



State of Louisiana

**Coastal Protection and Restoration Authority
of Louisiana**

Monitoring Plan

for

**Pass Chalard to Grand Bayou Pass
Barrier Shoreline Restoration (BA-35)**

State Project Number BA-35
Priority Project List 11

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Updated by:

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The Coastal Protection and Restoration Authority of Louisiana (CPRA) and the National Marine Fisheries Service (NMFS) 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 (CSA) No. NA07NMF4630073 dated March 2, 2006. 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 will be available on the CPRA Document Referencing System accessible through the CPRA website.

The project features covered by this plan are inclusive of and are identified as the Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration (BA-35) project. 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. This is a revised version of an earlier monitoring plan written prior to project construction. The schedule of monitoring events has been revised to reflect the actual dates of construction, as well as changes in the Barrier Island Comprehensive Monitoring Program (BICM) data collection schedule, which will provide some monitoring data for this project. Reports will be generated using the monitoring data outlined in this plan and recommendations will be made to adaptively manage the project.

Construction of the Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration (BA-35) project 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. The Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration (BA-35) project was approved on the 11th Priority Project List.

1. PROJECT DESCRIPTION, PURPOSE, GOALS, and FEATURES

Description

The Barataria/Plaquemines barrier shoreline system is about 30 miles long, reaching from Grand Terre Island to Sandy Point, Louisiana. The Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration (BA-35) project is located within this barrier shoreline system between Chaland Pass and Grand Bayou Pass in Plaquemines Parish, Louisiana (Figure 1). The proposed project was developed as part of the comprehensive Barataria Shoreline Complex Project with the goal of restoring the entire Barataria island chain.

The Barataria shoreline is an important coastal barrier in protecting the residential communities, infrastructure and interior marshes of Barataria Bay. This barrier shoreline provides unique habitat for coastal fisheries and wildlife and helps protect natural and human resources from tidal inundation, storm surge and wave action. The Barataria island chain, like all of Louisiana’s barrier islands, is experiencing accelerated land loss through a complex interaction of global sea level rise, compaction subsidence, frequent and intense storm impacts, inadequate sediment supply, and human disturbance (Penland et al. 1988; McBride et al. 1989). Barrier shoreline change analyses conducted through



Figure 1. Pass Chaland to Grand Bayou Pass Barrier Restoration (BA-35) project area.

the Barrier Island Comprehensive Monitoring Program (BICM) have demonstrated accelerated shoreline loss rates along the Barataria island chain (Table 1; Martinez et al. 2009). The recent shoreline change rate for the Modern Delta region, which includes the BA-35 project area, was estimated to be -118.3 ft/yr (1996-2005), as compared to a historic change rate of +15.2 ft/yr (1855-2005). The Chaland Headland Region, which contains BA-35, showed an increase in the shoreline loss rate from the historic average of -22.4 (1855-2005) to -33.3 ft/yr (1996-2005).

Generally, barrier island restoration involves increasing beach/dune cross-sections and improving the bayside marsh platform. The enhancement of the beach and dune will provide increased protection from storm-related surge and wave attack through the reduction of island breaching or loss of major portions of the islands. Restoration of the marsh platform behind the barrier islands will reinforce the long-term stability of the island system against major storm events. Prevention of island breaching (inlet cutting) and limitations on overtopping (washover) during storms are the primary mechanisms by which the project will provide storm protection (CPE 2003).

