State of Louisiana

Coastal Protection and Restoration Authority

2015 Monitoring Plan

for

Sabine Refuge Marsh Creation (CS-28) Cycles 4 and 5.

State Project Number CS-0028
Priority Project List #8

June 2015
Cameron Parish

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MONITORING PLAN
SABINE REFUGE MARSH CREATION PROJECT CS-0028
Cycles 4-5

July 19, 2016

The project features covered by this plan are inclusive of and are identified as the Sabine Refuge Marsh Creation 4-5 (CS-0028). This plan outlines the provisions to monitor the project using standardized data collection techniques and to analyze that data to determine whether the project is achieving the anticipated benefits.

Construction of CS-0028-4 was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning and Restoration Act (CWPPRA) enacted on November 29, 1990 as amended. This project was approved on the 8 Priority Project List.

The construction components associated with this project are located in the Sabine National Wildlife Refuge, west of LA Highway 27, in large, open water areas north of Brown's Lake in Cameron Parish, Louisiana.

PROJECT DESCRIPTION, PURPOSE, LOCATION, AND GOALS

Description:
The Sabine Refuge Marsh Creation project area is composed of 3,300 acres located within the Chenier Plain in southwestern Louisiana, in the Calcasieu-Sabine Basin, west of LA Highway 27 and Calcasieu Lake. 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). Cycles 4 and 5 consist of the creation of 202 and 275 acres (respectively) of brackish marsh platform using material dredged from the Calcasieu River Ship Channel. In addition to cycles 4 and 5 funding became available to create a 241 and 171 acre cell located within Unit 1A of the Sabine Refuge boundary (figure 1).

Purpose:
The purpose of the project is to create emergent vegetated marsh, and to enhance and protect existing broken marsh. Most land loss in the area occurred between 1956 and 1978 (United States Department of Agriculture [USDA] 1993) with the highest loss rate around 1965 (Dunbar et. al. 1990). The current land loss rate in the project area is approximately 0.5 square miles per year (United States Army Corps of Engineers [USACE] 2000). One major cause for the land loss is vegetation death caused by hurricanes, oil and gas canals and the subsequent altered hydrology, and saltwater intrusion via large navigation canals acting as conduits for Gulf of Mexico water (USDA 1993). Saltwater from the Calcasieu Ship Channel (CSC) had been introduced from several sources including the GIWW through Alkali Ditch and and probably more importantly through West Cove Canal via Back Ridge Canal (Miller 1997). The combined effects of oil waterlogging and increased salinity may have accellerated marsh loss rates. If the marsh vegetation was stressed by extended inundation periods, or the

shift to more salt tolerant vegetation could not keep pace with the death of existing vegetation, then unvegetated mudflat may have resulted. Without vegetation to hold the substrate together or increase accretion, the marsh is more easily deteriorated. When the substrate elevation becomes too low, emergent vegetative growth is prohibited even if favorable salinity conditions return (Turner and Cahoon 1987).

The goal of the project within cycles 4 and 5 consists of dredging approximately 1,000,000 yd3 of material to create 230 acres (93 ha) of emergent marsh per cycle (figure 2). Additional funding was available which allowed the USFWS to pump two additional cells located in unit 1A. These cells allowed for an additional 241 and 171 acres to be pumped (figure 2). Levee construction for Cycle 4 and Cycle 5 began in September 2014. Dredging for Cycle 4 and Cycle 5 began in February 2015 (figure 2). Aerial photography and vegetation will be monitored in Cycles 4 and 5. The initial height of the dredged material (slurry) is to be no more than +4.5 ft Mean Low Gulf (MLG) (2.29 ft Geoid 12A) to settle to a final target elevation of approximately +2.5 ft MLG (.29 ft Geoid 12A) after initial consolidation. To contain the dredge material initially, perimeter earthen retention dikes will be constructed to a maximum height of + 6.5 ft MLG (4.29 ft Geoid 12A), with a minimum of 1:3 side slopes, and a 5 ft crown width. Interior earthen dikes will be similar but have a maximum height of (+ 3.5 to 4.0 ft MLG or + 1.29 ft to 1.71 ft Geoid 12A). The dikes will be allowed to remain until the dredge material has stabilized and been colonized by emergent vegetation. After stabilization, the remaining dikes will be breached to allow fisheries access and sediment distribution into the adjacent marsh (USACE 2000). Since Cycles 4 and 5 have a separate project budget from the original CS-28 project, Cycles 4 and 5 have their own monitoring plan.

