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

2005 Operations, Maintenance, and Monitoring Report

for

Sabine Refuge Marsh Creation

State Project Number CS-28
Priority Project List 8

June 2005
Cameron Parish

Prepared by:

Leigh Anne Sharp, Monitoring Section, Coastal Restoration Division (CRD)
and
Herb Juneau, P.E., Field Engineering Section, Coastal Engineering Division (CED)
Louisiana Department of Natural Resources (LDNR)/ Coastal Restoration and Management
Lafayette Field Office
635 Cajundome Boulevard
Lafayette, LA 70506

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for
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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 (Sharp and Juneau 2007).

I. Introduction

The project area is composed of 3,300 acres (1,335 ha) of wetlands located in the Calcasieu-Sabine Basin on the Chenier Plain. The area is within the Sabine National Wildlife Refuge and roughly bounded by Starks North Canal to the north and east, Back Ridge Canal to the south, and existing marsh to the west (figure 1). Hurricanes and canal building between 1956 and 1978 caused land loss in the area. Saltwater from the Calcasieu Ship Channel (CSC) is currently introduced from several sources including the GIWW through Alkali Ditch and probably more importantly through West Cove Canal via Back Ridge Canal (Miller 1997). Vegetation has shifted from intermediate sawgrass-dominated marsh including *Cladium jamaicense* (sawgrass), *Schoenoplectus californicus* (giant bulrush), and *Phragmites australis* (Roseau cane), with some fresh marsh to more brackish species including *Spartina patens* (saltmeadow cordgrass), *Schoenoplectus americanus* (bulrush), and *Schoenoplectus robustus* (saltmarsh bulrush) since at least 1968 (Chabreck et al. 1968; Chabreck and Linscombe, 1978, 1988). Most of the project is currently shallow open water with brackish marsh on the surrounding edges. The current land loss rate is approximately 0.5 square miles (1.3 km^2) per year (United States Army Corps of Engineers [USACE] 2000).

The Sabine Refuge Marsh Creation project (CS-28) is designed to create approximately 1,120 acres (450 ha) of emergent vegetated marsh and to nourish and protect existing broken marsh. During the January 2001 maintenance dredging by the Operations Division of the U.S. Army Corps of Engineers-New Orleans District, approximately 1,000,000 cubic yards (764,554 cubic meters) of sediment were dredged from the Calcasieu Ship Channel between miles 8.3 to 10.4 (13.4 to 16.7 km) and placed in a confined area within the Sabine National Wildlife Refuge. The first cycle created approximately 200 acres of vegetated marsh. Over 36,000 *Spartina alterniflora* plants were planted along the edges of the perimeter and the constructed canals in the Cycle 1 dredge placement area. Four more cycles of dredge placement are scheduled to occur every year beginning in 2005 (figure 2). Construction of future cells is currently being stalled by litigation and landrights issues.

