



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

**Monitoring Plan**

for

**Vermilion River Cutoff Bank  
Protection**

State Project Number TV-03  
Priority Project List 1

January 2014  
Vermilion Parish

Prepared by:

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

**MONITORING PLAN**  
**PROJECT NO. TV-03 VERMILION RIVER CUTOFF**

**ORIGINAL DATE: November 1, 1994**

**REVISED DATES: July 23, 1998; August 14, 2003,**

**January 15, 2014**

Preface

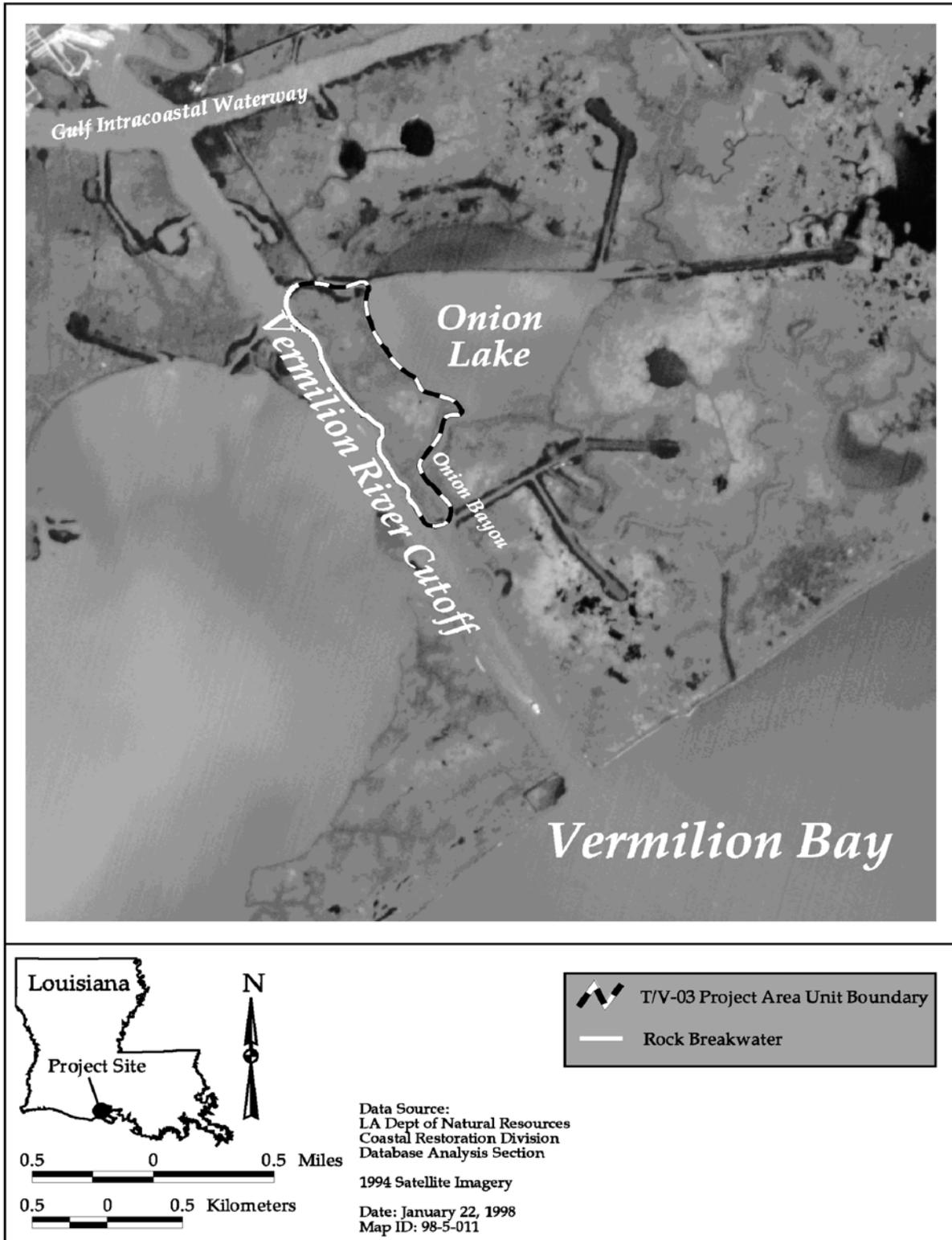
Pursuant to a CWPPRA Task Force decision on April 14, 1998, the original monitoring plan was reduced in scope due to budgetary constraints. Specifically, post-construction aerial photography was reduced from three to two, and shoreline surveys will be conducted five times post-construction.

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 eliminate the 2011 aerial photography, but maintain the shoreline monitoring as originally planned. Satellite imagery collected through CRMS-*Wetlands* can be used to evaluate changes in land and water areas within the project area. These recommendations have been incorporated into the Monitoring Elements section.

