



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

**Monitoring Plan**

for

**Lake Portage Land Bridge**

State Project Number TV-17  
Priority Project List 8

July 2004  
Vermilion Parish

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LDNR/Coastal Restoration and Management

## **MONITORING PLAN**

### **PROJECT NO. TV-17 (PTV-20) LAKE PORTAGE LAND BRIDGE PROTECTION**

**ORIGINAL DATE: September 19, 2002**

**REVISED DATE: August 14, 2003**

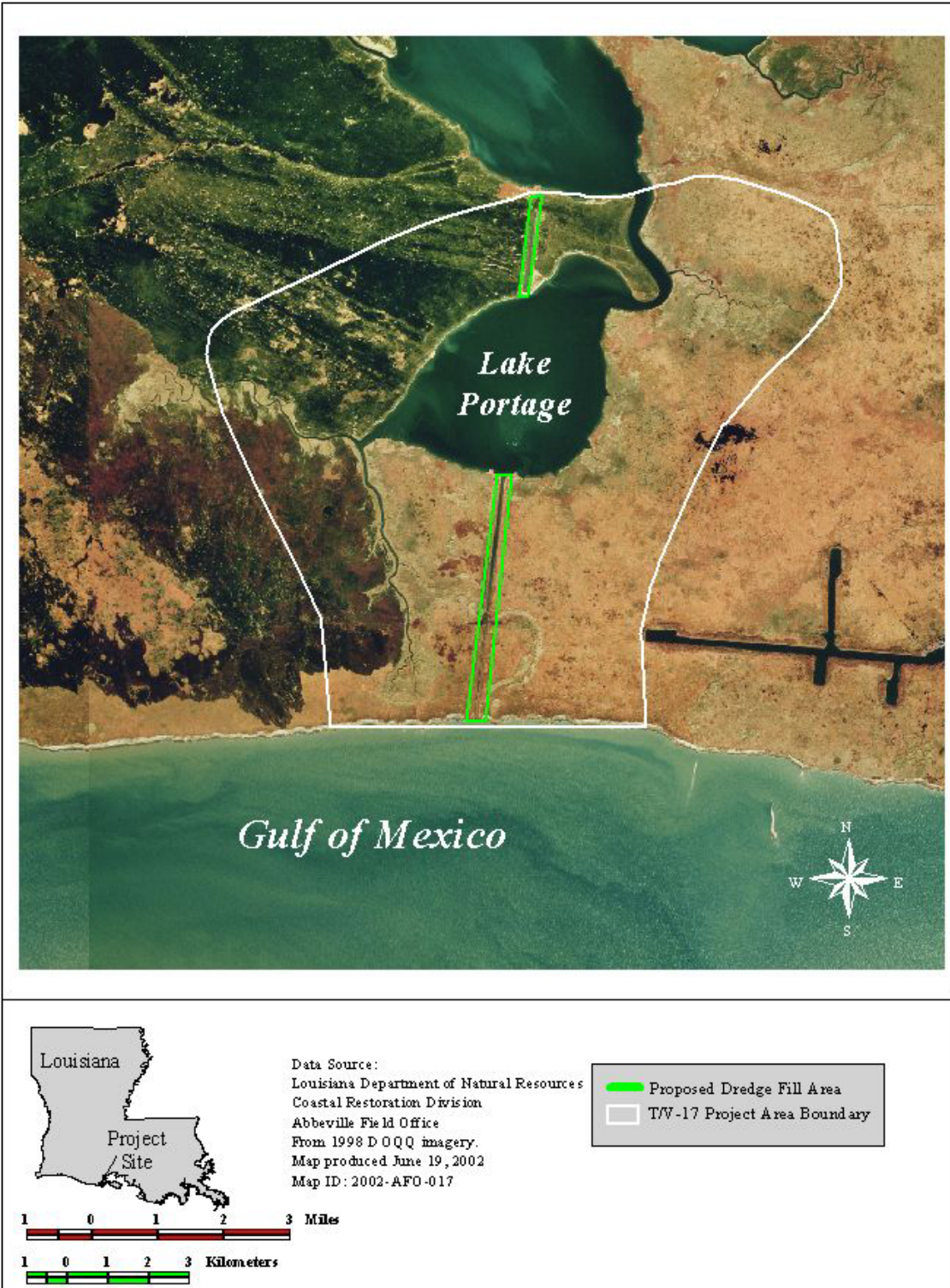
**REVISED DATE: July 15, 2004**

#### Preface

Pursuant to the 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. It was merged 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 a review of monitoring efforts on currently constructed projects for opportunities to 1) determine whether 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. The recommendations for modifying this Monitoring Plan are the result of a joint meeting with DNR, USGS, and the federal sponsor. The recommendations have been incorporated into this revised Monitoring Plan and are described in the Monitoring Strategies section. Specifically, it was determined that this project could best be evaluated by 1) replacing the land:water analyses from aerial photography with land:water analyses from CRMS satellite imagery, 2) monitoring emergent vegetation via periodic aerial inspections in cooperation with DNR Coastal Management Division and ground inspections in cooperation with O&M inspections, and 3) collecting photography of the condition of the sheetpile plug during annual O&M inspections.

