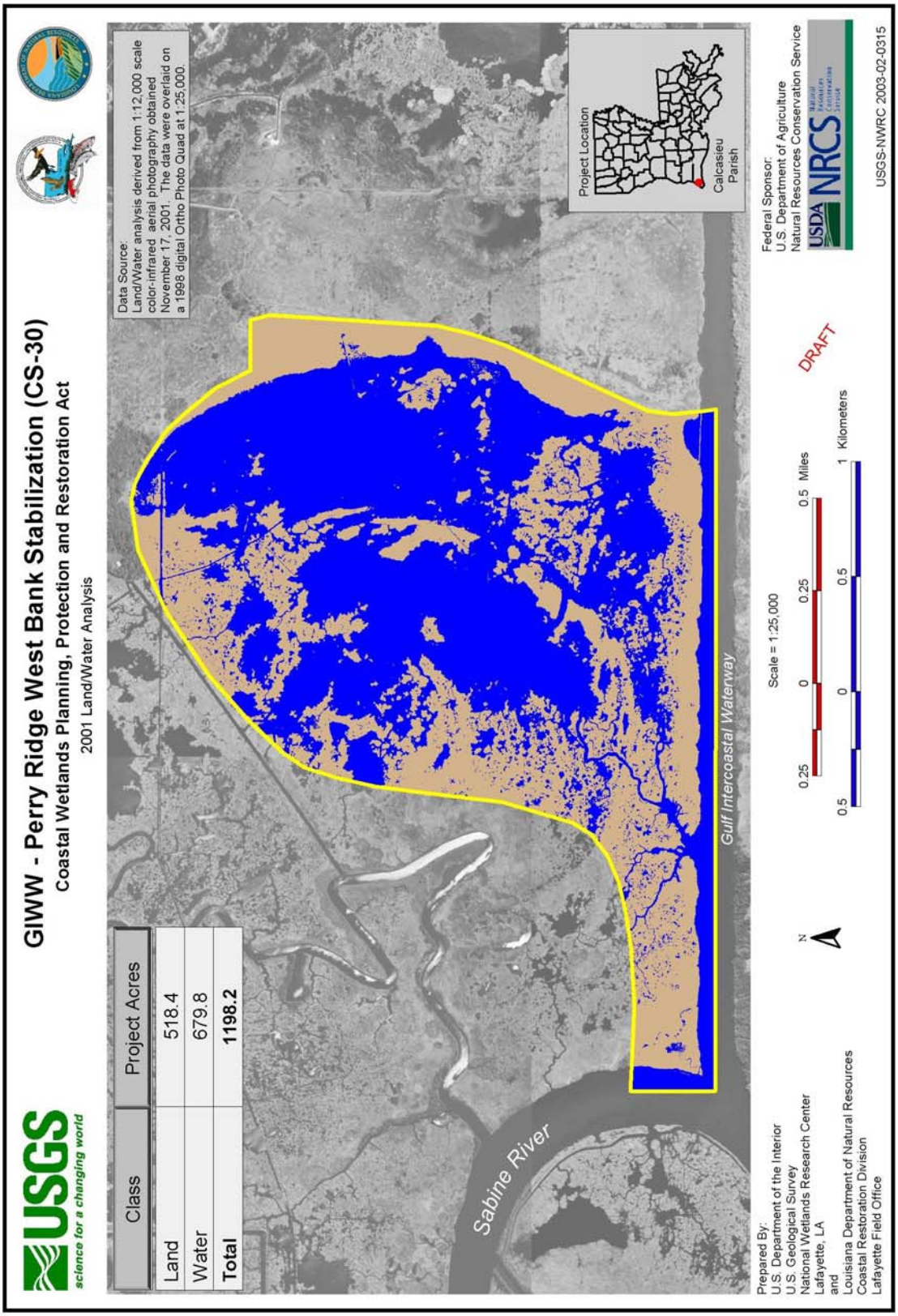

Figure 3. Perry Ridge West (CS-30) project 2001 land/water analysis.

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Figure 4. View of the Perry Ridge West rock dike taken October 21, 2003. The photograph is facing west.

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Figure 5. Views of the *Schoenoplectus californicus* plantings taken July 2002. The photograph on the top is facing southwest, and on the bottom is facing south.