Table 1: BICM shoreline change analyses of regions containing the BA-35 project area (Martinez et al. 2009)

	Historic Change (1855-2005) Avg. ft/yr	Long-Term Change (1904-2005) Avg. ft/yr	Short-Term Change (1996-2005) Avg. ft/yr	Near-Term Change (2004-2005) Avg. ft/yr
Modern Delta	15.2	-30.2	-118.3	-528.5
Chaland Headland Region	-22.4	-20.2	-33.3	-79.9

Purpose

The purpose of the Pass Chaland to Grand Bayou Pass Barrier Restoration (BA-35) project is to rebuild and nourish the barrier shoreline using the following strategies:

1. Dredged material will be used to create a marsh platform, beach berm, and gulfward beach fill to increase island width and average height thus prolonging the integrity of the island.
2. Sand fences and vegetation plantings will be used to stabilize placed dredged material.
3. Restore tidal connection through post-construction excavation of placed material and breaching of containment dikes to create tidal creeks and ponds.



Goals

The goals of the BA-35 project are to:

1. Create 226 acres of back-barrier marsh platform settled to intertidal elevation with unrestricted tidal exchange.
2. Establish marsh vegetation (both planted and natural colonization). One quarter of the marsh creation areas will be 80% or greater vegetated after the first complete growing season following construction and 100% of the marsh creation area will be vegetated after three complete growing seasons.
3. Prevent breaching (defined as failure of the beach/dune resulting in an opening of the island to tidal exchange between the Gulf and the bay).
4. Optimize tidal linkage to the created marsh platform.

The creation and restoration of dune, beach, and back barrier marsh through the use of dedicated dredging is consistent with the Louisiana's Comprehensive Master Plan for a sustainable Coast (CPRA 2012), specifically, the Barrier Island/Headland Restoration Component.

Features

Construction of the BA-35 project began in mid-2008 and was completed in June 2009. This project involved the creation of over 420 acres of beach, dune, and marsh platform through the placement of approximately 2.95 million yd³ of fill (CEC 2010). A channel was incorporated at the western end of the project area to facilitate flushing of Bay Joe Wise through Pass Chalard. The beach and dune elements were constructed to elevations of +4.0 and +6.0 feet NAVD88, respectively. The marsh platform was constructed in three cells. The two easterly cells were constructed to the target marsh elevation of +2.6 feet NAVD88. The westerly cell, which included the breach, was constructed to an elevation of +2.9 feet NAVD88 to account for the primary consolidation settlement of the underlying soils due to the weight of the additional material placed in this cell to close the breach. Approximately 14,360 ft of sand fencing was installed along the dune to aid in sand retention. Planting of the dune and marsh platform occurred in August 2009 and included the planting of sea oats (*Uniola paniculata*), bitter panicgrass (*Panicum amarum*), saltmeadow cordgrass (*Spartina patens*), gulf cordgrass (*Spartina spartinae*), gulf bluestem (*Schizachyrium maritimum*), and seashore dropseed (*Sporobolus virginicus*).

2. ITEMS REQUIRING MONITORING

Project-specific data collection for the BA-35 project will be supplemented by data collected through the Barrier Island Comprehensive Monitoring program (BICM) as outlined in the Monitoring Budget (Attachment 1). To more effectively identify the magnitude, rates, and processes of barrier shoreline change, BICM was developed by the CPRA as a framework for a coast-wide monitoring effort (Troutman et al. 2003). A significant component of this effort includes documenting the historically dynamic morphology of the Louisiana nearshore, shoreline, and backshore zones. An advantage of BICM is that it will provide long-term morphological datasets on all of Louisiana's

barrier islands and shorelines, rather than just those islands and areas that are slated for coastal engineering projects or have had construction previously completed. BICM will provide unified, long-term datasets that will be available to evaluate constructed projects, plan and design future barrier island projects, develop operation and maintenance activities, and assess the range of impacts created by past and future tropical storms. Data for BICM tasks are collected and compiled for all of the barrier island systems and shorelines with similar approaches and methodologies. The project-specific monitoring for the BA-35 project will follow procedures used to collect BICM data. In addition to the BICM program, the Coast-wide Reference Monitoring System (CRMS) - *Wetlands* program will provide supplemental aerial photography for the BA-35 project, when possible. In the event that BICM/CRMS data collection does not occur as scheduled, additional project-specific data collection will occur as outlined in the Non-BICM Alternative Plan (Attachment 1).

