State of Louisiana

Coastal Protection and Restoration Authority of Louisiana

2022 Monitoring Plan

for

Cameron Meadows Marsh Creation and Terracing (CS-0066)

State Project Number CS-0066
Priority Project List #22

July 2022
Cameron Parish

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MONITORING PLAN
FOR
CAMERON MEADOWS MARSH CREATION AND TERRACING CS-0066

The project features covered by this plan are inclusive of and are identified as the Cameron Meadows Marsh Creation and Terracing Project (CS-0066). 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-0066 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 22 Priority Project List.

The construction components associated with this project are located in Cameron Parish, approximately 18 miles west of Cameron, 5 miles north of the Gulf of Mexico, northeast of Johnson's Bayou, and south of Cameron Meadows Gas Field. The borrow area is located on state water bottoms within the Gulf of Mexico approximately five miles south of the project area.

PROJECT DESCRIPTION, PURPOSE, LOCATION, AND GOALS

Description:
The Cameron Meadows Marsh Creation Project area is 989 acres in the Calcasieu/Sabine Basin. The location of the project is 18 miles west of Cameron, 5 miles North of the Gulf of Mexico, and South of Cameron Meadows Gas Field (Figure 1).

Purpose:
Significant marsh loss in the Cameron Meadows area is attributed to rapid fluid and gas extraction beginning in 1931, as well as Hurricanes Rita, Gustav and Ike. Rapid fluid and gas extraction resulted in a surface down warping along distinguished geologic fault lines. In the decades that followed, organic matter filled the low area and an emergent marsh community became established. During the hurricanes of 2005 and 2008, the physical removal of the marsh coupled with low rainfall has resulted in the conversion of intermediate to brackish marsh to approximately 7,000 acres of open water. In addition to these direct losses, significant marsh loss has resulted from saltwater intrusion and increased water levels associated with storm damage and gas extraction.

The goal of this project is to restore approximately 400 acres of coastal marsh habitat. The project also seeks to reverse the conversion of wetlands to shallow open water in the project area through re-establishment of hydrologic connectivity. Sediments were hydraulically dredged from the Gulf of Mexico and pumped via pipeline to create approximately 308 acres of marsh. 11,844 linear feet of terraces were constructed to reduce fetch and the erosive potential of wind-generated wave energy. Terraces were constructed to +3.0 feet NAVD 88 (Geoid 12A), with a 15 feet crown width.

In order to meet the project goals of a marsh elevation that is comparable to the marsh elevation of nearby healthy marsh, 0.87ft NAVD88 (Geoid 12A) has been identified as the marsh elevation.

GeoEngineers were tasked to perform consolidation settlement calculations so as to meet a constructed marsh elevation of +1.0 feet at target year (TY) five (0.87 feet plus 0.13 feet of RSLR. A target fill elevation of +1.5 feet would settle to an approximate elevation of +1.0 foot NAVD88 Geoid 12A at TY5. A half foot (+0.5 ft) of maximum vertical tolerance will be accepted. Data taken from nearby CRMS sites show a slightly higher marsh elevation of 0.90ft NAVD88 (Geoid 12A).

