



State of Louisiana

**Coastal Protection and Restoration Authority of
Louisiana**

Monitoring Plan

for

**Mid Breton Landbridge Marsh Creation and
Terracing (BS-0032)**

State Project Number BS-0032
Priority Project List 27

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Monitoring Plan for Mid Breton Landbridge Marsh Creation and Terracing (BS-0032)

Priority Project List 27

The Coastal Protection and Restoration Authority of Louisiana (CPRA) and the United States Fish and Wildlife Service (USFWS) agree to carry out the terms of this monitoring plan for the Mid Breton Landbridge Marsh Creation and Terracing project (BS-0032). As outlined in this plan, monitoring data will be collected using standardized data collection techniques and will be analyzed to determine whether the project is achieving the anticipated benefits. Operations, Maintenance, and Monitoring (OM&M) reports will be written to document the condition of the project features, present and interpret monitoring data, and if needed, make recommendations for adaptive management of the project. This monitoring plan, forthcoming OM&M reports, and additional documents pertaining to BS-0032, can be accessed through CPRA's Coastal Information Management System (CIMS) website at <http://cims.coastal.louisiana.gov>.

Construction of the Mid Breton Landbridge Marsh Creation and Terracing project 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.

1. PROJECT DESCRIPTION, GOALS, and FEATURES

Description

The Mid Breton Landbridge Marsh Creation and Terracing project (herein referred to as BS-0032) is located in the Breton Sound Basin along Bayou Gentilly, in Plaquemines Parish, Louisiana. It is bounded by Delacroix Island to the northeast, Lake Petit to the south, and Lost Lake to the west (Figure 1).

The primary influence of marsh loss in the project area has been tropical storms and hurricanes. From 1932 to 1990, the Caernarvon Mapping Unit lost 14,240 acres of marsh. Prior to Hurricane Katrina, the greatest loss documented occurred between 1956 and 1974 and coincided with Hurricane Betsy and an increase in oil and gas industry activity, including the dredging of pipeline and access canals, which caused land loss through saltwater intrusion and erosion. In 2005 Hurricane Katrina devastated the area resulting in substantial marsh loss. Approximately 24,960 acres of marsh around the upper and central portions of Breton Sound were converted to open water by mechanical removal of the marsh or by marsh submergence during Hurricane Katrina (Barras 2006). The loss rate in the project area is estimated to be -1.99 % per year for the period 1984 to 2016.

A number of projects have been proposed in the Caernarvon Diversion outfall area through programs such as CWPPRA, Louisiana Coastal Area Ecosystem Restoration Program LCA, and Supplemental Water Resources Development Act (WRDA) funding, with only a few being constructed or authorized for construction. Without restoration, this region will continue to see the coalescence of water bodies and higher wave generated erosion rates. This increase in wave rate would greatly affect areas such as Grand Lake, Lake Petit, and the surrounding marsh areas resulting in more direct connection between interior intermediate marshes and the open brackish Black Bay system. Reestablishment of the Breton Sound marshes is dependent on both the maintenance and restoration of the marsh framework as well as optimizing the flow and sediments delivered by the Caernarvon Freshwater Diversion. The 2011 BS-03a Monitoring Report (Moore et al. 2011) recommended marsh creation and terracing within large open water areas as a restoration plan to combat marsh loss in the area.

This project is one increment in a series of marsh creation projects proposed in the 2017 State Master Plan (CPRA 2017) in order to achieve a landbridge in Breton Sound Basin that would limit the exchange of brackish water into the interior freshwater marshes and reestablish some of the marshes that were lost during Hurricane Katrina. In the 2017 State Master Plan there are six marsh creation projects proposed in this area to form that contiguous landbridge. Currently, there are various increments of this landbridge proposed through the CWPPRA Program that are in various stages of planning (BS-0037, BS-0038, BS-0041, BS-0042).