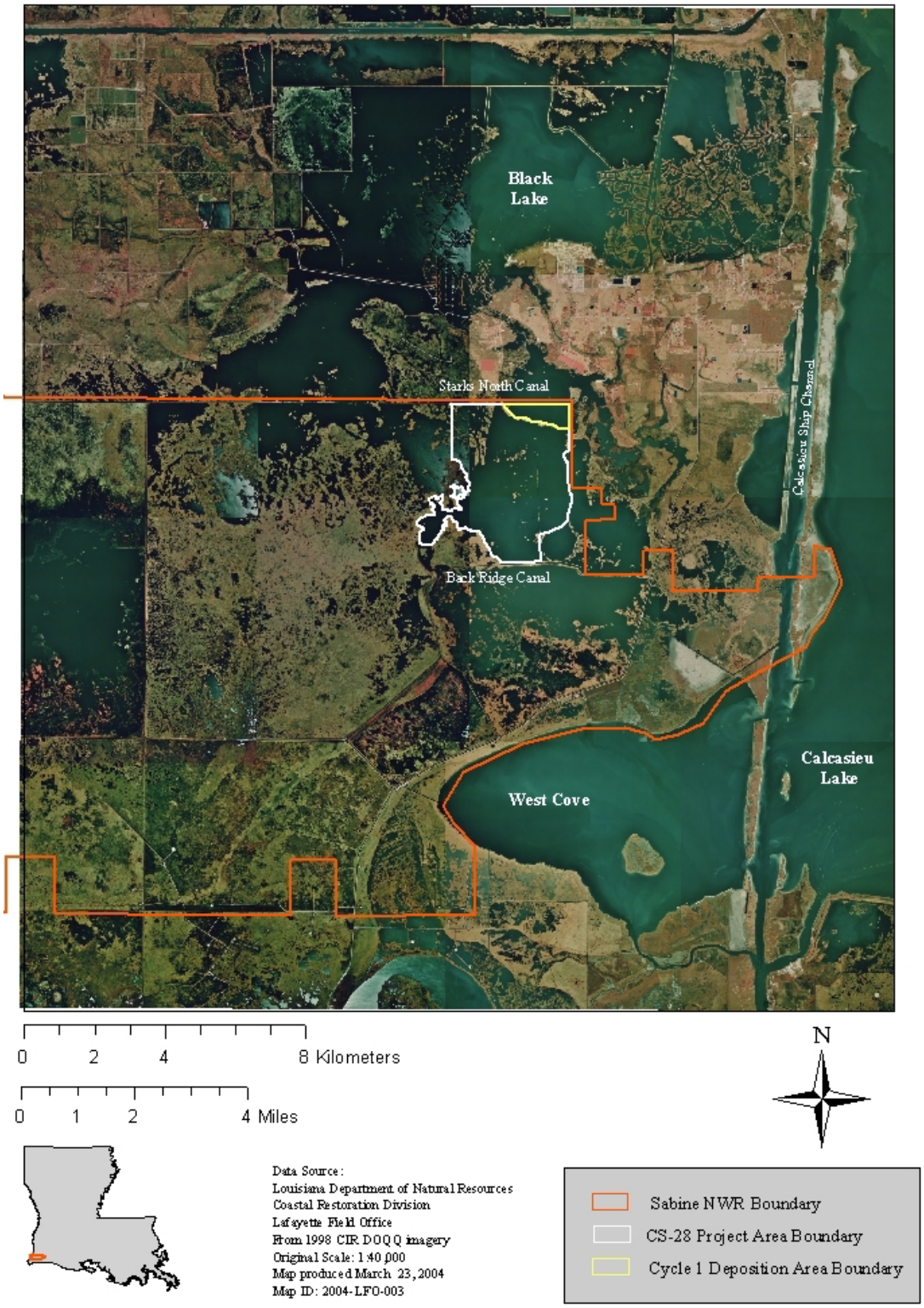

Figure 1: Sabine Refuge Marsh Creation (CS-28) project area boundary.

