State of Louisiana

Coastal Protection and Restoration Authority of Louisiana

Monitoring Plan

for

Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38)

State Project Number BA-38 (1 & 2)
Priority Project List 11

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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. NA17FZ2534, dated January 30, 2004. 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 Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38) 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 Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38) 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 Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38) 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 Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38) project is located in two areas within this barrier shoreline system: Pelican Island [BA-38(1)] is located between Fontanelle Pass (Empire Waterway) and Scofield Pass; and the Chaland Headland [BA-38(2)] is located between Pass La Mer and Chaland 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, compactual 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. Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38) 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-38 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-38(2), showed an increase in the shoreline loss rate from the historic average of -22.4 (1855-2005) to -33.3 ft/yr (1996-2005). Similarly, the Scofield Region, which contains BA-38(1), showed an increase in the shoreline loss rate from -14.9 ft/yr (1855-2005) to -34.1 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-38 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 [BA-38(2)]	-22.4	-20.2	-33.3	-79.9
Scofield Region [BA-38(1)]	-14.9	-19.7	-34.1	-111.4

Purpose

The purpose of the Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38) project is to rebuild and nourish two Barataria barrier shorelines 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 pre- or post-construction excavation of placed material and breaching of containment dikes to create tidal creeks and ponds.

Goals

The primary goals of the BA-38 project are 1) to increase the elevation and width of the barrier shoreline using dredged sediments and 2) to reduce the loss of dredged sediments through the growth of vegetation and construction of sand fences. Specific goals for the two phases of this project are as follows:

Pelican Island [BA-38(1)]:

1. Nourish the gulf shoreline and create 57 acres of dune and 71 acres of supra-tidal habitat with sand and create 264 acres of back-barrier marsh platform settled to an elevation with unrestricted tidal exchange within three years after construction.
2. Nourish 36 acres of existing saline marsh with effluent discharge.
3. To establish marsh vegetation (both planted and natural colonization). There would be approximately 35% vegetation cover of the total sub-aerial acreage at the end of TY3 and 65% at the end of TY5.
4. Fill breaches, restore and create dune and marsh to increase island longevity and maintain integrity of the sub-reach.
5. Create 5.5 acres of tidal creeks with unimpeded tidal exchange by TY3.

Chaland Headland [BA-38(2)]:

1. Nourish the gulf shoreline and create approximately 90 acres of dune and 90 acres of supra-tidal habitat with sand and create 264 acres of back-barrier marsh platform settled to an elevation with unrestricted tidal exchange within three years after construction.
2. To establish marsh vegetation (both planted and natural colonization). There would be approximately 27% vegetation cover of the dune and supra-tidal acreage at the end of TY3 and 52% at the end of TY5. Approximately 80% of more cover of planted marsh acres at TY3 and 80% cover of 100% of all created acres at TY5.
3. Fill breaches, restore and create dune and marsh to increase island longevity and maintain integrity of the sub-reach.
4. Create tidal creeks post construction.

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

Pelican Island [BA-38(1)]:
Construction of BA-38(1) began in late 2011 and was completed in December 2012. This project involved the placement of approximately 2,600,500 yd^3 of beach fill and 1,906,000 yd^3 of marsh fill (CPE 2013). Beach fill was placed continuously along the length of the gulf shoreline. The fill had a dune crest elevation of +7.5 ft (NAVD) and a dune crest width of 122 ft. Marsh fill was placed between the constructed dune and primary dike along the length of the island to an elevation of approximately +2.6 ft (NAVD). Approximately 13,900 ft of sand fencing was installed along the length of the constructed dune. There were approximately 190.2 acres of beach and 396.0 acres of marsh within the project area immediately following construction. Planting of the dune and marsh platform is expected to occur in 2014 and will include the planting of sea oats (*Uniola paniculata*), bitter panicgrass (*Panicum amarum*), saltmeadow cordgrass (*Spartina patens*), smooth cordgrass (*Spartina alterniflora*), seashore paspalum (*Paspalum vaginatum*), gulf bluestem (*Schizachyrium maritimum*), and seashore dropseed (*Sporobolus virginicus*).

Chaland Headland [BA-38(2)]:
Construction of BA-38(2) began in March 2006 and was completed in January 2007. Project construction consisted of the placement of 927,400 of yd^3 of marsh fill, and 2,443,500 yd^3 of beach and dune fill (CPE 2008). The constructed beach and dune elevations on Chaland Headland were +4 and +6 ft (NAVD) respectively, and the marsh platform elevation was +2.5 ft NAVD. Dredging of an access channel and closure of an island breach and existing canals were included within the project construction plan. Approximately 29,000 ft of sand fencing was erected concurrent with construction in shore parallel rows with staggered gaps. Planting of the dune and marsh platforms was completed during construction and included the following species: sea oats (*Uniola paniculata*), bitter panicgrass (*Panicum amarum*), saltmeadow cordgrass (*Spartina patens*), and smooth cordgrass (*Spartina alterniflora*).

2. ITEMS REQUIRING MONITORING

Project-specific data collection for the BA-38 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-38 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-38 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-38 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). Immediate pre/post-construction photography of BA-38(1) (2011/2013) and BA-38(2) (2006/2007) was acquired by NOAA using construction funds and will be analyzed using monitoring funds. Additional post-construction aerials of the project area will be acquired through CRMS and analyzed through BICM approximately every six years. Anticipated CRMS/BICM habitat analyses will occur in 2012, 2018, 2024, and 2030.

