



Coastal Protection and
Restoration Authority of Louisiana

State of Louisiana

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2012 Operations, Maintenance, and Monitoring Plan

for

Bioengineered Oyster Reef Demonstration Project (LA-08)

State Project Number LA-08
Priority Project List 17

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Cameron Parish

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**OPERATION, MAINTENANCE, MONITORING AND REHABILITATION
PLAN FOR THE
BIOENGINEERED OYSTER REEF DEMONSTRATION PROJECT
(LA-08)**

The Coastal Protection and Restoration Authority (CPRA) and the National Oceanic and Atmospheric Administration / National Marine Fisheries Service (NMFS) agree to carry out the terms of this Operation, Maintenance, Monitoring and Rehabilitation Plan (hereinafter referred to as the “Plan”) of the accepted, completed project features in accordance with the Memorandum of Agreements No. HC-CWPPRA-004 for Operations and Maintenance and No. HC-CWPPRA-004 dated September 01, 2010.

The project features covered by this plan are inclusive of and are identified as the Bioengineered Oyster Reef Demonstration Project (LA-08). The intention of the provisions of this plan is to maintain this project in a condition that will generally provide the anticipated benefits that the project was based on. In addition 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. Reports will be generated and recommendations made for future projects. There is no requirement that this project function to any standard beyond the five (5 year) economic life; except that it is not left as a hazard to navigation or a detriment to the environment.

Construction of the Bioengineered Oyster Reef Demonstration 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. This project was approved on the fourteenth (14th) Priority Project List.

The construction components associated with this project are located entirely on land owned by the Rockefeller Wildlife Refuge managed by the Louisiana Department of Wildlife and Fisheries.

1. PROJECT DESCRIPTION, PURPOSE, LOCATION, AND GOALS

The Bioengineered Oyster Reef Demonstration Project consists of two, 215 ft segments of artificial reef separated by a 145 ft gap. The proposed location of the project is along the Gulf of Mexico shoreline on the west end of Rockefeller Wildlife Refuge in Cameron Parish of the Mermentau Basin (figure 1.).

The purpose of this project is to provide a shoreline breakwater to reduce wave action and thereby reduce shoreline erosion into the adjacent marsh. The artificial reef is designed to attenuate wave energy by 50 % and provide oysters with habitat in order to maintain a vertical height as the structure sinks into the low weight-bearing substrate.

The demonstration project has a 5 year economic life, which began on February 18, 2012.



Figure 1. The Bioengineered Oyster Reef Demonstration Project (LA-08) consists of two reef segments on the Gulf of Mexico coast of Rockefeller Wildlife Refuge. The reef segments are each 215 ft long and intended to act as breakwaters to diminish wave energy from eroding the coastline. Note that the reef segments are located on the 2008 shoreline.

The project objective is to:
Attenuate 50% of wave energy from the Gulf of Mexico reaching the shoreline.

The project goals are:

1. Reduce shoreline erosion along the Gulf of Mexico.
2. Provide habitat for oysters which would create a self-sustaining reef, attenuate more wave energy, produce shell hash to nourish the shoreline, and retain sediment between the reef and shoreline.

2. CONSTRUCTION COMPLETION

Construction was finalized on February 18, 2012. The Bioengineered Oyster Reef Demonstration Project completion report includes: project personnel; construction activities and change orders; final construction costs; final as-built project features; baseline bathymetry/topography elevations of the project area; and, other significant milestone dates and comments (Coast and Harbor Engineering 2012).

The project “As-Built” construction drawings are updated with all field changes and modifications that occurred.

3. PROJECT PERMITS

Project permit applications were completed and submitted to appropriate agencies, and permits were received prior to construction. Project permits can be found in the completion report (Coast and Harbor Engineering 2012). Provisions for renewal of certain Federal and State Permits may be required.

4. ITEMS REQUIRING MAINTENANCE AND REHABILITATION

No operations, maintenance, repair, and/or rehabilitation is planned for this demonstration project.