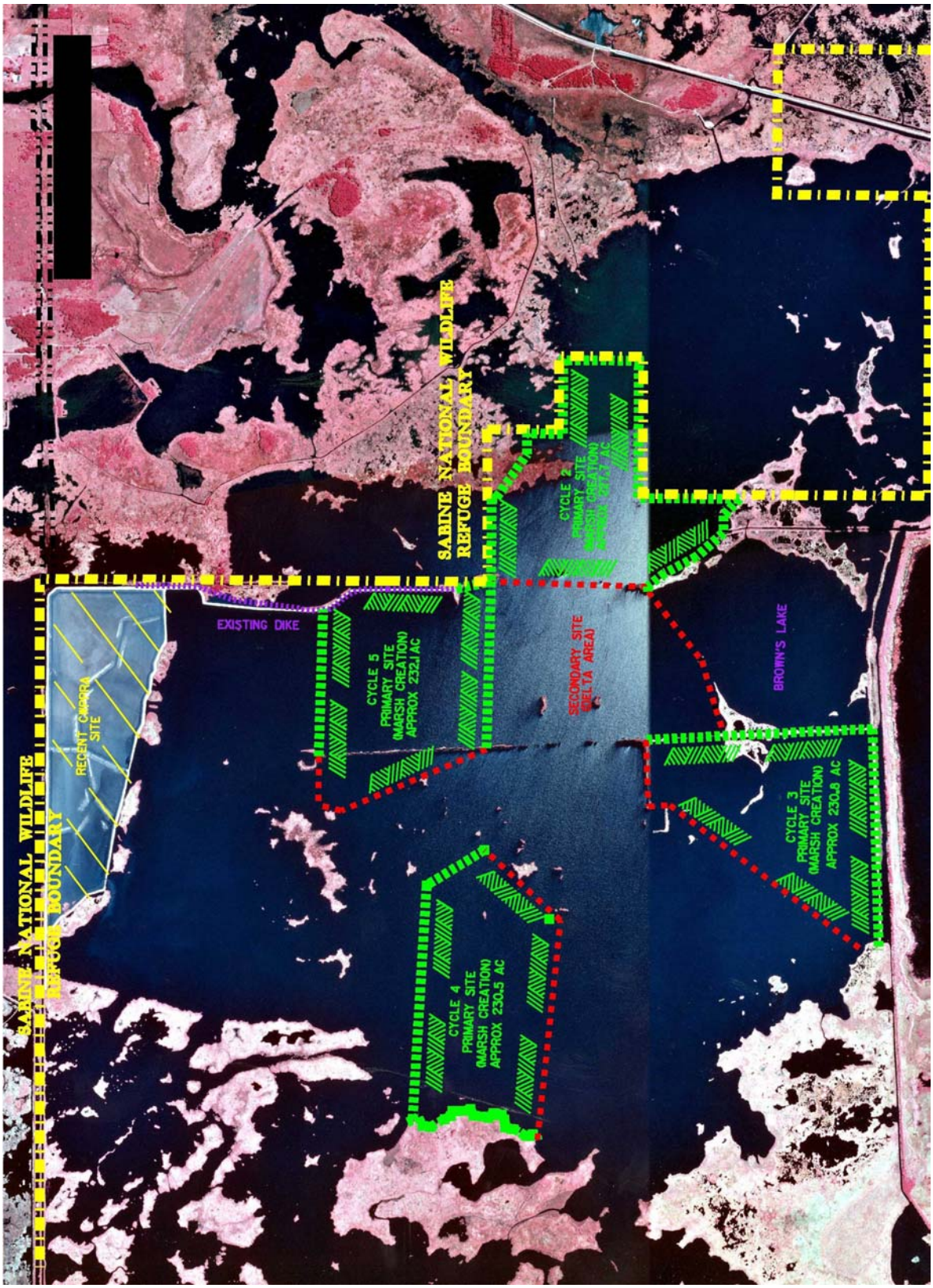

Figure 2. Location of Cycle 1 dredge placement area and the proposed locations of Cycles 2-5.

II. Maintenance Activity

There are no O&M monies for this project therefore, no inspection, activity, operation, or plan applies.

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-28 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. Recommended changes in monitoring stations and the schedule of data collection are listed under individual monitoring elements.

a. Monitoring Goals

The objective of the Sabine Refuge Marsh Creation Project is to create new vegetated marsh and enhance and protect existing surrounding marsh vegetation.

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

1 Place dredge spoil slurry to a maximum height of 4.5 ft (1.4 m) MLG to settle to a height of 2.5 ft (0.8 m) MLG, after five years, for each of five dredging cycles.

2. Create 125 acres (50 ha) of vegetated wetlands in the first dredge placement cycle and 230 acres (93 ha) in each cycle for Cycles 2 through 5.

3. Reduce loss of existing surrounding marshes within the project area.

b. Monitoring Elements

Aerial Photography:
Near-vertical color-infrared aerial photography (1:24,000 scale) was used to measure vegetated and non-vegetated areas for the project and reference areas. The photography was obtained in 2000 prior to project construction and on December 15, 2002, following construction. 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).

