



State of Louisiana

**Coastal Protection and Restoration Authority
of Louisiana**

Monitoring Plan

for

**South Lake Lery Shoreline and Marsh
Restoration (BS-16)**

State Project Number BS-16
Priority Project List 17

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The Coastal Protection and Restoration Authority of Louisiana (CPRA) and the United States Fish and Wildlife Service (FWS) agree to carry out the terms of this Monitoring Plan (hereinafter referred to as the “Plan”) of the accepted, completed project features in accordance with the Cost Sharing Agreement No. 2511-08-09 (CSA), dated February 19, 2008, with amendments effective May 21, 2012. The CSA will be included in the Operations and Maintenance (O&M) Plan, along with the construction completion report, the project permits, and the O&M budget. The Monitoring Plan the O&M Plan will be available on the CPRA Document Referencing System. <http://cims.coastal.la.gov/>

The project features covered by this plan are inclusive of and are identified as the South Lake Lery Shoreline and Marsh Restoration (BS-16). The intention of the provisions of this Plan is to monitor the project using standardized data collection techniques and to analyze that data to determine whether the project is achieving the anticipated benefits. Reports will be generated and recommendations made to adaptively manage the project.

Construction of the South Lake Lery Shoreline and Marsh Restoration (BS-16) was authorized by Section 303(a) of Title III Public Law 101-646, the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) enacted on November 29, 1990, as amended. South Lake Lery Shoreline and Marsh Restoration (BS-16) was approved on the 17th Priority Project List.

1. PROJECT DESCRIPTION, PURPOSE, GOALS, and FEATURES

Description

The Lake Lery Shoreline Restoration and Marsh Creation project is located within the Breton Sound hydrologic basin in Plaquemines Parish, Louisiana, southeast of New Orleans and northwest of the community of Delacroix (Figure 1). Its purpose is to restore historic marsh conditions by re-establishing the shoreline of Lake Lery and by creating new emergent wetlands.

The project includes the restoration of 35,723 linear feet of the southern and western Lake Lery shoreline (NRCS 2011). Material excavated by bucket dredge will be used to construct an earthen embankment along the shoreline to support coastal wetland plantings and provide a stable platform along the shoreline. Additionally, 647.5 acres of interior marsh will be created in five marsh creation cells adjacent to the southern and western Lake Lery shoreline. Fill material hydraulically dredged from the borrow areas will be pumped into these cells and contained by 58,795 linear feet of containment dikes.