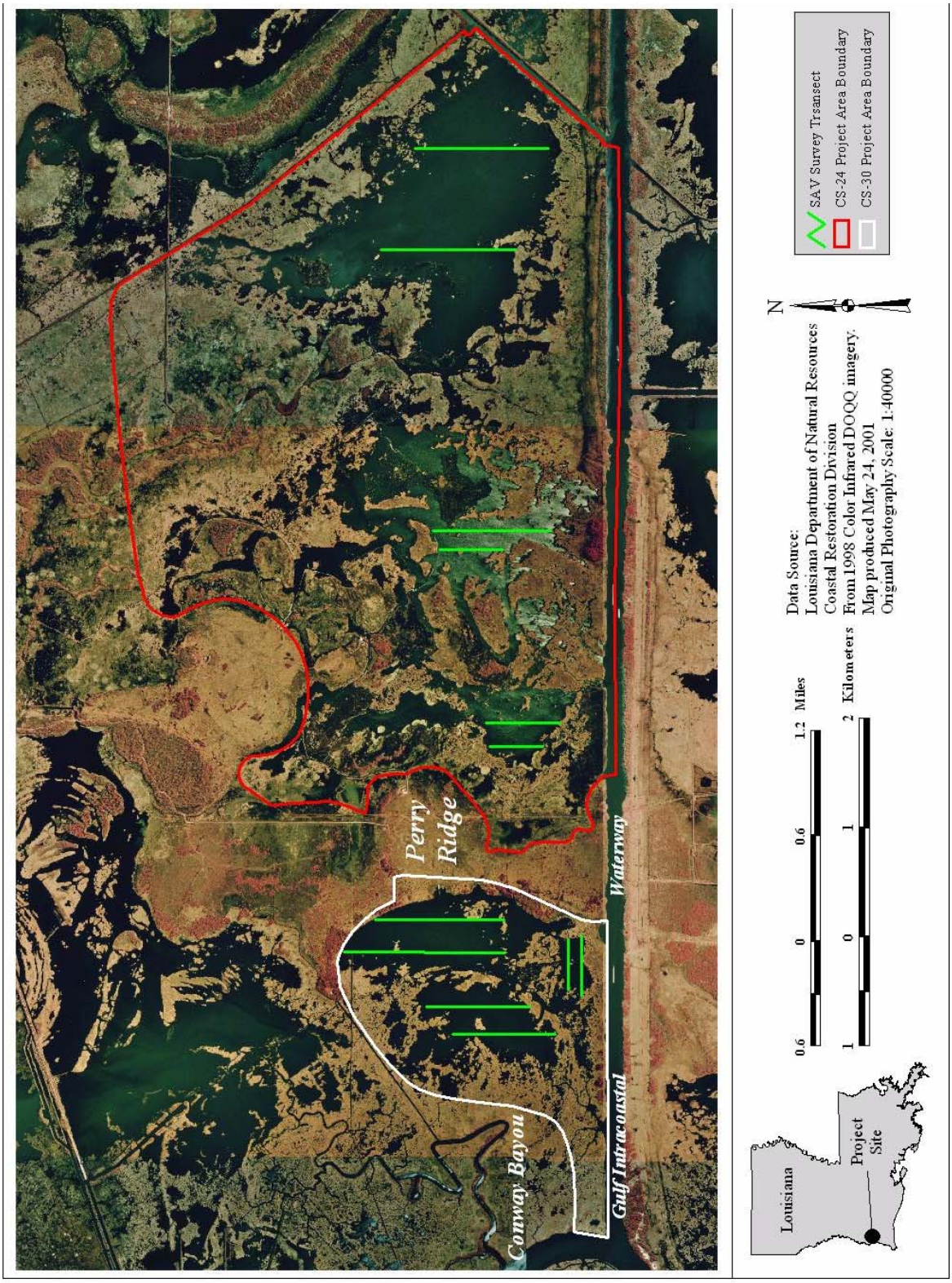

Figure 6. Location of SAV transects at Perry Ridge West (CS-30) project.

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Table 1. List of scientific and common names for vegetation species collected.