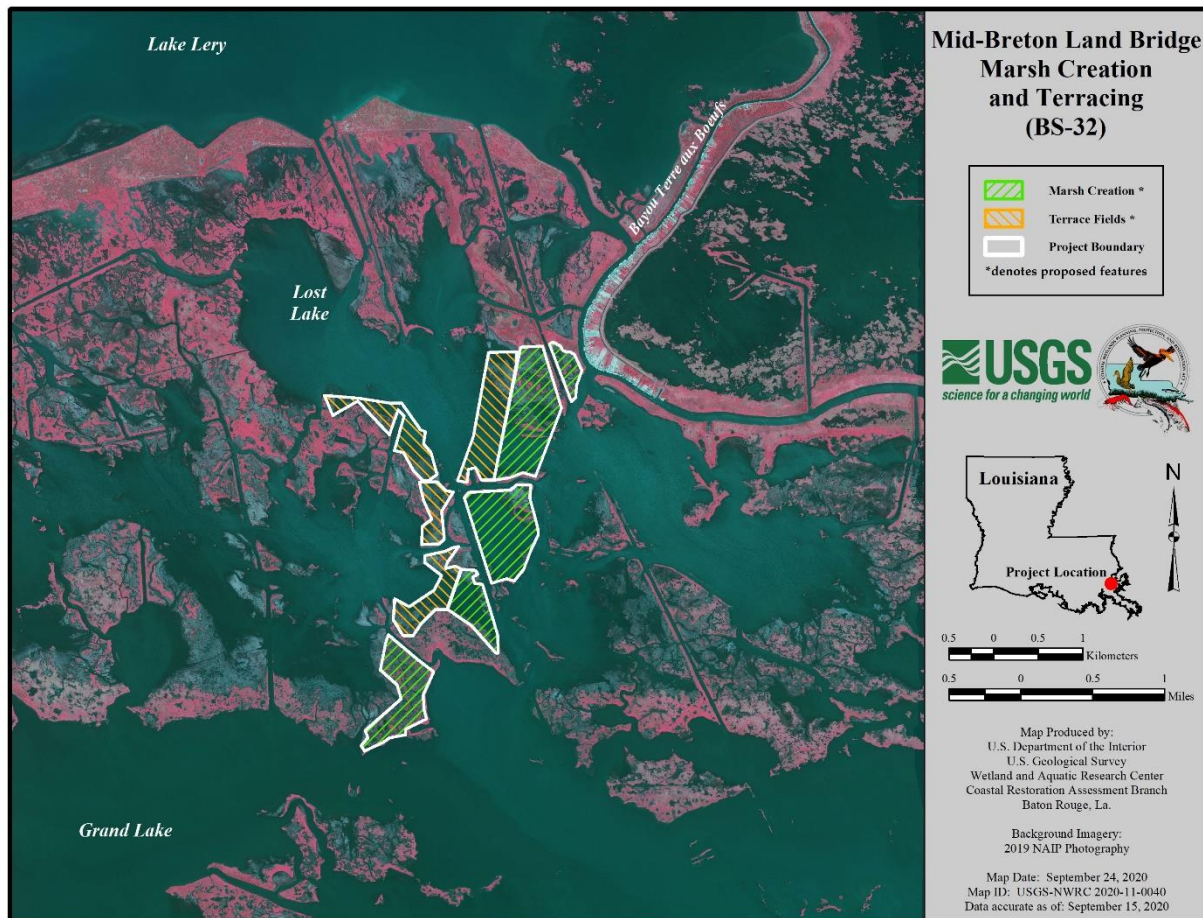


Figure 1. Mid Breton Landbridge Marsh Creation and Terracing (BS-0032) project Phase 2 area and features.

Goals

The primary project goals are 1) to restore 514 acres of intertidal marsh and 2) to create 22,000 linear feet of terraces.