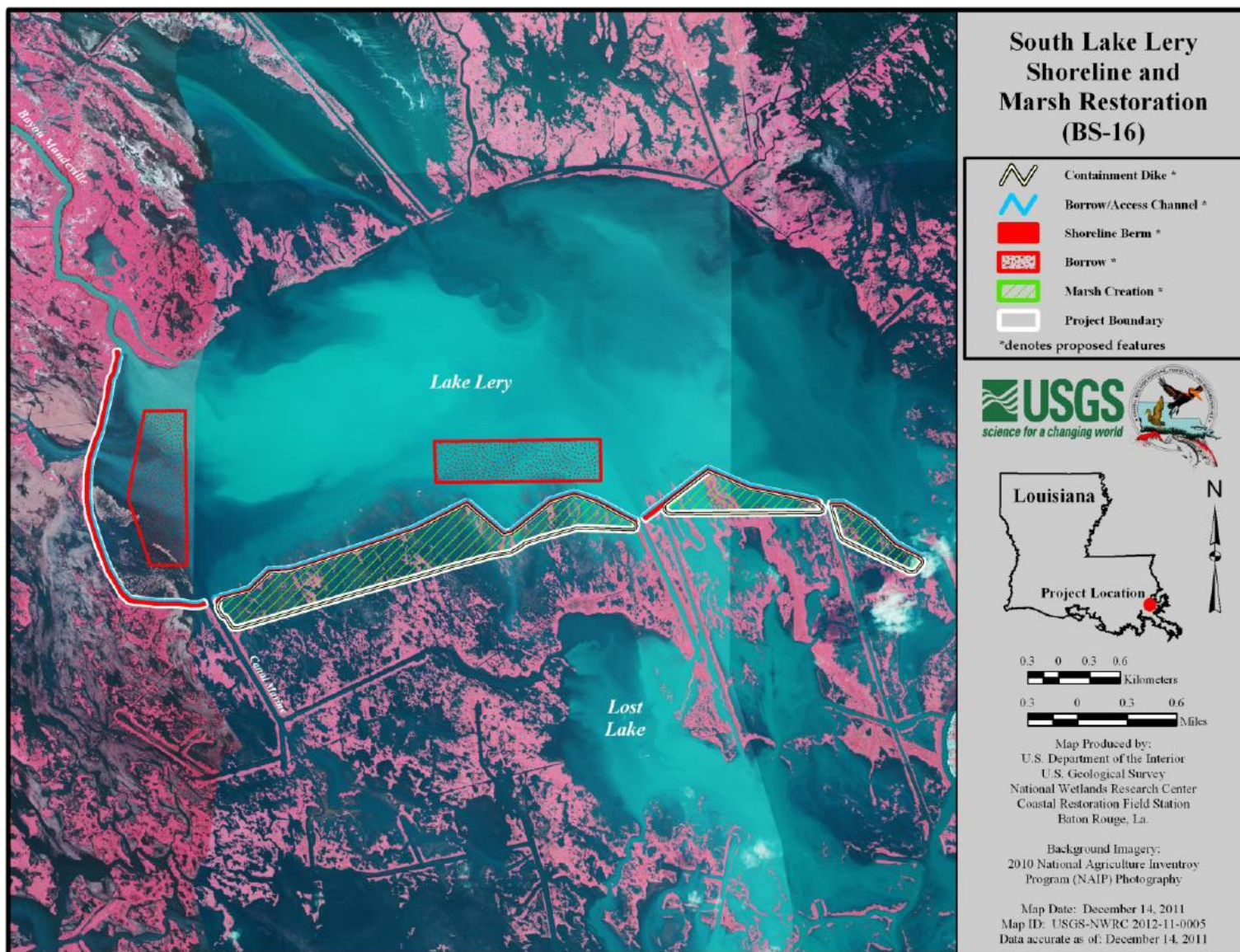


Figure 1. South Lake Lery Shoreline and Marsh Restoration (BS-16) project areas and features.

Purpose

The purpose of the project is to restore the southern and western shorelines of Lake Lery by mechanically dredging portions of Lake Lery and placing that material along the shorelines. In addition, sediments from Lake Lery will be hydraulically dredged and deposited in shallow open water areas south of the newly restored shoreline to create emergent wetlands. Historically the greatest land loss (6,500 acres) occurred from 1956-1974 and coincided with Hurricane Betsy and extensive canal building. More recently, large land loss has occurred as a result of Hurricanes Katrina and Rita in 2005. Land-water data indicates a 1984-2011 loss rate of -1.53 percent per year (USFWS 2011), with the primary causes of marsh loss being the 2005 Hurricane's, but since that event shoreline erosion appears to be the result of wind generated waves. The need to address coastal Louisiana's severe wetland loss has been identified in numerous restoration plans, programs, and State and Federal laws; implementation of the proposed project would help to fulfill that need.

Goals

Specific goals of the project are to: 1) create/nourish 496 acres of marsh by filling open-water areas and fragmented marsh with dredged material; and 2) restore 35,831 feet (55 acres of marsh) of the southern and western shorelines.

The introduction and placement of sediments through the use of dedicated dredging is consistent with the Louisiana's Comprehensive Master Plan for a sustainable Coast (CPRA 2012).

Features

Hydraulically dredged bottom sediments from Lake Lery will be pumped into shallow open-water and fragmented marsh areas within the project area to create approximately 496 acres of marsh. Earthen containment dikes will be constructed around the fill sites to contain the dredged material slurry. Mechanically dredged (i.e., bucket dredged) material will be excavated from near shore Lake Lery water bottoms and used to restore 35,831 linear feet of the Lake Lery shoreline resulting in the creation of approximately 55 acres of wetlands.

A. Shoreline Restoration

The shoreline restoration feature consists of sediments mechanically dredged from Lake Lery and placed along the existing adjacent shorelines basically forming a low levee along the lakeshore. That feature has been designed to maintain its integrity against the design wave height (+2.2 feet) based on the twenty year life of the project. Design parameters include a crown width of 50 feet (60 feet-wide along the western shoreline), a lakeside slope of 1vertical (V):5 horizontal (H), and a marshside slope of 1(V):3(H). Design calculations indicated that the shoreline restoration feature should be constructed to an elevation of +2.5 to +3.0 feet to insure that the crown elevation is below a +2.0 at target year (TY) 5 (i.e., five years after construction), while still maintaining a minimum crown elevation of approximately +1.4 feet at the end of the twenty year project life. Most canals and pipelines along the shoreline will remain open. The shoreline slope will

be planted with 2 rows (14,337 trade gallons) of smooth cordgrass on 5.0-foot-long staggered centers, approximately parallel to the shoreline. One row will be planted at an elevation of +0.6 feet NAVD 88 and the second row at elevation +0.1 feet NAVD 88. Also one row of California Bullrush (7,166 trade gallons) will be planted parallel to the shoreline on five foot centers staggered with the centers of the adjacent row of smooth cordgrass. This row will be planted at an elevation of -0.4 feet NAVD 88 (NRCS 2011).

B. Marsh Creation/Nourishment

Five marsh creation sites will be filled with hydraulically dredged material from Lake Lery. To determine target elevations for the fill sites, marsh elevation surveys were performed by NRCS and FWS. To achieve a sustainable marsh elevation throughout the project life, the marsh platform will initially be pumped to a higher elevation during construction and allowed to settle to the desired target elevation over time. It was concluded that a target fill elevation of between +2.0 to +3.0 feet NAVD 88 would ultimately settle to an elevation of +0.8 feet NAVD 88 in 20 years. That value is extremely close to the existing healthy marsh elevation (+0.84 feet NAVD 88).