Emergent Vegetation:
To document changes in emergent vegetation due to the project, vegetation was monitored pre-construction in 2001 and post-construction in 2002 and 2004. Ten stations were established in the project area and vicinity in pre-existing marshes (figure 3). Eight stations were also established in the first cycle dredge deposition area after construction, but before vegetation was planted along the edges. Two 2-m^2 plots were sampled at each of the stations. Percent cover, height of dominant species, and species richness were quantified. Vegetation will be sampled in

late summer of 2006, 2008, 2010, and 2017. Construction delays could cause these dates to change.

Elevation Survey:

The elevation of the initially placed dredge material was documented within placement sites for the first dredging cycle in 2002. Elevation measurements were to be recorded in 2003 for Cycle 1 and every year after each subsequent cycle is built (2004, 2006, 2008, 2010, and 2017).

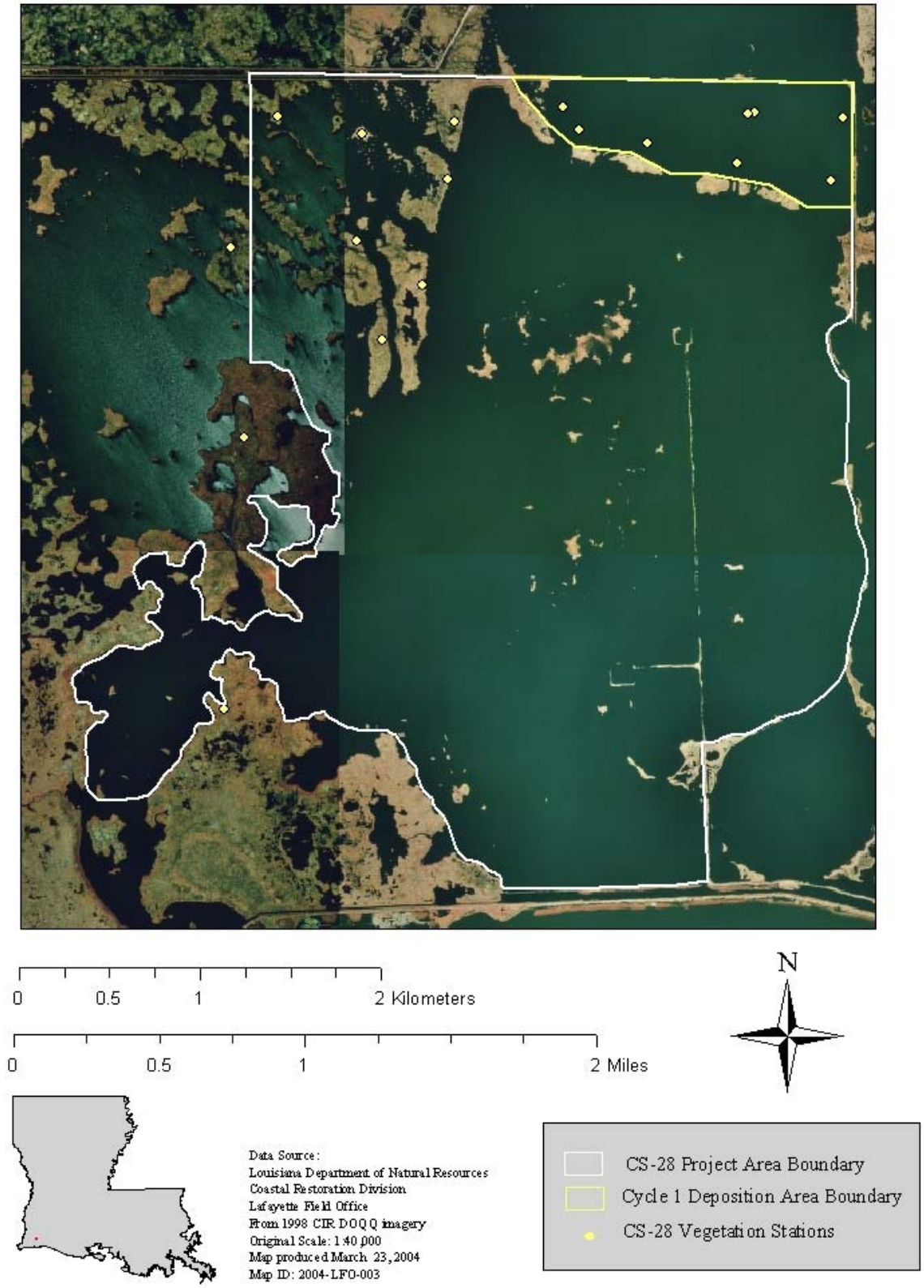

Figure 3. CS-28 project area and vegetation station locations.