Features

Approximately 514 acres of intertidal marsh will be created in five (5) separate marsh creation cells using borrow from Lake Lery. In addition, 22,000 feet of terraces will be created using *in situ* borrow. Dredged material will be pumped into the marsh creation areas to achieve a desired elevation. Determination of the target marsh fill elevation was governed by several factors including the tidal range, percent inundation, the healthy marsh elevation, the physical properties of the borrow material, and the bearing capacity of the foundation soils in the marsh creation area. The ideal final marsh platform is designed to settle into the optimal intertidal marsh range (10%-65% inundated) shortly after construction and remain there for the duration of the 20 year project life. The target elevation for marsh creation areas 1 and 5 is

+2.8 feet NAVD88 and for marsh creation areas 2, 3, and 4, the target fill elevation is +3.5 feet NAVD88. It is estimated that the five marsh creation areas will require approximately 2,556,345 yd³ of fill. Earthen containment dikes will be used during marsh fill. The containment dikes will be constructed to +5.0 feet NAVD88 during the construction phase. Upon completion of the marsh fill activities and initial settlement, the containment dikes will be degraded to marsh elevation. A second containment dike degradation may occur after continued marsh settlement, within the first three years post-construction. Terraces will be constructed to +3 feet NAVD feet and will be approximately 500 feet in length, 44 terraces total, for approximately 22,000 linear feet.

2. ITEMS REQUIRING MONITORING

The following monitoring elements will provide data to evaluate the success of the BS-0032 project, as based on the project goals. Data collected from BS-0032 monitoring stations and Coast-wide Reference Monitoring System-Wetlands (CRMS-Wetlands) stations surrounding the project area will be used to compare characteristics between the created marsh and local, natural marsh. Three Operations, Maintenance, and Monitoring (OM&M) reports will be written in Year 5, Year 11, and Year 20 of the project life (approximate years 2026, 2032, and 2041). Modifications to the monitoring timeline and procedures are subject to CPRA and USFWS approval.

A. Topographic Surveys

Data from topographic surveys will be compared over time to determine if the dredged material is settling at the predicted rate and if the marsh platform and ridge are maintaining elevations that are in the functional marsh range. Post-construction real-time kinematic (RTK) topographic surveys are planned for Year 4, Year 6, Year 11, and Year 16 (approximate years 2026, 2028, 2033, and 2038). For consistency, these surveys will be conducted along a subset of the as-built survey transects. Actual transects will be finalized after as-built survey is conducted. In general, transects for the this survey will be spaced approximately 500 ft. apart with points taken every 50 ft. unless there is significant elevation change.

B. Land/Water Analyses

Analyses of aerial photography will be used to evaluate land to water ratios over time within the project area. Land to water ratios in the project area will be analyzed using aerial photography collected through CRMS (Z/I Imaging digital mapping camera) with 1-meter resolution (Folse et al. 2018). The photography will be georectified using standard operating procedures described in Steyer et al. (2000). Land/water analyses are tentatively scheduled for Year 2, Year 4, Year 7, Year 10, Year 16, and Year 19 (approximately 2024, 2026, 2029, 2032, 2038, and 2041, depending on the CRMS coast-wide flight schedule).

C. Vegetation

Vegetation data will be used to assess the establishment of vegetation on the created marsh platform and in the terrace field, to compare the vegetation in the created marsh to local, natural marsh and nearby marsh creation projects, and to gauge the quality and stability of the vegetative community. Project vegetation data will be compared to CRMS 0146, CRMS 0121, and CRMS 0135. Over time, as more of the proposed nearby marsh creation projects are constructed, vegetation data will be compared across projects. Surveys of vegetation will follow CRMS methodology (Folse et al. 2018) and include an assessment of total cover, species present, and percent cover of each species within randomly selected 2m x 2m sample plots. There are a total of 20 proposed vegetation plots in the marsh creation areas for the BS-0032 project (Figure 2). Additional plots (up to 15) will be established on terraces, once the specific locations are determined (based on as-builts). Currently, there are 44 terraces proposed. Vegetation plot locations are subject to change depending on final construction specifications. Five vegetation surveys of

the created marsh and terrace areas shall occur in Year 3, Year 6, Year 11, Year 16, and Year 20 (approximate years 2025, 2028, 2033, 2038 and 2042).