Marsh side or interior containment dikes will be built to +3.5 to +4.5 feet NAVD 88 with a 5-foot crown width and 1(V):3(H) side slopes. Containment dikes will be constructed with a bucket dredge using *in situ* material and the borrow area will be filled with hydraulically dredged material. Interior containment dikes will be gapped within 3 years of the construction completion date. Twenty-five-foot wide gaps will be constructed every 1,000 feet thus allowing for natural tidal connectivity and to prevent ponding.

Lake side containment dikes will be built on top of the inside edge of the shoreline embankment with materials dredged from the lake and placed there during the construction of the shoreline embankment. These containment dikes will match the height of the interior dikes for that marsh cell and will be constructed with a 5-foot crown and 1(V):3(H) side slope. These containment dikes will be degraded by the end of construction to allow tidal connectivity.

C. Borrow Site

The proposed borrow sites are located along the southern and western shorelines of Lake Lery and cover a combined 335 acres (Site A-175 acres and Site B-351 acres) Figure 2. The proposed borrow sites were chosen for their proximity to the marsh fill sites and do not cross any pipelines. The maximum depth of cut is assumed to be elevation -20 feet NAVD 88. The total volume of available sediment in the combined borrow areas are 8,712,000 cubic yards (cyds). The total fill volume required is 3,840,447 cyds, (including refilling containment dike borrow sites).

2. ITEMS REQUIRING MONITORING

The Coast-wide 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, and soils, and aerial photography data are collected at each CRMS site (Folse et al. 2008, revised 2012). No CRMS monitoring stations are located in the BS-16 project area. However, project-specific monitoring was added to help analyze project success.

Additional project-specific monitoring was added to help evaluate success. The following monitoring strategies will provide the information necessary to evaluate the specific goals of creating/nourishing approximately 496 acres of marsh and restoring 35,831 feet of lake shoreline.

- A. Aerial Photography - In order to evaluate land/water ratios in the project area, near-vertical, color-infrared aerial photography (1:12,000 scale) will be obtained through CRMS in years 1, 10 and 20 (2019, 2026, and 2036), or as near these dates as possible using the CRMS schedule for photography acquisition. The photography will be georectified using standard operating procedures described in Steyer et al. (1995, revised 2000), and land/water ratios will be determined.
- B. Vegetation – Vegetation data will be used to assess how the shoreline berm and marsh creation sites are being colonized by emergent marsh vegetation. Twenty-five 2m x 2m vegetation monitoring stations will be established within the project area, with 15 stations along the shoreline berm and 10 stations within the marsh creation areas. Vegetation surveys will be conducted at each of the 25 sites following CRMS methodology (Folse et al. 2012). Examples of data collected at these stations include total cover, species present, percent cover of each species, average height of each vegetation layer, and the depth of water on the marsh surface. Vegetation surveys will be conducted in years 3, 5, 10, 15, and 20 (2019, 2021, 2026, 2031, and 2036).
- C. Shoreline Position – Shoreline position data will be used to assess the integrity of the shoreline berm and to track the movement of the shoreline over time. To evaluate change in shoreline position, a sub-meter Differential Global Positioning Satellite (DGPS) system will be used to document the position of the vegetated marsh edge. Shoreline position data will be analyzed using the Digital Shoreline Analysis System (DSAS version 4.0) extension for ArcGIS® (Thieler et al. 2009). DSAS uses a measurement baseline method to calculate rate-of-change statistics for a time series of shorelines. Shoreline Position surveys will be conducted in years 1, 5, 10, 15, and 20 (2017, 2021, 2026, 2031, and 2036).

3. MONITORING BUDGET

The cost associated with the Monitoring this project, as outlined in Section 4 of this plan for the twenty (20) year project life is summarized in Attachment I.

4. **RESPONSIBILITIES**

A. CPRA will:

1. Coordinate and oversee all scientific data collection.
2. Ensure that all data goes through quality control procedures and is entered into the public database.
3. Analyze the data and report on the status of the project every three years, or as otherwise directed by FWS. Should the data indicate that the project is not meeting the goals and objectives, adaptive management recommendations will be made.
4. Review the monitoring plan and budget annually with the FWS to determine that the data being collected adequately evaluate the project.

B. FWS will:

1. Review the monitoring plan and budget annually to determine that the data being collected adequately evaluates the project.

REFERENCES

- Coastal Protection and Restoration Authority of Louisiana. 2012. *Louisiana's Comprehensive Master Plan for a Sustainable Coast*. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.
- 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 Coast-wide 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.
- Natural Resource Conservation Service. 2011. South Lake Lery Shoreline and Marsh Restoration (BS-16): Final Design Report. Alexandria, LA.
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- Thieler, E. R., Himmelstoss, E. A., Zichichi, J. L., and Ergul, Ayhan. 2009. Digital Shoreline Analysis System (DSAS) version 4.0 – An ArcGIS extension for calculating shoreline change: U.S. Geological Survey Open-File Report 2008-1278.
- U.S Fish and Wildlife Service. 2011. South Lake Lery Shoreline and Marsh Restoration: Project Information Sheet for wetland value assessment, Louisiana Ecological Services, Lafayette, Louisiana.

ATTACHMENT I PROJECT BUDGET