Should the project prove to be effective, the long term coupling of channel dredging and beneficial use of dredged material in the CS-28 project area and surrounding areas will allow for continued marsh creation.

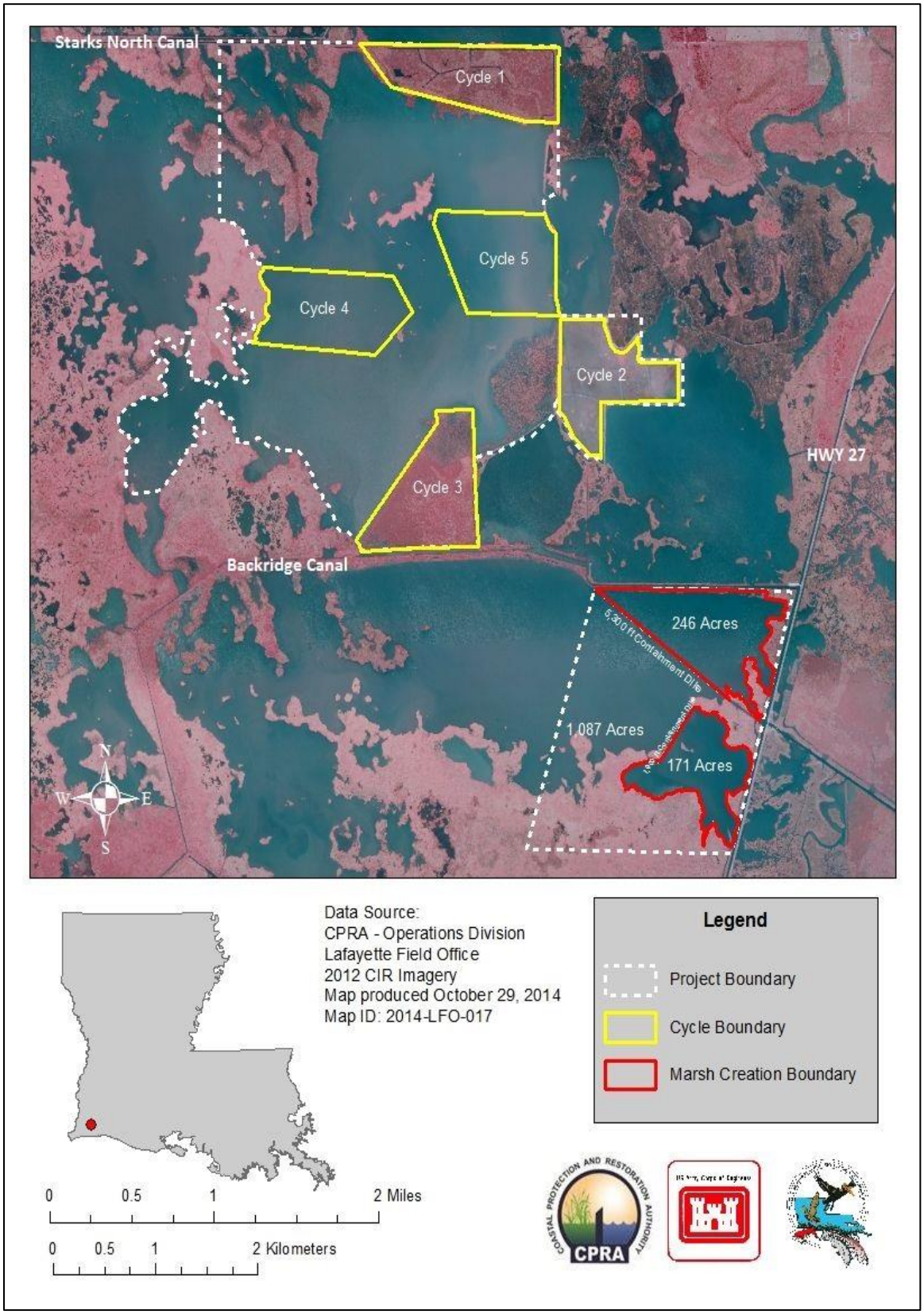

Figure 1. Sabine Refuge Marsh Creation (CS-28) project area boundary, deposition area boundaries for cycles 1-5 and additional unit 1A deposition areas.