#### Project Description

The Lake Portage Land Bridge Protection Project is a shoreline protection project from the 8<sup>th</sup> priority list of the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA), comprised of 1,540 acres (623 ha) of brackish marsh located in Vermilion Parish, Louisiana. The project area is bounded to the south by the Gulf of Mexico and to the north by Vermilion Bay, and is outlined in figure 1. The project area surrounds Lake Portage within the Paul J. Rainey Wildlife Sanctuary and the Louisiana State Wildlife Refuge, west of Southwest Pass (29°35'30" North Latitude, 92°06'23" West Longitude). This area has exhibited wetland vegetation loss of approximately 6 acres (2.4 ha) during the period 1968-1997, as indicated by habitat change analyses conducted by the USGS National Wetlands Research Center (NWRC) in Lafayette, Louisiana and the Louisiana Department of Natural Resources (LDNR). Currently,



**Figure 1.** Lake Portage Land Bridge protection project (TV-17) boundary and features.

approximately 81 percent of the 1,540 total acres (623 ha) are classified as emergent marsh and the remaining 19 percent as shallow open water. The estimate of wetland loss during the next 20 years with no action taken is 24 acres (9.7 ha), or 2% of the remaining emergent marsh area.

The Lake Portage Land Bridge project is located on the chenier plain of southwestern Louisiana, which developed during the past 5,000 years through westward littoral transport of Mississippi River delta sediments, in combination with deposition of local fluvial sediments (Howe et al. 1935; Van Lopik and McIntire 1957; Byrne et al. 1959; DeLaune et al. 1983). The development of cheniers coincided with eastward shifts in the course of the Mississippi River (Byrne et al. 1959; Gould and McFarlan 1959; DeLaune et al. 1983). These cheniers are recessional beach ridges, comprised of sand and shell fragments, which parallel the current shoreline (Gosselink et al. 1979).

The Gulf of Mexico, Atchafalaya River, and Vermilion Bay are the dominant hydrologic influences in the project area, which cause the area to be a tidal system. The habitats of primary importance in the project and adjacent areas are the brackish emergent marsh, shallow open water of Lake Portage, and the open water of the Gulf and Vermilion Bay (Chabreck and Linscombe 1978, 1988, 1997). The area in general exhibits a strong maritime character due to the influence of the Gulf of Mexico, Vermilion Bay, and various channels, bayous, and other water bodies. The climate of the Lake Portage area and vicinity is characterized as humid subtropical (United States Environmental Protection Agency [USEPA] 2002). Southerly winds from the Gulf of Mexico serve to moderate summer heat and infrequent winter polar air masses. Precipitation is typically abundant in all seasons as total annual precipitation averages 59 in (149.9 cm). The heaviest precipitation normally occurs between April and September. Mean summer and winter temperatures are 81EF (27EC) and 52EF (11EC), respectively. The effects of meteorological events can amplify water level fluctuations by as much as 2 ft (0.7 m) due to strong northerly winds and 10 ft (3 m) during a tropical storm or hurricane.

The dominant soils present in and around the project area are the Scatlake mucky clay, Bancker muck, and coastal beach (U. S. Department of Agriculture, Natural Resources Conservation Service [USDA-NRCS] 1996). Muck soils are level, poorly drained saline mineral soils, which are very fluid, and occur on low ridges of coastal brackish marshes. They are frequently flooded by shallow water during the highest normal tides and by deep water during infrequent extreme tides associated with storms. The coastal beach soil is a gently sloping intertidal soil, comprised of sand and shell fragments, that is usually void of vegetation.

Vegetation in the brackish marshes is dominated by *Spartina patens* (marshhay cordgrass), *Schoenoplectus robustus* (sturdy bulrush), *Schoenoplectus americanus* (chairmaker's bulrush), and *Juncus roemerianus* (needlegrass rush). Spoilbank vegetation is dominated by *Sesbania drummondii* (rattlebox) and *Baccharis halimifolia* (saltbush). Vegetation occurring adjacent to the shoreline is characterized by *Distichlis spicata* (saltgrass), *Borrchia frutescens* (bushy seaside tansy), *Spartina alterniflora* (smooth cordgrass), *Schoenoplectus pungens* (common three-square), and *Fimbristylis castanea* (marsh fimbry) (USDA-NRCS 2002).