IV. Monitoring Activity (continued)

c. Preliminary Monitoring Results and Discussion

Aerial Photography:
Land /water analysis was recently completed for the photography acquired in December, 2002. The 2000 photography was collected for the adjacent Sabine Structure Replacement (CS-23) and was processed for CS-23, but has not yet been subset for the CS-28 project area. The 2002 acreages are presented in figure 4. When the photography flight took place, the area was entirely mudflat.

Emergent Vegetation:
Vegetation stations were established in the dredge cell constructed in 2002 (Cell 1) after construction. At the time of station establishment, the area was still an un-vegetated mudflat (figure 5). The Cell 1 stations were revisited in 2004 and at that time, two species were abundant in the dredge construction area, *Schoenoplectus robustus* and *Spartina alterniflora* (table 1, figure 6). *Spartina alterniflora* had been planted along the edges post-construction in 2002. Total cover had increased from 0 to 52% in the constructed marsh (figure 7). Comparisons to the vegetative assemblages in the adjacent marsh revealed that cover in the constructed marsh was approaching levels found in the natural marsh (figure 7). Height of dominant vegetation in the constructed marsh (*Spartina alterniflora*) was almost twice that of dominant vegetation in the natural marsh (*Distichlis spicata* and *Spartina patens*) (figure 8). Species richness in the constructed marsh was lower than that of the natural marsh but had increased to a maximum of two species in any single plot compared to a maximum of six species in any single natural marsh plot. Mean values for species richness are shown in figure 9.

Cell 1 was over 50% vegetated two years after construction and the growth was vigorous. The succession of species on the constructed marsh will be tracked over time. The adjacent marsh does not appear to have been nourished after construction by the suspended dredge sediments, when the southern levee was purposely degraded post-construction (delta formation); the pre-construction cover, height, and richness (2001) were virtually the same as the post-construction values (2002). Cover, height, and richness actually decreased in the adjacent marsh from 2002 to 2004.

Elevation Survey:
An elevation survey was conducted "as built" following construction in 2002. The 2003 survey was only conducted in the area where Cycle II is to be built.