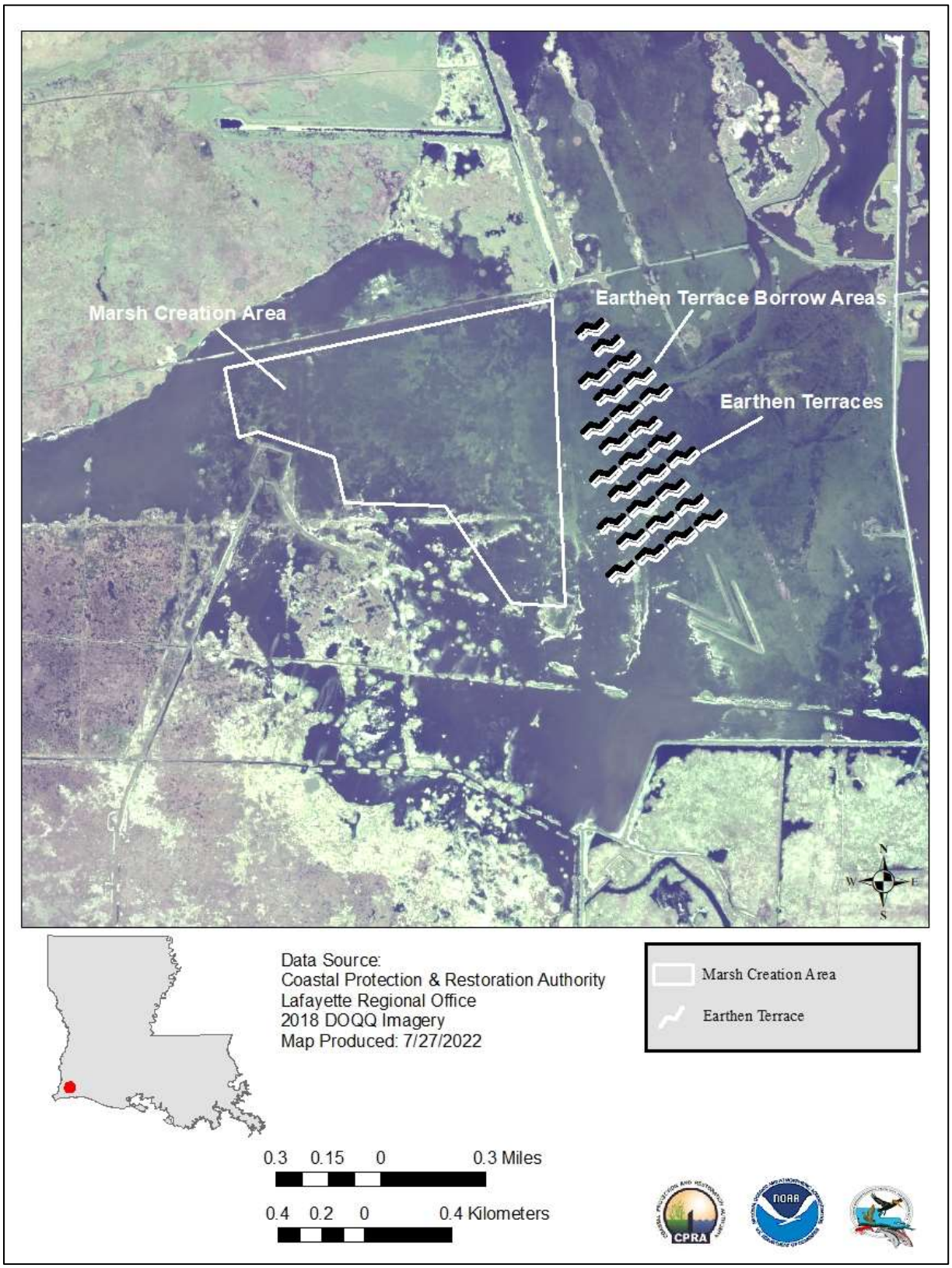

Figure 1. Cameron Meadows Marsh Creation and Terracing (CS-0066) project area and features.

Goals:
The specific project goals are:

1. Construct an emergent marsh that is 80% vegetated and contains 304 acres of created marsh.

2. Construct a marsh that settles to the height predicted by the established settlement curves within the project area and maintains an elevation of 1.0 (+ 0.5 ft) (Geoid 12A) NAVD88 at the end of the project life.

3. Create 12,150 linear feet of terraces to reduce wind generated wave fetch, and slow tidal exchange within the project area.