- A. **Reef Segments:** Two, 215 ft reef segments constructed by interlocking Oysterbreak™ concrete rings overlain on a marine mattress.

5. ITEMS REQUIRING MONITORING

The project is divided into two reef segments and a control area. The reef area contains two, 215 ft reef segments; the western segment has Oysterbreak™ rings composed of Oysterkrete®, and the eastern segment has Oysterbreak™ rings composed of standard weight concrete. The control area does not have any breakwaters. The following monitoring elements will provide the information necessary to evaluate the project goals.

- A. **Topographic and bathymetric surveys** perpendicular to the shoreline will track elevation changes of the reef segments, marsh, and water bodies both landward and seaward of the reef positions. Elevation data will be collected at a minimum

of 5 ft intervals or closer if necessary to define distinct morphologic features such as steep changes in slope, shoreline face, sand bars, scour holes, and distinct changes in Oysterbreak™ structure profile; in addition, the position of the end of vegetated zone and shoreline scarp (top and bottom) will be delineated on each transect. Surveys will be conducted annually (time of year is contingent upon construction completion) from these transects starting at 100 ft landward from the averaged shoreline contour into the Gulf of Mexico (figure 2):

- 11 transects at the control area, 1,200 ft into the Gulf of Mexico on 200 ft spacing
- 24 transects at the breakwaters, 5 extending 2,000 ft into the Gulf of Mexico
- Perimeter and longitudinal section on the breakwaters to detect scour around and between the reef segments.

Elevation surveys are scheduled for the summer of 2013, 2014, and 2016. A survey will also be conducted following a large storm if needed.

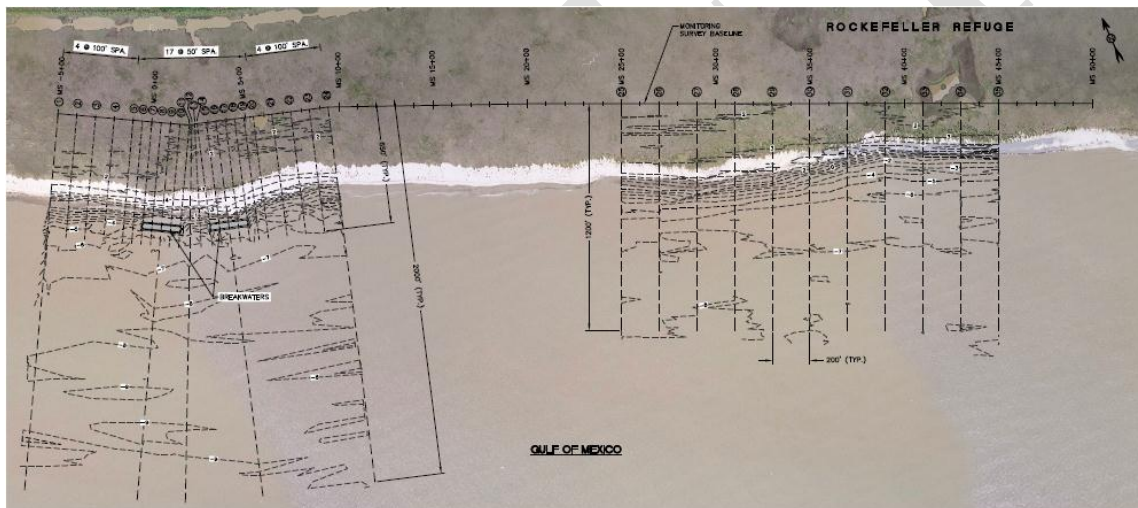


Figure 2. Approximate locations of topographic and bathymetric survey transects for the Bioengineered Oyster Reef Demonstration project (LA-08). The aerial photography was taken on March 24, 2012.