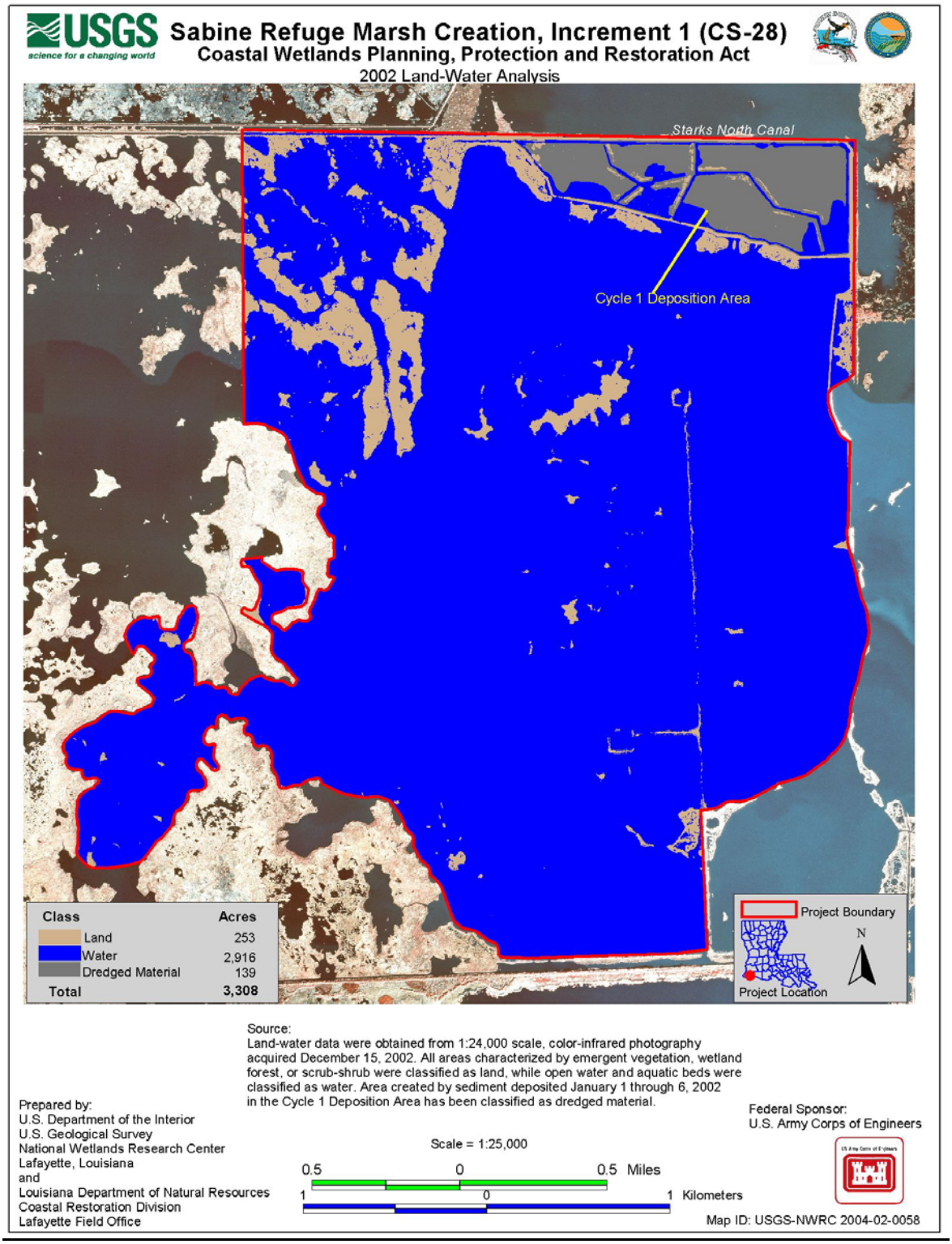

Figure 4. Land:water analysis from photography obtained December 15, 2002, with project boundaries and land, water, and dredge material acreages. Most of the dredge material is now vegetated.

Figure 5. Photograph of vegetation station (CS28-205) in the Cycle 1 deposition area at time of establishment (September 2002). The plants in the background are *Salicornia bigelovii*.

Figure 6. Photograph of vegetation station (CS28-205) in the Cycle 1 deposition area two years after construction (August 2004).

Table 1. Frequency of abundance (% of station's species present) of emergent vegetation species in the CS-28 project and reference areas.

	Reference Area			Cycle 1	
Scientific Name	**2001**	**2002**	**2004**	**2002**	**2004**
Bare ground	.	.	.	100	12.5
Amaranthus australis	10	10	.	.	.
Distichlis spicata	95	100	100.0	.	.
Ipomoea sagittata	.	5	.	.	.
Iva annua	25	5	.	.	.
Juncus roemerianus	5	10	7.1	.	.
Kosteletzkya virginica	5	.	.	.	.
Paspalum vaginatum	70	80	.	.	.
Schoenoplectus americanus	10	10	21.4	.	.
Schoenoplectus maritimus	30	35	.	.	.
Schoenoplectus robustus	.	.	57.1	.	12.5
Solidago sempervirens	.	.	7.1	.	.
Spartina alterniflora	5	15	0.0	.	87.5
Spartina patens	80	70	64.3	.	.
Symphyotrichum tenuifolium	10	.	14.3	.	.
Typha	5	5	7.1	.	.
Vigna luteola	.	.	7.1	.	.