Features:
Approximately 4.4 million cubic yards of dredging material is available from a borrow site located approximately five miles offshore in the Gulf of Mexico (Figure 2). The total dredged volume necessary to construct the marsh cell to a +1.5 to +2.0 ft Geoid 12A elevation is 1,720,923 cubic yards (Final accepted quantity). The dredge material was placed into the marsh creation cell north of Highway 82 and the Gulf of Mexico shoreline and south of Central Canal located on the Sabine National Wildlife Refuge, to restore 308 acres of intermediate and brackish marsh. Terrace construction consisted of 27 terraces totaling approximately 11,884 linear feet of earthen terraces. The 27 terraces are aligned to avoid the pipelines to the west and east. The terraces were constructed in the open water areas between the marsh creation cell and the shoreline to reduce tidal exchange and scour. The borrow site was designed to avoid and minimize impacts to offshore infrastructure and sensitive aquatic habitats. The sediment was transported into the project area from the borrow site under Highway 82 via a permanently installed 42" concrete casing. The concrete casing will offer access under the Highway for future projects as a permanent pipeline right of way allowing further restoration of this critical transportation corridor. Retention levees were degraded to support estuarine fisheries access and to achieve a functional marsh. The project would result in approximately 450 net acres of intermediate-brackish marsh over the 20-year project life.

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-66 project area, there are several CRMS stations located nearby which can be used as a references to determine project effectiveness (Figure 2).

The following monitoring strategies will provide the information necessary to evaluate the specific goals of restoring/creating approximately 308 acres of emergent marsh while establishing 11,884 feet of earthen terraces.

A. **Water Level** - Water level (ft) readings will be recorded hourly at nearby CRMS sites within the vicinity of the project area. Water level readings will be used to determine the frequency, depth, and duration of flooding on a known marsh elevation within the project area, and to determine flooding within the fill area after each of the fill area surveys.

B. **Emergent Vegetation** - To document the condition of the emergent vegetation in the project area over the life of the project, vegetation will be monitored at 15 sampling stations 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. Ten (10) stations will be established within the dredged areas and five (5) stations in the overflow area. Percent cover, dominant plant heights, and species composition will be documented in 2m x 2m sampling plots marked with 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, Y6, Y10 and Y14, and Y17.

C. **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 coast-wide flights to Y0 (preconstruction) and post construction when coast-wide imagery becomes available near Y5, Y14, and at a later date if deemed necessary.

D. **Elevation Survey** - To document the settlement of the slurry to the predicted settlement curves a cross sectional survey in NAVD 88 Geoid 12A is required across the fill area. 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 fifteen vegetation monitoring stations within the fill 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. Y6, Y10, Y14 and Y17.

E. **Soil Properties -** Project specific soil cores will be collected at 5 sites, within the contained site and 2 in the surrounding uncontained deposition sites upon establishment at years Y2, Y3, Y6, Y10, Y14, and at a later date if deemed necessary. Analysis of soil properties will include but not necessarily be limited to soil pH, salinity (EC), bulk density, moisture, percent organic matter, wet/dry volume, and texture (Particle Size Distribution) analysis.

F. Due to the project area being an impounded unit, supplemental data from CRMS sites will also be available as reference sites and can be used to assess trends and changes around the project area. Those data include hourly salinity and water level, annual vegetation, rates of elevation change, vertical accretion, and shallow subsidence as well as soil composition and aerial photography analysis. Supplemental data will be used in OM&M Reports as needed.

MONITORING BUDGET

The cost associated with the Monitoring of the features outlined above in this plan for the 20-year project life is $838,924.53 (Table 1).

RESPONSIBILITIES – MONITORING

A: CPRA will:

1. Conduct joint site inspections with NMFS after major storm events if determined to be necessary by CPRA and/or NMFS. CPRA will submit to NMFS, 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. NMFS will:

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

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	Start Construction: End Construction:	January 2021 May 2022
B.	Monitoring	Initiated:	June 2022
C.	NOAA Project Manager	Jennifer Smith	225-757-5230
D.	CPRA Project Manager	Jessica Diez	225-342-1477
E.	CPRA Project Engineer	Tye Fitzgerald, P.E.	225-342-6507
F.	CPRA Monitoring Manager	Mark Mouledous	337-482-0661
G.	CPRA Operations Manager	Dion Broussard, P.E.	337-482-0686

REFERENCES

Barras, J.A., 2006, Land area change in coastal Louisiana after the 2005 hurricanes—A series of three maps: U.S. Geological Survey Open-File Report 2006–1274. (Also available at http://pubs.usgs.gov/of/2006/1274/.)

