



**State of Louisiana  
Department of Natural Resources  
Coastal Restoration Division**

**Monitoring Plan**

for

**Boston Canal/Vermilion Bay Bank  
Protection**

State Project Number TV-09  
Priority Project List 2

August 2003  
Vermilion Parish

Prepared by:

Christine Thibodeaux, Monitoring Section (CRD)  
LDNR/Coastal Restoration and Management

**MONITORING PLAN**  
**PROJECT NO. TV-09**  
**BOSTON CANAL SHORELINE STABILIZATION**

**ORIGINAL DATE: September 7, 1994**  
**REVISED DATES: July 19, 1995; July 23, 1998;**  
**August 14, 2003; December 19, 2013**

Preface

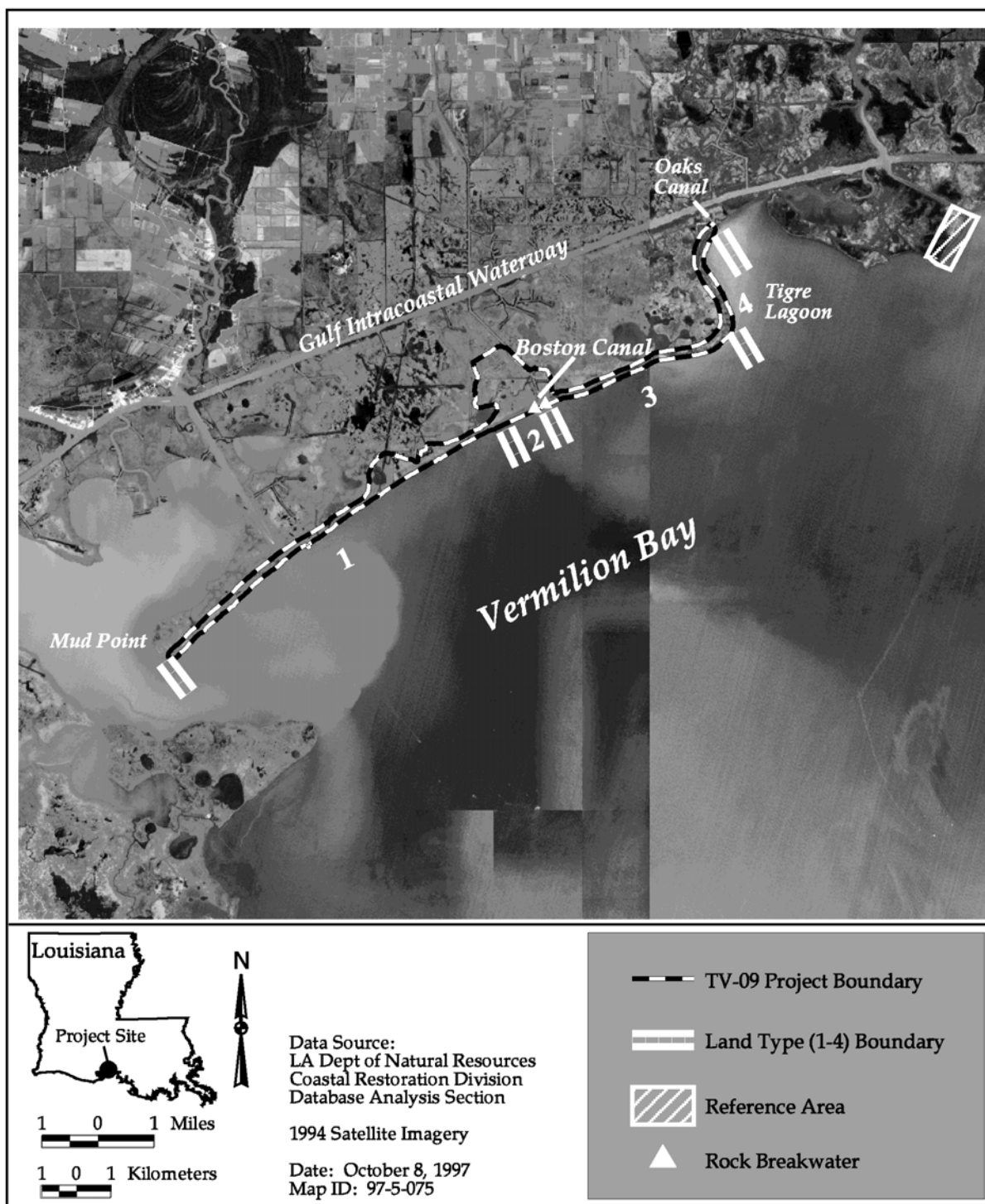
The original monitoring plan was updated due to inadequate funds. The plan modifications were to: obtain aerial photography once instead of four times; reduce the number of elevational surveys from five to three; reduce the number of shoreline surveys from eight to three; and reduce the number of vegetation surveys from nine to five.