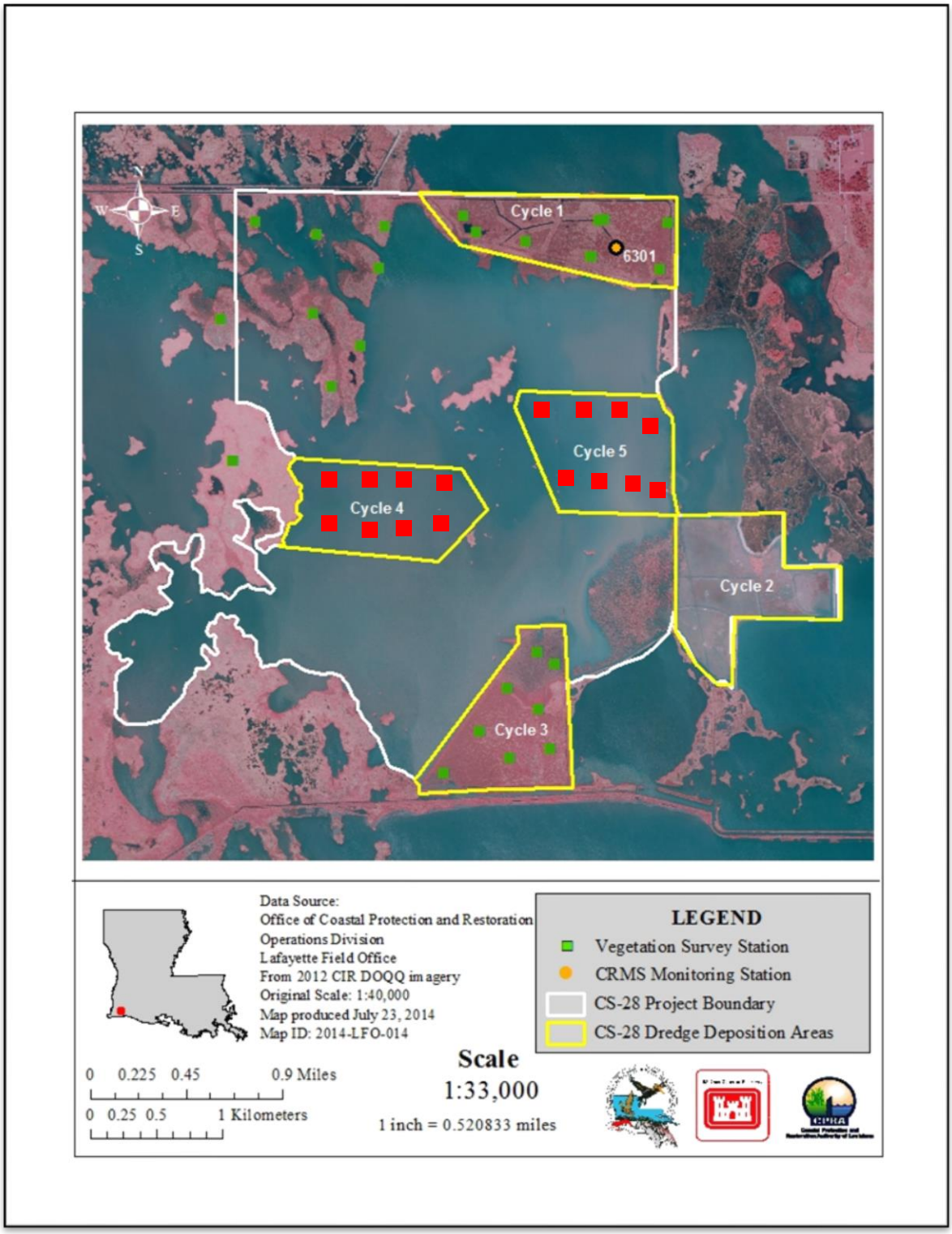

Figure 2. Location of Cycles 1, 3 and Reference vegetation stations and proposed Cycles 4, and 5 vegetation stations.