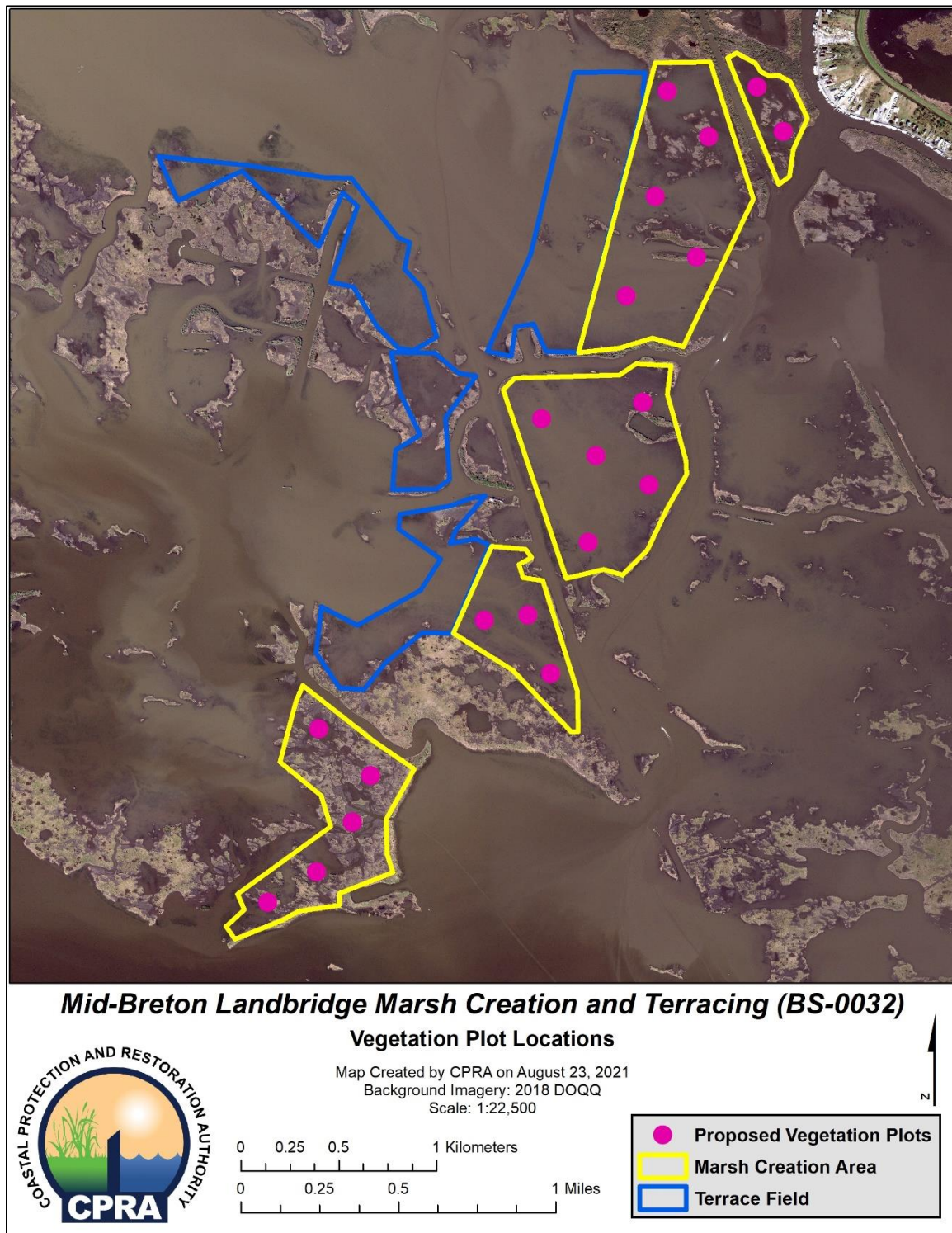


Figure 2: Location of vegetation monitoring plots in the marsh creation areas. Vegetation plots will added to the terraces upon construction completion.

3. MONITORING BUDGET

The total projected *inflated* monitoring budget for the 20-year project life is \$1,099,672. The budget break down for monitoring activities, as outlined in Section 2, is summarized in Appendix 1.