Pursuant to a CWPPRA Task Force decision on April 14, 1998, the updated monitoring plan was modified due to budgetary constraints. Specifically, the goal to increase sediment elevation was dropped and the elevational surveys were eliminated. In order to provide consistency with other shoreline protection projects, one additional aerial photography was added and the number of shoreline surveys was increased to six.

Pursuant to a CWPPRA Task Force decision on August 14, 2003 to adopt the Coastwide Reference Monitoring System (CRMS-*Wetlands*) for CWPPRA, updates were made to this Monitoring Plan to merge it with CRMS to provide more useful information for modeling efforts and future project planning while maintaining the monitoring mandates of the Breaux Act. The implementation plan included review of monitoring efforts on currently constructed projects for opportunities to 1) determine if current monitoring stations could be replaced by CRMS stations, 2) determine if monitoring could be reduced to evaluate only the primary objectives of each project and 3) determine whether monitoring should be reduced or stopped because project success had been demonstrated or unresolved issues compromised our ability to actually evaluate project effectiveness. As a result of a joint meeting with DNR, USGS, and the federal sponsor, the recommendations for this Monitoring Plan were to maintain it in its current form. Based on the fact that the plantings have become indistinguishable, the photography has already been collected and analyzed, and only shoreline position monitoring remains, it was recommended to complete the monitoring for this project as originally planned.

Project Description

The Boston Canal/Vermilion Shoreline Stabilization project area consists of approximately 466 ac (186 ha) of brackish marsh and open water. It is located in Vermilion Parish, approximately 12 mi (19.3 km) south of Delcambre, LA. The project boundaries extend from Mud Point on the western end to Oaks Canal on the eastern end (figure 1). The northern boundary is brackish marsh and the southern boundary is Vermilion Bay. *Spartina patens* (marshhay cordgrass) and *Scirpus olneyi* (Olney bulrush) combine to make up 64% of the marsh vegetation. *Spartina cynosuroides* (big cordgrass) makes up 19% of the area and is typically found on elevated bayou



**Figure 1.** Boston Canal/Vermilion Bay Shoreline Protection (TV-09) project area, reference area, and land type boundaries.

banks. The open water area contains submerged and floating aquatics which are confined to a narrow band along the shore due to the tidal influence.

The subsidence rate for the Vermilion Bay area is 0.07in/yr (0.18 cm/yr). Based on DNR GIS data, erosion rates are estimated at 7 ft/yr (2.13 m/yr) as a result of high wave action generated by the long fetch across Vermilion Bay. The shoreline composition varies in correlation with adjacent bay bottom sediments. The shoreline from Mud Point to Boston Canal is a gently sloping beach. The shoreline from Boston Canal to Oaks Canal consists of reworked, bay bottom sediments deposited on top of marsh soil materials. The shoreline configuration of this area consists of 50% cutbanks on small points and 50% recessed gently sloping inlets. A slightly fluid clay soil similar to Creole clay occurs immediately landward of the entire shoreline.

Management of this project consists of stabilizing the Vermilion Bay and Boston Canal shorelines to prevent further regression of the shorelines into the adjacent marsh. Vegetation will be placed along approximately 13.25 mi (21.3 km) of Vermilion Bay shoreline bounded on the west by Mud Point and on the east by Oaks Canal. Transplants of *Spartina alterniflora* (saltmarsh cordgrass) will be planted on five-foot centers in two rows west of Boston Canal and in three rows east of Boston Canal. Transplants will be parallel to the shoreline.

Rock bulkheads will be constructed parallel to the banks of Boston Canal, extending into Vermilion Bay and then turning 90° to follow the shoreline (figure 2). The structures are designed to prevent the banks at the mouth of the Boston Canal from widening into the adjacent marshes. Sediment fences will be installed behind each rock bulkhead to trap sediments during times of overwash. This increased sedimentation will subsequently encourage revegetation of the area behind the bulkheads.