The specific goals are:

1. Place dredge spoil slurry to a maximum height of 4.5 ft MLG (2.21 ft Geoid 12A) to settle to a height of 2.5 ft MLG (.21 ft Geoid 12A), after five years, for each of five dredging cycles

2. Create 202 acres (cycle 4) and 275 acres (cycle 5) of emergent vegetated wetland.

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

Reference Area

Monitoring appropriate reference areas concurrently with the project allows time controlled evaluation of the project's effectiveness. The main criteria for selecting a reference area are similar soil type, vegetation, hydrology, and proximity to the project area. There are nine vegetation reference stations associated with the CS-28 project area. Seven of the stations were established within CS-28 project area and two of the stations (CS23-149 and CS23-150) are historical vegetation stations used for monitoring the CS-23 project area (figure 2).

CRMS will provide a pool of reference sites within the same basin and across the coast to evaluate project effects. At a minimum, every project will benefit from basin-level satellite imagery and land:water analysis every 3 years, and supplemental vegetation data collected through the periodic Chabreck and Linscombe surveys. Other CRMS parameters which may serve as reference include Surface Elevation Table (SET) data, accretion (measured with feldspar), hourly water level and salinity, and vegetation sampling. A number of CRMS stations are available for each habitat type within each hydrologic basin to supplement project-specific reference area limitations.

ITEMS REQUIRING MONITORING

The Coastwide Reference Monitoring System (CRMS) - Wetlands is a network of 392 monitoring sites distributed throughout the coastal zone of Louisiana. Hydrographic, vertical accretion, elevation change, vegetation, soils, and aerial photography data are collected at each CRMS site. Although no CRMS monitoring stations are located in the CS-28 cycle 4-5 project area, there are several CRMS stations located nearby which can be used as a references to determine project effectiveness.

The following monitoring strategies will provide the information necessary to evaluate the specific goals of restoring/creating approximately 230 and 232 acres (respectively) within cycles 4 and 5.

A. **Aerial Photography -** In order to evaluate land/water ratios in the fill areas, land/water data will be obtained from digital imagery with 1-meter resolution. The photography will be georectified using standard operating procedures described in Steyer et al. (1995, revised 2000), and land/water ratios will be determined. Aerial photography will be captured using the nearest CRMS coastwide flights to Y0 (preconstruction) and postconstruction when coastwide imagery becomes available near Y5, Y10, and Y 19.

B. **Emergent Vegetation -** To document the condition of the emergent vegetation in the fill areas over the life of the project, vegetation will be monitored at 16 sampling stations, 8 within each unit, using a modified Braun Blanquet sampling method as outlined in (Folse et al. 2012). Stations will be established uniformly across the created marsh and the location of the stations will be such that they coincide with at least some of the elevation transects or settlement plates.Sixteen stations with replicate plots will be established within the dredged areas. Percent cover, dominant plant heights, and species composition will be documented in 2m x 2m sampling plots marked with two corner poles to allow for revisiting the sites over time. Vegetation data from the relevant CRMS sites within the area will be used as reference stations to compare species composition over time. Vegetation will be monitored post construction in Y3, Y5, Y10, Y15 and Y19.

C. **Elevation Survey -** To document the settlement of the slurry to an elevation of 2.5ft MLG after five years a cross sectional survey is required across each unit. Survey transects will be laid out every 500 feet at a minimum in the created marsh and extending into the open water and marsh adjacent to the marsh creation cells. Position, elevation, and water depth will be recorded every 100 feet along each transect. There are sixteen vegetation monitoring stations within the area that are marked with ¾ inch PVC poles. The surveyor will have to give those areas a 30 foot buffer. Elevation surveys will be conducted at Y3. Y10 and Y 19.

MONITORING BUDGET

The cost associated with the Monitoring of the features outlined above in this plan for the 20 year project life is $366,091.

RESPONSIBILITIES – MONITORING

A: CPRA will:

1. Conduct joint site inspections with USFWS after major storm events if determined to be necessary by CPRA and/or USFWS. CPRA will submit to USFWS, a report detailing the condition of the project features.

2. Provide a total contribution equal to the amount outlined in the Memoranda of Agreement for the 20 year life of the project.

3. Coordinate and oversee all monitoring data collection.

4. Ensure that all data goes through quality control procedures.

5. Analyze the data and report on the status of the project.

6. The federal and state representatives appointed above shall meet as necessary to review the reports and discuss the project status.