The following monitoring strategies will provide the information necessary to evaluate the goals of the BA-35 project:

- A. Aerial Photography - To determine changes in habitat types within the project area, near-vertical, geo-rectified photography will be acquired in the pre- and post-construction periods. All photography will be geo-rectified, mosaicked, and classified using BICM standard operating procedures (Troutman et al. 2003, Fearnley et al. 2009). Pre-construction photography of BA-35 (2008) was acquired and analyzed through CRMS/BICM. Additional post-construction aerials of the project area will be acquired through CRMS and analyzed through BICM approximately every six years in 2012, 2018, and 2024. A final habitat analysis will be conducted using project monitoring funds near the end of the 20-year project life (2028).
- B. Vegetation – Emergent vegetation will be sampled within the BA-35 project area using the Braun-Blanquet method (Mueller-Dombois and Ellenberg 1974, Folse et al. 2012). Transects will be extended across each island based on the existing BICM bathymetry survey lines which are spaced approximately 1500 ft apart. Five 2 m x 2 m plots will be randomly placed along each transect. Vegetation was sampled at BA-35 in 2013 and will be re-sampled in 2016, 2019, and 2023 and 2028.
- C. Surveys - A combination of bathymetric and topographic surveys will be used to monitor changes in the cross-shore profile of the islands. BICM LiDAR and bathymetric surveys will be used, when possible, to monitor project performance, but some project-funded surveys will be conducted in desired years where BICM data is not collected. LiDAR surveys will cover the whole shoreline and extend inland approximately 1 km. The resulting data will provide a density of approximately 1 elevation point per square meter. BICM bathymetry data will be collected along transects every 1500 ft (457.2 m) on both the gulf and bay sides of the island and will extend to 2 km offshore. Data will also be collected along transects 4500 ft (1371.6 m) apart from 2 km to 4 km offshore.

Pre-construction bathymetric/topographic surveys were conducted in 2006 through BICM and in 2007/2008 through project design. Post-construction surveys were conducted in 2009 (as-built) through construction and in 2010 (Year 1) using monitoring funds. Remaining post-construction surveys will be conducted approximately every 5 years through BICM in years in 2013, 2018, 2023, and 2028.

3. MONITORING BUDGET

The cost associated with the Monitoring this project, as outlined in Section 2 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 at years indicated in the project budget. Should the data indicate that the project is not meeting the goals and objectives, adaptive management recommendations will be made to improve the response. This may include pumping additional sediment if elevation is below target levels and or planting adaptable vegetation should the newly created marsh within each unit become sparse or unhealthy.
4. Review the monitoring plan and budget annually with the NMFS to determine that the data being collected adequately evaluates the project.

B. NMFS will:

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

REFERENCES

- Coastal Engineering Consultants Inc (CEC) 2010. Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration Project (BA-35): Project Completion Report. 10 pp. plus appendices.
- Coastal Planning and Engineering Inc (CPE) 2003. Barataria/Plaquemines Barrier Shoreline Restoration Project Geotechnical Investigation and Analysis. State/Federal Project No. BA-38. 52 pp. plus appendices.
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- Fearnley, S. L. Brien, L. Martinez, M. Miner, M. Kulp, and S. Penland 2009. Louisiana Barrier Island Comprehensive Monitoring Program (BICM) Volume 5: Chenier Plain, South Central Louisiana, and Chandeleur Islands--Habitat Mapping and Change Analysis 1996 to 2005 (Part 1: Methods for Habitat Mapping and Change Analysis 1996 to 2005). Pontchartrain Institute for Environmental Sciences, University of New Orleans. 11 pp.
- Folse, T. M., J. L. West, M. K. Hymel, J. P. Troutman, L. A. Sharp, D. Weifenbach, T. McGinnis, and L. B. Rodrigue 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.
- Martinez, L., S. O'Brien, M. Bethel, S. Penland, and M. Kulp 2009. Louisiana Barrier Island Comprehensive Monitoring Program (BICM), Volume 2: Shoreline Changes and Barrier Island Land Loss 1800's-2005. Pontchartrain Institute for Environmental Sciences, University of New Orleans. 32 pp.
- McBride, R.A., S. Penland, B.E. Jaffe, S.J. Williams, A.H. Sallenger, and K.A. Westphal 1989. Erosion and deterioration of the Isles Dernieres barrier island arc-Louisiana, U.S.A: 1853-1988. Transactions of the Gulf Coast Association of Geological Societies 39: 431-444.
- Mueller-Dombois, D. and H. Ellenberg 1974. *Aims and Methods of Vegetation Ecology*. New York: John Wiley and Sons. 547 pp.
- Penland, S., R. Boyd, and J.R. Suter 1988. A transgressive depositional systems of the Mississippi River delta plain: A model for barrier island shoreline and shelf sand development. Journal of Sedimentary Petrology 58:932-949.