Project Description

The Vermilion River Cutoff, near Intracoastal City, La., was constructed in 1944 to connect the Vermilion River and the Gulf Intracoastal Waterway (GIWW) with Vermilion Bay for navigational purposes. A large section of the west bank of the Vermilion River Cutoff has eroded as a result of both bay-side wave action and boat wakes within the cutoff. Erosion of the west bank of the Vermilion River Cutoff, estimated at 23.3 ft/yr (7.1 m/yr) from comparisons of 1955–1985 aerial photography, has occurred to the extent that the land bridge between the cutoff and Vermilion Bay, to the west, is breached in several places (LDNR 1991). Erosion on the east bank threatens to breach the land bridge between the cutoff and Onion Lake.

The project will attempt to stabilize the west side of the cutoff by armoring the three remaining land points adjacent to Vermilion Bay with limestone rip-rap. It will also protect the east side of the cutoff from further erosion through the use of a 8,900 ft (2,713 m) freestanding rock breakwater (figure 1). The original plan was revised when it was found that a continuous dike along the west bank would stop the flow of desirable nutrients and sediment from the cutoff into Vermilion Bay.



**Figure 1.** Vermilion River Cutoff (T/V-03) shoreline protection project.

The project is designed to directly prevent the loss of 54 ac (22 ha) of marsh as well as preserve the inherent functions and values of thousands of wetland acres, thereby protecting the integrity of the entire Onion Lake wetland complex. A similar project at Blind Lake successfully utilized a rock breakwater to prevent further erosion of an existing spoil bank.

### Project Objectives

1. Maintain and protect approximately 54 ac (22 ha) of brackish marsh along the eastern side of the Vermilion River Cutoff that will contribute to protecting the integrity of several thousand acres of the Onion Lake wetland complex.
2. Prevent the Vermilion River Cutoff from widening into adjacent marshes.

### Specific Goal

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

1. Decrease the rate of shoreline erosion along the east bank of the Vermilion River Cutoff adjacent to Onion Lake through the use of a rock breakwater.

### Monitoring Elements

CRMS will provide a pool of reference sites within the same basin and across the coast to evaluate project effects. At a minimum, every project will benefit from basin-level satellite imagery and land:water analysis every 3 years, and supplemental vegetation data collected through the periodic Chabreck and Linscombe surveys. Other CRMS parameters which may serve as reference include Surface Elevation Table (SET) data, accretion (measured with feldspar), hourly water level and salinity, and vegetation sampling. A number of CRMS stations are available for each habitat type within each hydrologic basin to supplement project-specific reference area limitations.

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

1. **Aerial Photography** To measure vegetated and non-vegetated areas for the project area (to include near-vertical, color-infrared aerial photography at 1:12,000 maximum scale, and reference markers). Aerial photography will be georectified by National Wetlands Research Center (NWRC) personnel following procedures outlined in Steyer et al. (1995). Photography will be obtained prior to construction in 1993 and in post-construction years 2002.

Based on the CRMS review, aerial photography originally scheduled for 2011 was eliminated. CRMS satellite imagery land:water classification will be used to evaluate changes in land area overtime.

2. Shoreline Change To document shoreline movement, shoreline markers will be established at the vegetated marsh edge along the original shoreline adjacent to the breakwater. Shoreline position will be documented in pre-construction (1995), and post-construction years 1999, 2002, 2006, 2011, and 2014 to provide a template for mapping shoreline changes and movement over time. Shoreline positions will be compared to historical data sets available in digitized format for 1956, 1978, and 1988.

### Anticipated Statistical Analyses and Hypothesis

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 on both historical data and data collected post-project implementation to assess changes in marsh loss/gain rates.
2. Descriptive and summary statistics will be used on historical shoreline erosion data in order to identify an area along the Vermilion River Cutoff suitable as a reference. A reference area must have an erosional history similar to that of the pre-project shoreline in the project area.

If a suitable reference area is located, descriptive and summary statistics will be used to compare annual shoreline movement (ft/yr) in the project area with that of the reference.

Descriptive and summary statistics will be used to compare measured rates of shoreline movement (ft/yr) within the project area between successive years. Also, historical values for the area as well as data available from other surveys (i.e., USACE, USFWS, LDNR, LSU) will be gathered to document and allow for statistical analysis of long-term shoreline movement along the Vermilion River Cutoff in the project area. When the  $H_0$  is not rejected, possible negative effects will be examined.

*Goal:* Decrease the rate of shoreline erosion along the east bank of the Vermilion River Cutoff adjacent to Onion Lake.

*Hypothesis:*

- $H_0$ : Shoreline erosion rate post-construction will not be significantly less than shoreline erosion rates in previous years.