B. USFWS will:

1. Conduct joint site inspections with CPRA after major storm events if determined to be necessary by CPRA or USFWS.

2. Provide a total contribution equal to the amount outlined in the Memoranda of Agreement for the 20 year life of the project.

3. Review reports submitted by CPRA and provide comments.

Notes

A. Implementation

4th cycle	Start Construction	September 2014
	End Construction	May 2015
5th cycle	Start Construction	September 2014
	End Construction	May 2015

2) USACE Point of Contact: Scott Wandell (504) 862-2201

3)	DNR project manager: DNR monitoring manager:	Darrell Pontiff Mike Miller	(337) 482-0683 (337) 482-0662
4)	USFWS project manager:	Robert Dubois	(337) 291-3127
5)	Sabine NWR manager:	Terry Delanie	(337) 762-3816

6) The twenty-year monitoring plan development and implementation budget for this project is $366,091. Summary reports on coastal restoration efforts within cycles 4 and 5 will be available in Y4, and Y16. Comprehensive reports on coastal restoration efforts in the Calcasieu-Sabine hydrologic basin will be available in Y6, Y11 and Y20. These reports will describe the status and effectiveness of the project as well as cumulative effects of restoration projects in the basin.

7) Available ecological data, including both descriptive and quantitative data, will be evaluated in concert with the statistical analysis to aid in determination of overall project success. This includes ancillary data collected in the monitoring project but not used directly in statistical analysis, as well as data available from other sources (USACE, USFWS, LDNR, LSU, etc.).