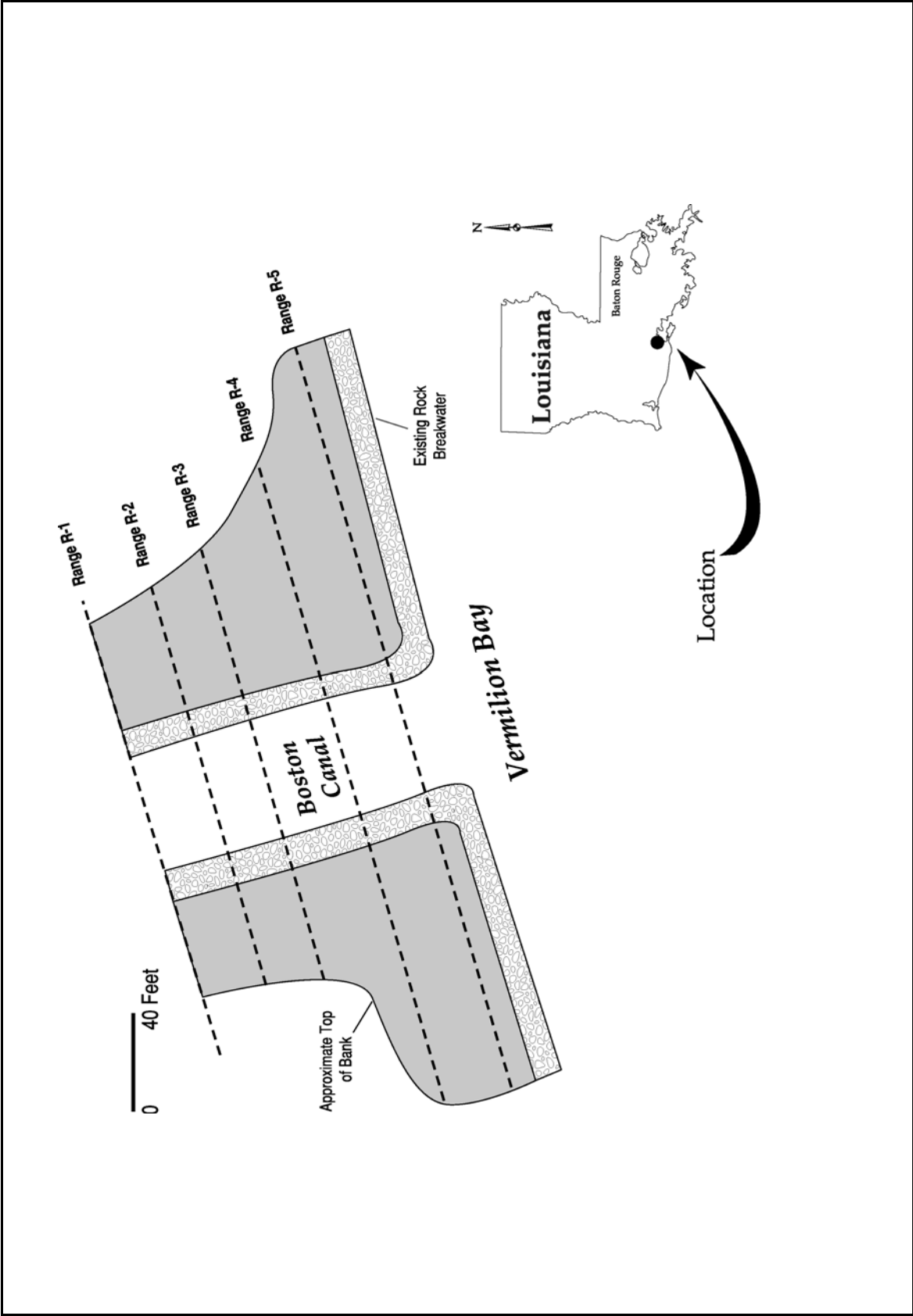
### Project Objectives

1. Protect approximately 466 ac (186 ha) of wetlands between Mud Point and Oaks Canal from physical erosion from Vermilion Bay through shoreline stabilization.
2. Stabilize 13.25 mi (21.3 km) of the Vermilion Bay shoreline and prevent further regression of the Boston Canal banks.

### Specific Goals

The following goals will contribute to the evaluation of the above objectives:

1. Decrease the rate of shoreline erosion at the intersection of the Boston Canal and Vermilion Bay by armoring the corners of the canal with rock bulkheads.



**Figure 2.** Boston Canal/Vermilion Bay Shoreline Protection (T/V-09) cross section of the mouth of Boston Canal labeling elevational transects.