C&C Technologies, Inc. Survey Report Cameron Meadows Marsh Creation and Terracing Project. Lafayette, LA. February 2015.

CB&I. 2013. Louisiana Borrow Area Management and Monitoring; Shaw Environmental and Infrastructure, Baton Rouge, LA. 29 pp.

Folse, T. M., J. L. West, M. K. Hymel, J. P. Troutman, L. A. Sharp, D. Weifenbach, T. McGinnis, and L. B. Rodrigue. 2008 (revised 2012). A Standard Operating Procedures Manual for the Coastwide Reference Monitoring System-*Wetlands*: Methods for Site Establishment, Data Collection, and Quality Assurance/Quality Control. Louisiana Coastal Protection and Restoration Authority, Office of Coastal Protection and Restoration. Baton Rouge, LA. 191 pp.

Steyer, G.D., R.C. Raynie, D.L. Steller, D. Fuller, and E. Swenson. 1995 (revised 2000). Quality management plan for the Coastal Wetlands Planning, Protection, and Restoration Act monitoring program. Open-file series no. 95-01 (Revised June 2000). Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division. 97 pp.

Thompson, W. and Borne, B., 2015. *Cameron Meadows Marsh Creation and Project (CS-66) – 30% Design Report.* Baton Rouge, Louisiana Coastal: CB&I Coastal Planning & Engineering, Inc. 45P

Appendix I

Figures
and
Project Monitoring Budget

Figure 2. Cameron Meadows Marsh Creation Project (CS-0066) borrow area and CRMS site locations.