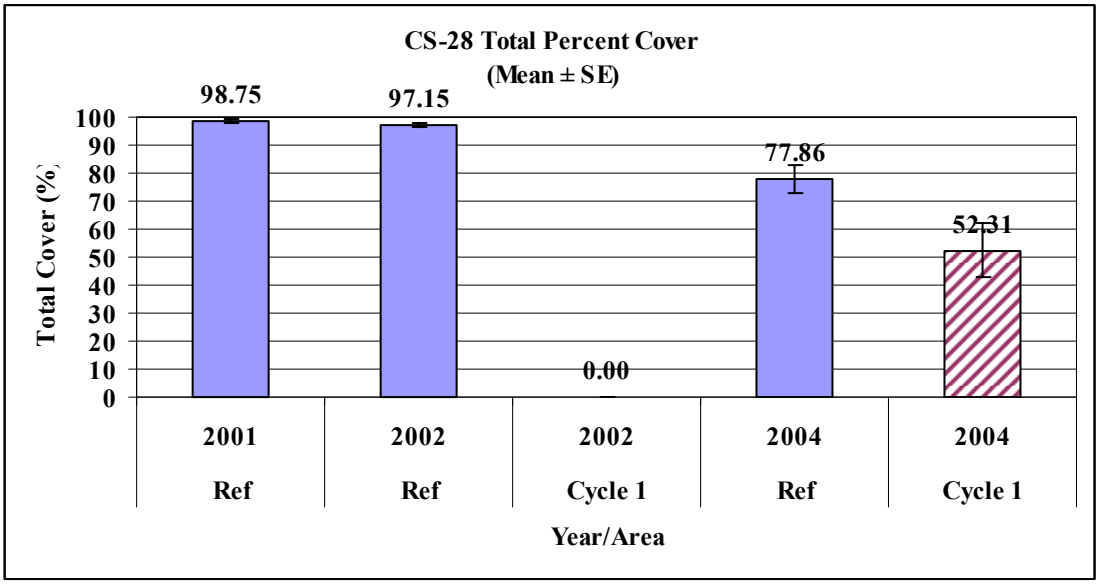

Figure 7. Total % cover of emergent vegetation at sites in pre-existing marsh adjacent to and within the CS-28 Cycle 1 dredge deposition area.