Scientific Name	Common Name
Alga	alga
Ceratophyllum demersum	coontail
Chara sp.	green algae
Myriophyllum spicatum	spike watermilfoil
Najas guadalupensis	southern waternymph
Ottelia alismoides	ducklettuce
Potamogeton sp.	pondweed
Ruppia maritime	wigeongrass
Utricularia sp.	bladderwort
Vallisneria americana	American eelgrass

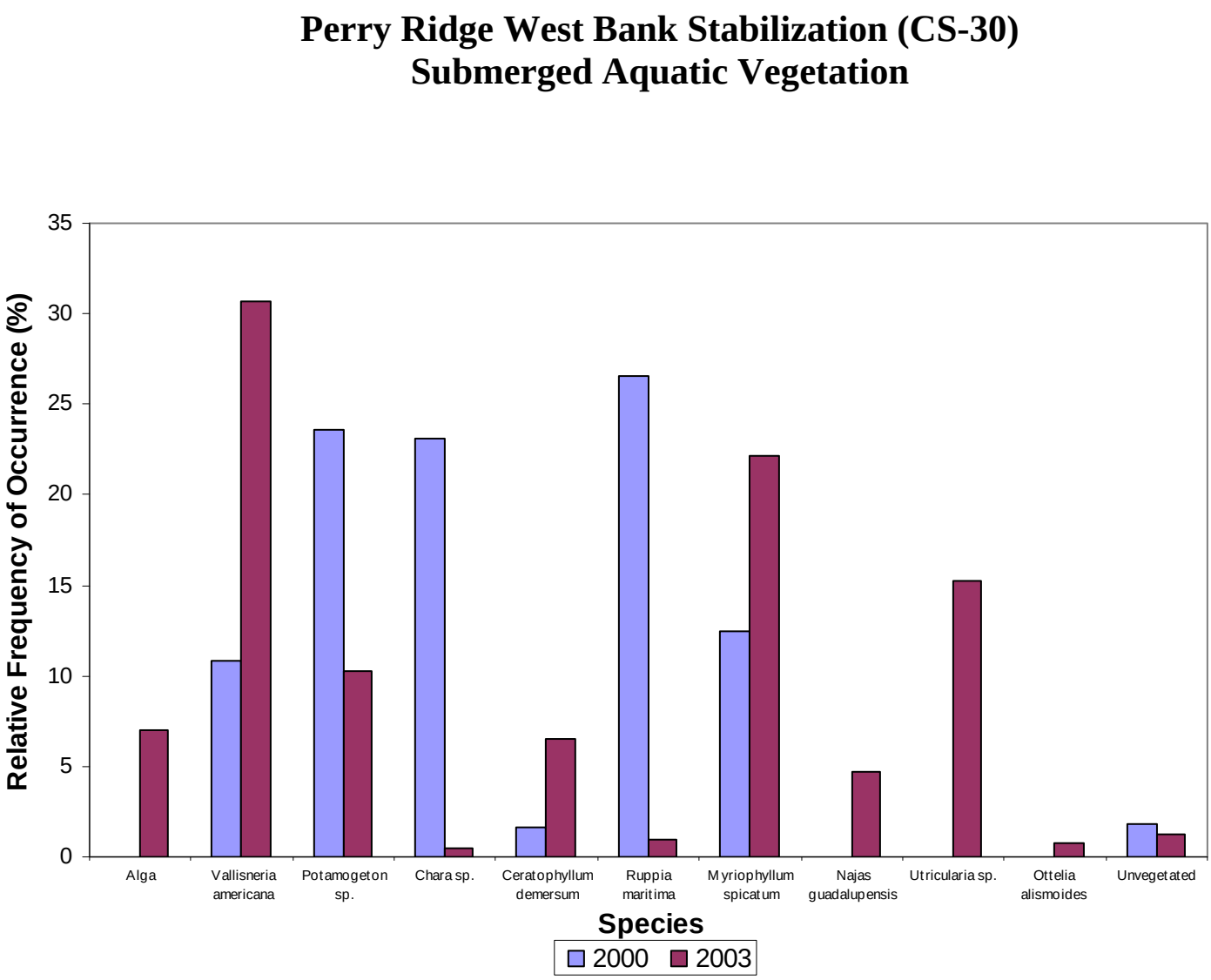

Figure 7. Relative frequency of occurrence (%) by species in the project area, pre-construction in November 2000 and post-construction in October 2003.