- B. **Ground-level photography** will be collected during annual inspections and surveys to photo document changes in shoreline (profile, composition, vegetation) and reef structure over time. Photography stations will be established along the shoreline at each of the survey transect locations to maintain an accurate reference for comparison.
- C. **Aerial photography** encompassing 1 mile west and east of the project area will provide a greater context of area landform changes and visually represent shoreline change. Aerial photography (1:12,000 scale; 0.89 ft ground resolution) will be obtained during low tide in the summer on three occasions (2012, 2014, and 2016) and after a storm event if necessary.

- D. **Wave attenuation** will be monitored by strategically deploying high-frequency, water-level gages to assess differences in wave transmission (heights) between offshore and behind the reef segments and control area. Four gages will be deployed on 3 occasions (early spring after construction in 2012, 2014, and 2016) for 1 month in early spring:
- seaward of the reef section to monitor wave potential
 - behind each Oysterbreak™ reef section (2 gages)
 - in the control area at the same depth as the gages behind the reef sections.
- E. **Oyster and Water Quality Monitoring** will be conducted to (1) quantify the oyster settlement and colonization on the OysterBreak™ reef segments and (2) test OysterKrete® against standard weight concrete in its ability to enhance settlement and colonization of oysters on the OysterBreak™ reef segments. Three types of oyster monitoring that will be conducted over the course of the project.
- **Spat Availability and Recruitment** – The amount of oyster larvae (spat) and other organisms that attach to spat settlement surfaces (cylinders composed of the different concrete types) will be quantified over two years. The spat cylinders will be deployed in pairs (1 OysterKrete® and 1 standard weight cylinder) along landward and seaward edges of each reef segment. The initial set of spat cylinders will be deployed soon after the reef is constructed in March 2012 and will be retrieved in winter 2012/2013 at which time another set will be deployed. The set deployed in winter 2012/2013 will be retrieved in winter 2013/2014.
 - **Reef Growth** – The thickness and height of select reef rings will be measured at low tide to quantify oyster accumulation, and photographs will be taken of the rings from the same position each sampling event. Reef growth will be monitored each winter in 2012/2013 and 2013/2014 concurrent with the spat plate retrieval and in the winter 2015/2016 during the Oyster Biomass Production survey.
 - **Oyster Biomass Production** – Oysters and other encrusted organisms will be scraped from set areas (minimum 2 ft²) of the oyster rings that have been monitored over time for reef growth. Contents from each scraping will be weighed in total to quantify biomass production, and lengths of individual oysters will be measured to determine age classes which will serve as a surrogate for oyster age and reef complexity. The oyster biomass survey will be conducted in winter of 2015/2016.

One water-quality gage per reef segment will be deployed to monitor growing conditions for the oysters (water temperature and salinity).

- F. **Monitoring reports** will be available as part of the Operations, Maintenance, and Monitoring (OM&M) reports by the end of 2013 (monitoring progress and preliminary results) and 2016 (final close out report).

6. OPERATION, MAINTENANCE, AND MONITORING BUDGET

The total cost for Operations and Maintenance for the Bioengineered Oyster Reef Demonstration Project is \$16,249. The total cost for monitoring the Bioengineered Oyster Reef Demonstration Project is \$348,250.

7. OPERATION OF STRUCTURES

There are no operations associated with this project.

8. RESPONSIBILITIES – MAINTENANCE, MONITORING AND REHABILITATION

A: CPRA will:

1. In accordance with the Memoranda of Agreement, assume all responsibilities for maintenance and rehabilitation of the accepted completed project features identified in Section 4.
2. 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.
3. Provide a total contribution equal to the amount outlined in the Memoranda of Agreement for the five year life of the demonstration project.
4. Coordinate and oversee all monitoring data collection.
5. Ensure that all data goes through quality control procedures.
6. Analyze the data and report on the status of the project at the midpoint (3 years) and after monitoring completion.
7. 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 five year life of the demonstration project.
3. Review the monitoring reports and provide comments.

9. **REFERENCE**

Coast and Harbor Engineering. 2012. LA-08 Bio-Engineered Oyster Reef Demonstration Project, Project Completion Report. April 2, 2012. 7 pp and 5 Appendices.

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