Troutman, J.P., D.M. Lee, S. Khalil, B.S. Carter, K.S. Gray, and L.A. Reynolds 2003. Draft Barrier Island Comprehensive Monitoring Program. Louisiana Department of Natural Resources Coastal Restoration Division Biological Monitoring Section.

ATTACHMENT I
MONITORING BUDGET



Project Name: BA-35 Pass Chaland to Grand Bayou Pass Barrier Restoration																								Total Monitoring Budget: \$597,752			
X = DATA COLLECTION NOT FUNDED THROUGH MONITORING BUDGET																											
Monitoring Items	BICM YEAR																										
	2008	Construction	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22			
Topo/Bathymetric Surveys		X	\$32,848.47			X (topo)	X (bathy)				X					X					X						
Aerial Photo/Habitat Classification	X				X						X						X							\$39,669			
Vegetation Surveys						\$8,000			\$8,490			\$9,009				\$9,752								\$10,767			
Reporting								\$8,800				\$9,600						\$10,800						\$11,900			
Reporting, Oversight & Admin	\$1,100	\$0	\$1,971	\$0	\$0	\$480	\$0	\$0	\$509	\$0	\$0	\$541	\$0	\$0	\$0	\$585	\$0	\$0	\$0	\$0	\$0	\$3,026	\$0	\$0			
Total, Monitoring	\$1,100	\$0	\$34,819	\$0	\$0	\$8,480	\$0	\$8,800	\$8,999	\$0	\$0	\$19,150	\$0	\$0	\$0	\$10,337	\$0	\$10,800	\$0	\$0	\$0	\$53,462	\$0	\$11,900	\$131,928		
NON-BICM ALTERNATIVE PLAN																											
Monitoring Items	BICM YEAR																										
	2008	Construction	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22			
Topo/Bathymetric Surveys		X	\$32,848.47			X (topo)	X (bathy)					\$56,312					\$62,173						\$68,643				
Aerial Photo/Habitat Classification	X				X							29106.24					\$34,569						\$41,057				
Vegetation Surveys						\$8,000			\$8,490			\$9,009					\$9,947						\$10,982				
Reporting								\$8,800					\$9,800					\$10,800						\$11,900			
Reporting, Oversight & Admin	\$1,100	\$0	\$1,971	\$0	\$0	\$480	\$0	\$0	\$509	\$0	\$0	\$5,666	\$0	\$0	\$0	\$0	\$6,401	\$0	\$0	\$0	\$0	\$7,241	\$0	\$0			
Total, Monitoring	\$1,100	\$0	\$34,819	\$0	\$0	\$8,480	\$0	\$8,800	\$8,999	\$0	\$0	\$100,093	\$9,800	\$0	\$0	\$0	\$113,090	\$10,800	\$0	\$0	\$0	\$127,923	\$11,900	\$434,705			