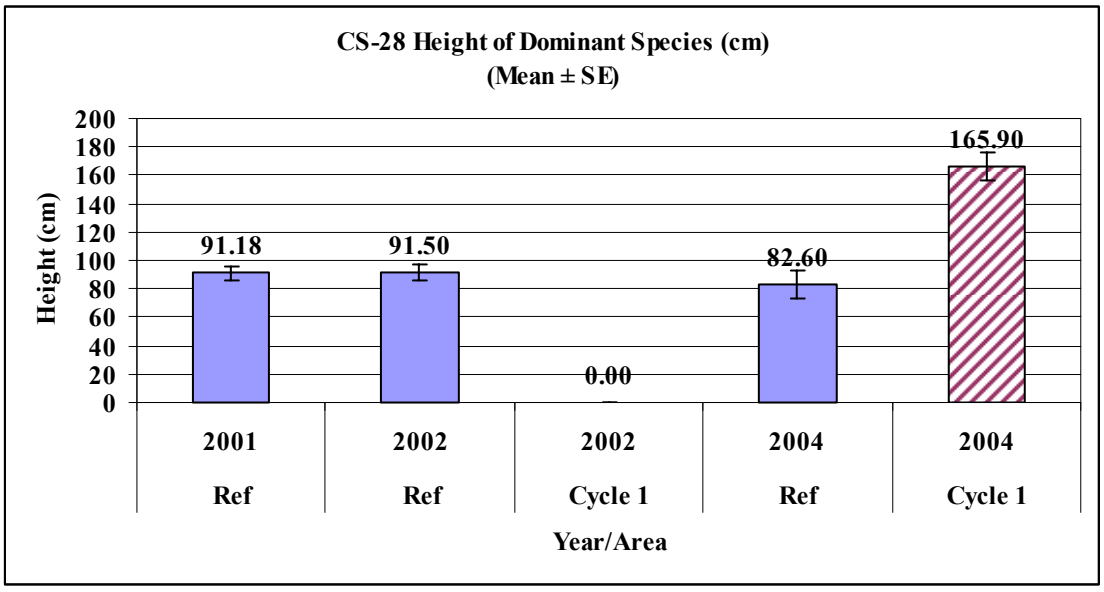

Figure 8. Height of dominant vegetation at sites in pre-existing marsh adjacent to and within the CS-28 Cycle 1 dredge deposition area.

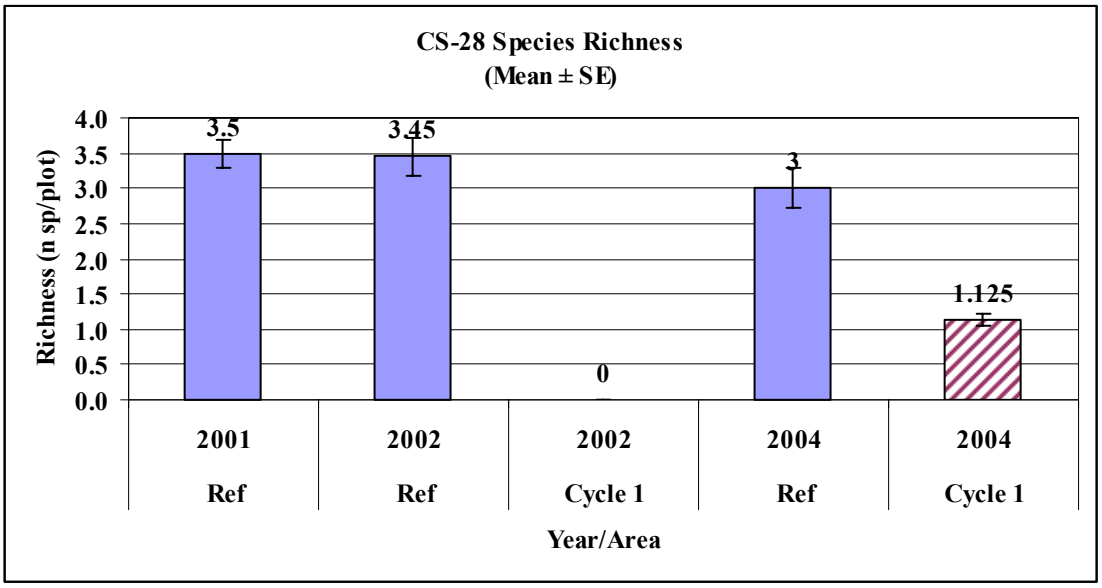

Figure 9. Mean species richness (± 1 standard error) at sites in pre-existing marsh adjacent to and within the CS-28 Cycle 1 dredge deposition area.

V. Conclusions

a. Project Effectiveness

The first cycle of marsh creation as part of the Sabine Refuge Marsh Creation (CS-28) project resulted in a densely covered marsh within two years. The plantings that were installed one year post-construction on the edge of the project area and along the edges of the interior canals enhanced colonization of the mudflat. The next vegetation sampling is scheduled for 2006.

The dredge does not appear to have nourished the adjacent pre-existing vegetated marsh. Future aerial photography and land: water analysis will reveal whether or not the land loss rate in the adjacent marsh has been affected by the project.

b. Recommended Improvements

Elevation surveys within the Cycle 1 project area need to be conducted.

c. Lessons Learned

Although the dredge material was covered in marsh vegetation within the first two years, the area is probably still settling. The project is currently highly successful.

VI. REFERENCES

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Appendix A
(Inspection Photographs)

No inspection was performed, therefore no pictures are available.

Appendix B
(Three-Year Budget Projection)

Note : There is no O&M budget for this project.

Appendix C
(Field Inspection Notes)

No inspection was performed, therefore field inspection notes are not available.