B. Vegetation – Emergent vegetation will be sampled within the BA-38 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. The first vegetation sampling of BA-38(2) was delayed due to the destruction of the plantings by Hurricanes Gustav and Ike in 2008, and was delayed again by Hurricane Isaac in 2012 following a second round of plantings in 2011. Vegetation was sampled at BA-38(2) in 2013 and will be sampled at both BA-38(1) and BA-38(2) in 2016, 2019, 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. BICM LiDAR and bathymetric surveys were conducted in 2006 (pre-construction) and will be conducted approximately every five years in 2013, 2018, 2023, 2028, and 2033. 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 of BA-38(2) using traditional cross-sectional transect methods were conducted in 2002 and early 2006 through project design and construction. Post-construction surveys of BA-38(2) were conducted in December 2006 (as-built) through construction, and in April 2009 (Year 3) and September 2010 (Year 4) using monitoring funds. Future BA-38(2) surveys will be conducted through BICM.

Pre-construction bathymetric/topographic surveys of BA-38(1) were conducted in 2002 and late 2011 through project design and construction. Post-construction (as-built) surveys of BA-38(1) were conducted in 2012 through construction. Because only bathymetry data (no LiDAR) will be available in 2014 through BICM, monitoring funds will be used to conduct a topographic-only survey of BA-38(1) in 2014 (Year 2) and a bathymetric/topographic survey in 2015 (Year 3). Future BA-38(1) surveys beyond Year 3 will be conducted through BICM.

For both BA-38(1) and BA-38(2), only a subset of the as-built survey lines will be surveyed during post-construction monitoring surveys due to budget constraints. Settlement plates, which were installed on each island during construction, will also be resurveyed when possible.

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

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Coastal Planning and Engineering Inc (CPE) 2008. Chaland Headland Restoration (BA-38-2) CWPPRA Project: Project Completion Report. 19 pp. plus appendices.

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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-38 Pelican Island and Pass La Mer to Chaland Pass Restoration **Total Monitoring Budget: $769,699**

X = DATA COLLECTION NOT FUNDED THROUGH MONITORING BUDGET

Monitoring Items	Quantity	CHALAND:	Year 1	Year 2	Year 3	Year 4	Year 5	PELICAN: Year 6	BICM YEAR Year 1	Year 2	Year 3	Year 4	Year 5	BICM YEAR Year 6	Year 7	Year 8	Year 9	Year 10	BICM YEAR Year 11	Year 12	Year 13	Year 14	Year 15	BICM YEAR Year 16	Year 17	Year 18	Year 19	Year 20	BICM YEAR	TOTAL
		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															
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032		
Aerial photo/habitat classification - CHALAND		$ 15,988	$ 15,988					X						X						X						X				
Aerial photo/habitat classification - PELICAN							$ 15,988	X (as built)						X						X						X				
Topo/Bathy Surveys CHALAND		X	X		$ 46,195	$ 47,119			X (topo)	X (bathy)				X					X					X					X	
Topo/Bathy Surveys PELICAN							X	X		$40,000	$52,023			X					X					X					X	
Vegetation Surveys CHALAND									$8,000			$8,490			$9,009				$9,752					$10,767						
Vegetation Surveys PELICAN												$8,490			$9,009				$9,752					$10,767						
Reporting							$8,000					$9,000			$9,500					$10,500						$11,500				$13,000	
Reporting, Oversight & Admin		$0	$0	$0	$2,772	$2,827	$959	$0	$480	$2,400	$3,121	$1,019	$0	$0	$1,081	$0	$0	$0	$1,170	$0	$0	$0	$0	$1,292	$0	$0	$0	$0	$0	$0	
Total, Monitoring		$15,988	$15,988	$0	$48,967	$57,946	$16,947	$0	$8,480	$42,400	$55,144	$26,999	$0	$0	$28,599	$0	$0	$0	$20,674	$10,500	$0	$0	$0	$22,826	$11,500	$0	$0	$0	$13,000	**$363,983**

NON-BICM ALTERNATIVE PLAN

Monitoring Items	Quantity	CHALAND:	Year 1	Year 2	Year 3	Year 4	Year 5	PELICAN: Year 6	BICM YEAR 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	TOTAL
		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														
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Aerial photo/habitat classification - CHALAND		$ 15,988	$ 15,988					X									$21,053					$25,004							
Aerial photo/habitat classification - PELICAN							$ 15,988	X (as built)									$21,053					$25,004						$30,737	
Topo/Bathy Surveys CHALAND		X	X		$ 46,195	$ 47,119			X (topo)	X (bathy)							$ 58,586					$64,684							
Topo/Bathy Surveys PELICAN							X	X		$40,000	$52,023						$ 58,586											$72,845	
Vegetation Surveys CHALAND									$8,000			$8,490			$9,009				$9,752					$10,767						
Vegetation Surveys PELICAN												$8,490			$9,009				$9,752					$10,767						
Reporting							$8,000					$9,000						$10,000					$11,000							$12,500	
Reporting, Oversight & Admin		$0	$0	$0	$2,772	$2,827	$959	$0	$480	$2,400	$3,121	$1,019	$0	$0	$1,081	$0	$9,557	$0	$1,170	$0	$0	$6,882	$0	$1,292	$0	$0	$0	$6,215	$0	
Total, Monitoring		$15,988	$15,988	$0	$48,967	$57,946	$16,947	$0	$8,480	$42,400	$55,144	$26,999	$0	$0	$19,099	$0	$168,835	$10,000	$20,674	$0	$0	$121,574	$11,000	$22,826	$0	$0	$0	$109,797	$12,500	**$769,176**