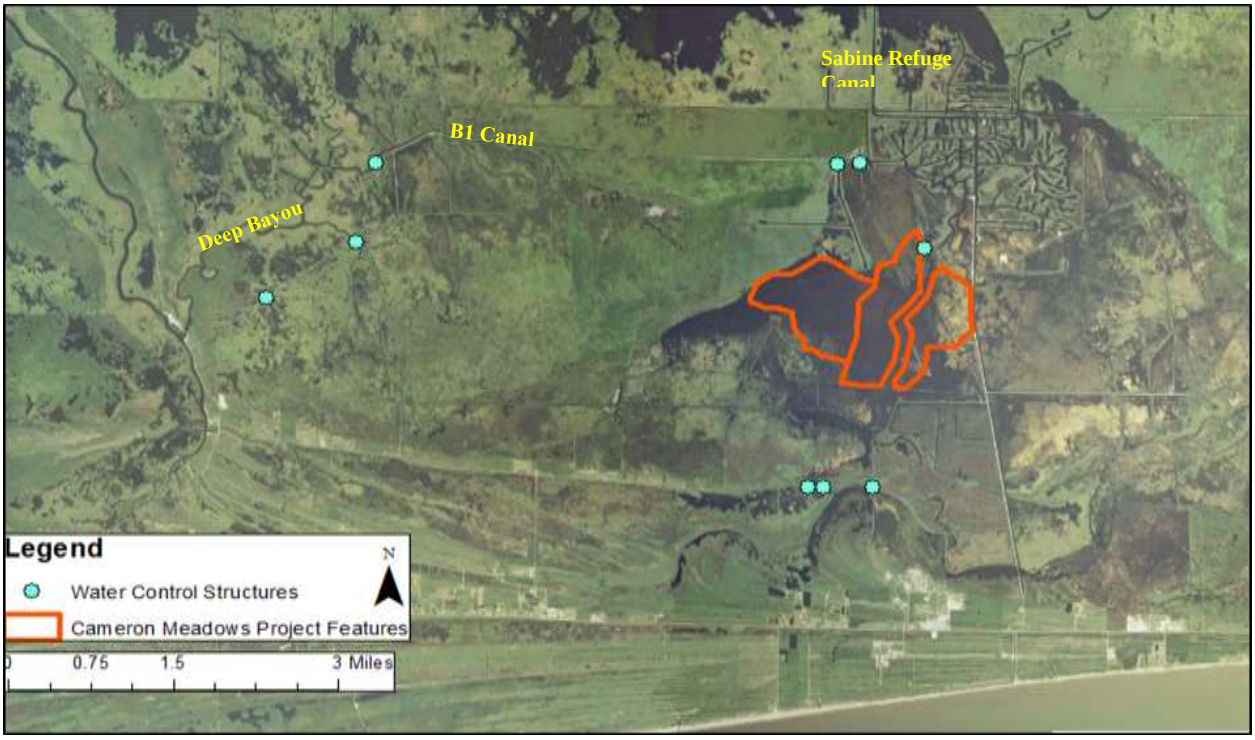

Figure 3. Water control structure locations (n=9) in and around the CS-66 project location (from CB&I 2015).

Monitoring Cost Estimate CS-66	Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Terrace Vegetation Surveys *includes 20 hours planning, 30 hours data collection (1 day; 3 people; 10 hrs/day), 20 hours data management*		$4,259.85		$4,259.85			$4,259.85				$4,259.85				$4,259.85			$4,259.85			
Emergent Vegetation Surveys *includes 20 hours planning, 30 hours data collection (1 day; 3 people; 10 hrs/day),20 hours data management*				$4,259.85			$4,259.85				$4,259.85				$4,259.85			$4,259.85			
OM&M Reports *Includes 6 wks of CPRA staff time at $60.86/hr*					$14,605.20			$14,605.20				$14,605.20				$14,605.20			$14,605.20		
Soils includes 10 hours planning, 30 hours data collection (1 day; 3 people; 10 hrs/day), 15 hours data management			$3,347.03	$3,347.03			$3,347.03				$3,347.03				$3,347.03						
Monitoring Project Administration *Includes 40 hours of CPRA staff time per year at $60.86/hr + 20 hours during Spatial Analysis years + 40 hours during Elevation Survey years*		$3,651.50	$2,434.40	$4,868.80	$2,434.40	$3,651.50	$4,868.80	$2,434.40	$2,434.40	$2,434.40	$4,868.80	$2,434.40	$2,434.40	$2,434.40	$6,085.80	$2,434.40	$2,434.40	$4,868.80	$2,434.40	$2,434.40	$2,434.40
IDC Charges (based on FY22; 212.65%)		$7,764.91	$12,294.20	$26,529.52	$36,234.71	$7,764.91	$26,529.52	$36,234.71	$5,176.75	$5,176.75	$26,529.52	$36,234.71	$5,176.75	$5,176.75	$29,117.47	$36,234.71	$5,176.75	$19,412.07	$36,234.71	$5,176.75	$5,176.75
Spatial Analysis *USGS will analyze CRMS funded coastwide flights or equivalent satellite imagery. $30,000 is a placeholder until a quote is requested.*		$30,000.00				$30,000.00									$30,000.00						
Elevation Surveys *cost-estimate derived from using CS-28 cycle 3 as comparable during 95% design .*				$40,000.00			$40,000.00				$40,000.00				$40,000.00			$40,000.00			
TOTAL Projected Monitoring Costs	**$864,483.63**	$45,676.26	$18,075.63	$83,265.05	$53,274.31	$41,416.41	$83,265.05	$53,274.31	$7,611.15	$7,611.15	$83,265.05	$53,274.31	$7,611.15	$7,611.15	$117,070.00	$53,274.31	$7,611.15	$72,800.57	$53,274.31	$7,611.15	$7,611.15

Figure 5. 20 year Monitoring cost estimate for Cameron Meadows Marsh Creation and Terracing Project (CS-66).