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Appendix I

Figures
and
Project Monitoring Budget

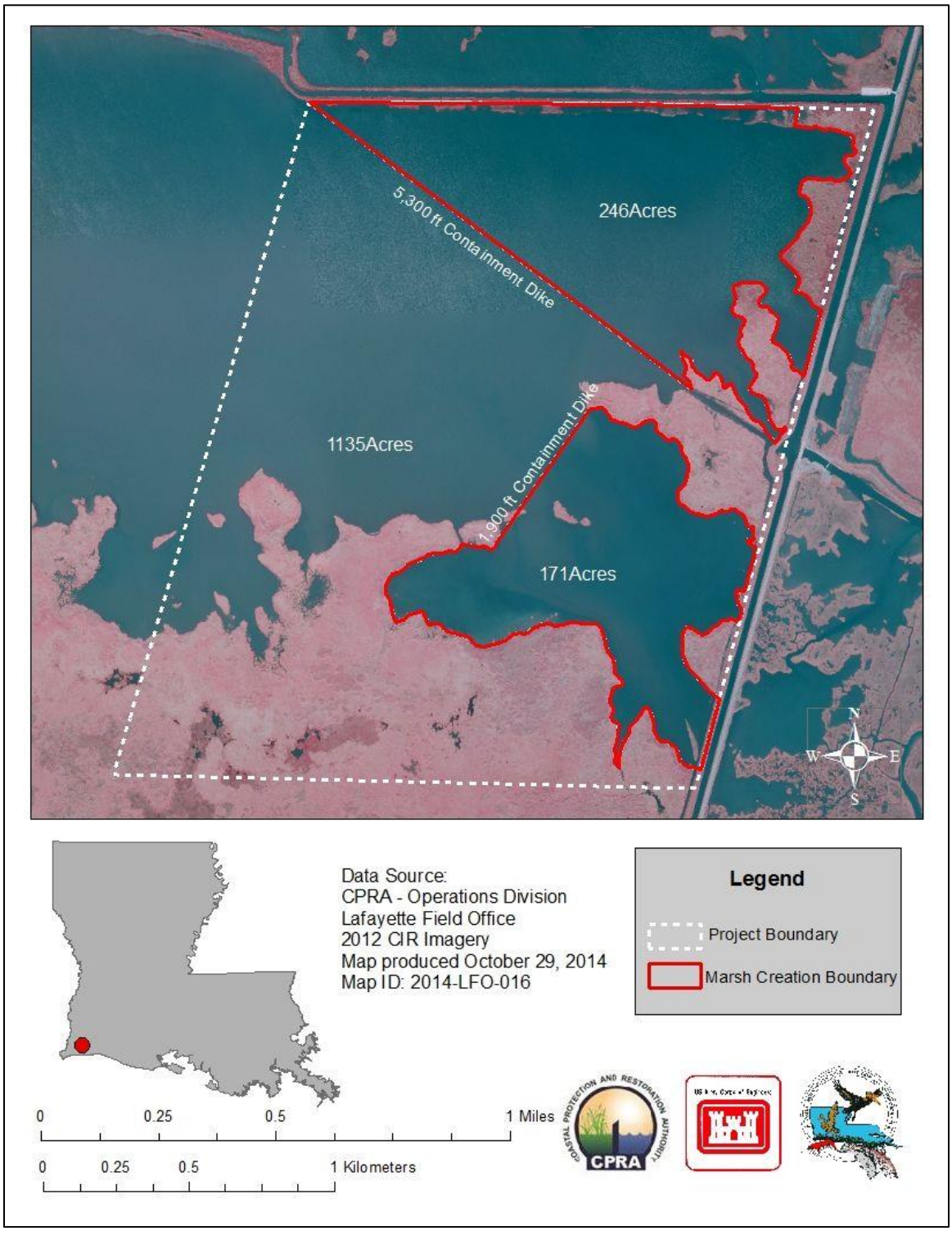

Figure 1a. Marsh creation cells and project boundary for the Unit 1A area located within the Sabine National Wildlife Refuge.

CS-28 East Sabine Marsh Creation Cycles 4 and 5

Operation & Maintenance and Monitoring

Project Priority List 8 (ver.052915)

O&M Cost Considerations:

Annual Costs

	Federal	State	TOTAL
Annual Inspections	$0	$0	**$0**
Annual Cost for Operations	$0	$0	**$0**
Preventive Maintenance	$0	$0	**$0**

Specific Intermittent Costs

Construction Items	Unit	Quantity	Unit Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Contractor Mobilization/Demobilization	LS	0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal				$0	$0	$0	$0	$0	$0	$0	$0
Subtotal w/ 25% contingency				**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
State Monitoring Items											
Surveys		1	$40,000			$40,000					
Aerial Photography		1	$29,947					$29,947			
Vegetative Analysis		1	$6,250			$6,250		$6,250			
Data analysis and report		1	$37,500						$37,500		
Summary Report		1	$6,250				$6,250				
Subtotal				**$0**	**$0**	**$46,250**	**$6,250**	**$36,197**	**$37,500**	**$0**	**$0**
State Costs											
Engineering Monitoring											
Engineering and Design Cost											
Administrative Cost											
Eng Survey											
0 days @ $3,755 per day											
Inspection (10 hrs/day)											
0 days @ $1,952 per day											
Subtotal				**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Monitoring & State Subtotal				**$0**	**$0**	**$46,250**	**$6,250**	**$36,197**	**$37,500**	**$0**	**$0**
Federal Costs											
Administrative Cost											
Subtotal				**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Fed Monitoring Items											
Surveying											
Final Report											
Subtotal				**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
			Total	**$0**	**$0**	**$46,250**	**$6,250**	**$36,197**	**$37,500**	**$0**	**$0**

Specific Intermittent Costs													
	Year 9	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**	**Year 19**	**Year 20**	
Construction Items													
Contractor Mobilization/Dei	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
State Monitoring Items													
Surveys		$40,000									$40,000		
Aerial Photography		$29,947									$29,947		
Vegetative Analysis		$6,250					$6,250				$6,250		
Data analysis and report			$37,500									$37,500	
Summary Report								$6,250					
	$0	**$76,197**	**$37,500**	**$0**	**$0**	**$0**	**$6,250**	**$6,250**	**$0**	**$0**	**$76,197**	**$37,500**	**$366,091**
State Costs													
Engineering Monitoring													
Engineering and Design Cost													
Administrative Cost													
Eng Survey													
Inspection (10 hrs/day)													
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
	$0	**$76,197**	**$37,500**	**$0**	**$0**	**$0**	**$6,250**	**$6,250**	**$0**	**$0**	**$76,197**	**$37,500**	**$366,091**
Federal Costs													
Administrative Cost													
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
Fed Monitoring Items													
Surveying													
Final Report													
	$0	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	
	$0	**$76,197**	**$37,500**	**$0**	**$0**	**$0**	**$6,250**	**$6,250**	**$0**	**$0**	**$76,197**	**$37,500**	**$366,091**