2. Decrease the rate of shoreline erosion and maintain the integrity of approximately 466 ac (186 ha) of shoreline and interior marsh on the northern edge of Vermillion Bay by establishing *S. alterniflora* along the shoreline.

### Reference area

The importance of using appropriate reference areas cannot be overemphasized. Monitoring on both project and reference areas provides a means to achieve statistically valid comparisons, and is, therefore, the most effective means of evaluating project success. The evaluation of sites was based on the criteria that both project and reference area have a similar vegetative community, soil type, and hydrology. The shoreline east of Tigre Lagoon and west of Avery Canal is oriented to the south-southeast as is most of the project area. Both are subject to similar tidal action.

The proposed reference area will be used in the evaluation of shoreline movement. Because it will not be planted with *S. alterniflora*, we will be able to determine the effect of the plantings on shoreline erosion.

### Monitoring Elements

The following monitoring elements will provide the information necessary to evaluate the specific goals listed above:

1. Aerial Photography To document vegetated and non-vegetated areas, color infrared aerial photography (1:12,000 scale with ground controls) will be obtained. The photography will be georectified using National Wetland Research Center (NWRC) standard operating procedures described in Steyer et al. (1995), but detailed photointerpretation, mapping and GIS is not currently planned. The photography will be obtained prior to construction (1994) and in 1997 (post-construction).
2. Vegetation The general condition of the vegetative plantings will be documented using a generally accepted methodology similar to Mendelssohn and Hester (1988), Coastal Vegetation Project, Timbalier Island. Species composition and % cover will be monitored in 1.0 m<sup>2</sup> plots marked with one corner pole to allow revisiting the same plot over time. The same corner pole will be used to mark a plot of 16 plants to determine % survival by counting live stems within each plot, dividing by the total number of plants, and multiplying by 100. Three percent of 4 groups of plantings will be randomly sampled. The groups represent the variable topography of the shoreline (see Note #5). These criteria will be documented at 6 months post-construction, and at years 1996, 1999, 2004 and 2013, or until the original plants become indistinguishable. The possibility of herbivore damage is recognized and will be recorded if observed.

3.      Shoreline Change      To document shoreline movement. Continuous differential GPS will be established at the mean high water line along the original shoreline adjacent to vegetative plantings in the project area and at a reference site located east of Avery Canal (figure 1). GPS will be documented in post-construction years 1995, 1998, 2004, 2008, and 2013 to provide a template for mapping shoreline position and shoreline changes over time. Shoreline positions will be compared to historical datasets available in digitized format for 1956, 1978, and 1988 shorelines.

### Anticipated Statistical Analyses and Hypotheses

The following hypotheses correspond with the monitoring elements and will be used to evaluate the accomplishment of the project goals.

1.      Descriptive and summary statistics will be used to test changes in shoreline erosion rates pre and post construction. Since data are collected continuously as the shoreline is walked with the DGPS, the shoreline position will be mapped using GIS and the difference in area between time periods will be calculated, and converted into a shoreline change rate. After several sets of data are acquired, we will A) compare site-specific shoreline movement within the project area, and B) compare shoreline movement between the project area and a control area east of the project area.

*Goal:* Decrease the rate of shoreline erosion at the mouth of Boston Canal and along Vermilion Bay.

2.      The success of the vegetative plantings will be determined by analyses of descriptive statistics. These elements will be examined utilizing ANOVA's to monitor the success or failure of the plantings. If monitoring results fail to reject the null hypothesis, project effects will be investigated.

*Goal:* Increase vegetative cover.

*Hypothesis:*

$H_0$ :      Post planting vegetative cover along the shoreline at time point  $i+1$  will not be more than vegetative cover at time  $i$ .

$H_a$ :      Post planting vegetative cover along the shoreline at time point  $i+1$  will be more than vegetative cover at time  $i$ .

1.	Implementation:	Start Construction:	October 1, 1994
		End Construction:	September 1, 1995

4. The twenty year monitoring plan development and implementation budget for this project is \$137,735. Progress reports will be available in 1995, 1996, and 1997, and comprehensive reports will be available in 1998 and 2002. Periodic comprehensive reports on coastal restoration efforts in the Teche-Vermilion hydrologic basin will describe the status and effectiveness of the project as well as cumulative effects of restoration projects in the basin.

6. NRCS will be contacted to assist in the placement of permanent vegetative plots.

- ## 8. References:

Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller and E. Swenson 1995. Quality management plan for 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.