4. RESPONSIBILITIES

The CPRA will:

1. Coordinate and oversee all scientific data collection.
2. Ensure that all data go through quality control procedures and that land-water analyses, topography, and vegetation data are entered into the public database.
3. Summarize and analyze project data and publish OM&M reports according to the schedule included in this monitoring plan. If the data indicate that the project is not meeting its goals and objectives, adaptive management recommendations will be made to improve the response.
4. Review the monitoring plan and budget annually with the USFWS to determine that the data being collected adequately evaluates the project and that funding is suitable to fulfill monitoring requirements.

The USFWS will:

1. Review the monitoring plan and budget annually with CPRA to determine that the data being collected adequately evaluate the project and that funding is suitable to fulfill monitoring requirements.
2. Review OM&M reports.

5. 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 06-1274.

CPRA. 2017. Louisiana's Comprehensive Master Plan for a Sustainable Coast. Coastal Protection and Restoration Authority of Louisiana, Baton Rouge, Louisiana. 93 pp.

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Moore, S., B. Carter, and T. Bernard. 2011. 2011 Operations, Maintenance, and Monitoring Report for Caernarvon Diversion Outfall Management (BS-03a). Coastal Protection and Restoration Authority of Louisiana, New Orleans, Louisiana. 59 pp.

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

APPENDIX I

Monitoring Budget for Mid Breton Marsh Creation and Terracing (BS-0032)

BS-0032

Inflated 20-Year Monitoring Budget

Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Project Close Out	
Calendar Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	Total By Monitoring Activity
Elevation Surveys				\$84,086		\$89,034					\$102,714					\$118,497						\$394,330
Land Water		\$37,059		\$9,150			\$10,799			\$12,745						\$17,752			\$20,951			\$108,458
Land Water - CPRA Administration		\$4,347		\$4,602			\$5,014			\$5,463						\$6,486			\$7,067			\$32,979
Vegetative Analysis			\$22,363			\$24,366					\$28,109					\$32,429				\$36,357		\$143,624
OM&M Report						\$36,548						\$43,386									\$56,116	\$136,050
Monitoring Management (1 week CPRA)		\$8,693	\$8,945	\$9,205	\$9,472	\$9,746	\$10,029	\$10,320	\$10,619	\$10,927	\$11,244	\$11,570	\$11,905	\$12,251	\$12,606	\$12,971	\$13,348	\$13,735	\$14,133	\$14,543	\$14,965	\$231,225
Administrative Cost (on Monitoring Items)		\$3,006	\$1,878	\$6,423	\$569	\$6,388	\$1,550	\$620	\$638	\$1,748	\$5,682	\$3,298	\$715	\$736	\$757	\$7,525	\$802	\$825	\$2,529	\$3,054	\$4,265	\$53,006
Annual Total		\$53,105	\$33,187	\$113,466	\$10,040	\$166,081	\$27,392	\$10,939	\$11,257	\$30,883	\$147,750	\$58,254	\$12,620	\$12,986	\$13,363	\$195,661	\$14,149	\$14,559	\$44,680	\$53,954	\$75,346	\$1,099,672
Running Total		\$53,105	\$86,292	\$199,758	\$209,798	\$375,879	\$403,271	\$414,210	\$425,467	\$456,350	\$604,099	\$662,353	\$674,973	\$687,960	\$701,323	\$896,983	\$911,132	\$925,692	\$970,372	\$1,024,326	\$1,099,672	

- Land/Water Analysis -Rates provided by USGS, who apply their own inflation values. Budget for 2024 includes photo acquisition, other years will use CRMS photography. Later dates (after 2030) may become cheaper as satellite imagery becomes cheaper to acquire.
- Vegetation Survey - based on CPRA rates, 2 field days with 3-person crew, 10-hr days (60 hrs total) + 40 office hrs for prep, data entry, etc.
- Topo/Bathy Survey - based on recent monitoring surveys of similar marsh creation restoration projects
- OM&M Report - based on 150 hrs CPRA staff rate
- Land water-CPRA Administration - USACE is billed directly by USGS, these are admin rates associated with setting up the analysis, QA/QC. etc- 20 hrs CPRA staff rate.
- Monitoring Management - based on 40 hrs CPRA staff rate