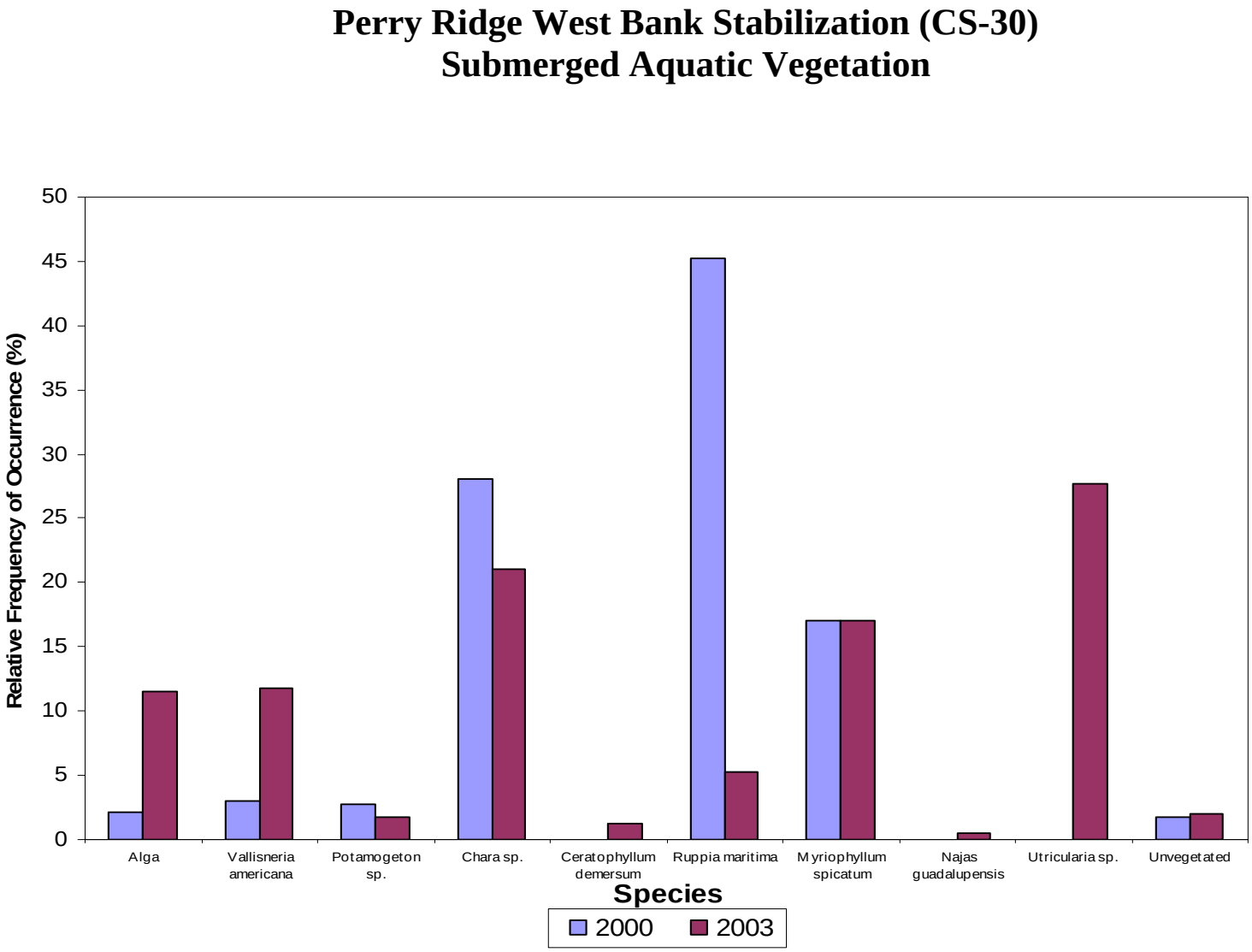

Figure 8. Relative frequency of occurrence (%) by species in the reference area, pre-construction in November 2000 and post-construction in October 2003.

V. Conclusions

a. Project Effectiveness

The project has been effective in maintaining SAV abundance. The diversity of SAV species has increased since construction as a result of the earthen terrace feature of the project. The pre-construction (2001) land : water analysis indicated 43.3% land and 56.7% water within the project area.

Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline. The vegetative plantings are in excellent shape.

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. 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. Literature Cited

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