Wetland loss in the project area has occurred in the form of conversion of beach and brackish marsh to open water. The high-energy water of the Gulf of Mexico, adjacent to the project area, has accelerated wave-induced erosion of the southern shoreline of the project area. A shoreline change study by Byrnes et al. (1995) found the mean shoreline retreat rate for the chenier plain from Cheniere au Tigre to Southwest Pass to be 9.5 ft/yr (2.9 m/yr) between 1883 and 1994. This loss has resulted primarily from erosional scouring from the same littoral currents that can also contribute to sediment accretion. These littoral currents from the Atchafalaya River and Wax Lake Outlet to the east, cause sediment accretion during periods of slow littoral currents and scouring as current velocity increases from storms and anthropogenic factors. One such factor is the removal of reef shell from Southwest Pass near Marsh Island, which caused an increase in current velocity.

The objective of this project is to backfill the canal associated with the Trunkline Gas Company Pipeline located to the north and south of Lake Portage, using approximately 44,000 yd<sup>3</sup> (33,640 m<sup>3</sup>) of dedicated dredge material. The pipeline, constructed in 1971, is a 36-inch (91.4 cm) diameter natural gas steel pipeline that connects Gulf production facilities and the Henry, Louisiana hub facility in Vermilion Parish. The canal is approximately 5,976 ft (1,821 m) long, 90 feet (27 m) wide and 3 feet (0.9 m) deep. The north end of the southern section of canal is partially separated from Lake Portage by a wooden bulkhead. Refurbishment of the east levee of the canal will also be required in order to allow for marsh creation to a sufficient elevation. The south end of the canal is connected to the Gulf of Mexico on high tides by a small tributary approximately 4 ft (1.2 m) wide and 2 ft (0.61 m) deep. The canal is otherwise insulated to the south from the Gulf by approximately 1,800 ft (548.6 m) of marsh.

#### Project Goals and Strategies/Coast 2050 Strategies Addressed

CWPPRA projects are reviewed prior to authorization of construction funds for compatibility of project goals with those in Coast 2050 (Louisiana Coastal Wetlands Conservation and Restoration Task Force and Wetlands Conservation and Restoration Authority 1998), and for the probability that proposed restoration strategies will accomplish those goals. Project goals and strategies were provided to LDNR by the sponsoring federal agency through the Environmental Assessment (EA) and/or Wetland Value Assessment (WVA) for the project. The following goals and strategies for the Lake Portage Land Bridge Protection Project were provided by the USEPA (2002) and USDA-NRCS (1999).

#### Project Goals:

- 1) Protect the marsh land bridge south of Lake Portage from breaching and creating another tidal pass from Vermilion Bay to the Gulf of Mexico. Prevent the loss of approximately 1,540 acres (623 ha) of interior emergent marsh from indirect loss and approximately 24 acres (9.7 ha) of emergent marsh from direct loss within the project area.

- 2) Create approximately 9 acres (3.6 ha) of marsh habitat by restoring areas of open water currently within the pipeline canal to vegetated wetlands by using material dredged from Vermilion Bay.

#### Project Strategies:

- 1) Use of dedicated dredge material from Vermilion Bay to backfill a pipeline canal to prevent the formation of a new tidal channel connecting the Gulf of Mexico and Vermilion Bay, which would cause accelerated tidal exchange and erosion of the Lake Portage land bridge.
- 2) Repair sections of the spoil bank of the pipeline canal to allow pumping of dredge spoil into the canal to the target elevation without undesired overflow of material into the surrounding marsh.

These project goals are consistent with the Coast 2050 common strategy of maintaining shoreline integrity and the region 3 specific strategy of stabilizing Gulf shorelines (USEPA 2002). Use of dedicated dredging, to create, restore, or protect wetlands is an important common strategy of the Coast 2050 plan that will be used and evaluated in this project. The “dedicated delivery and/or beneficial use of sediment for marsh building by any feasible means” is another one of the strategic goals of Coast 2050. Sustained emergent vegetation growth, due to the creation of new marsh habitat, should improve system linkages, another important strategic goal of the Coast 2050 plan.

#### Project Features

The project area will be protected by backfilling the gas pipeline canal to wetland elevation from the southwest shoreline of Vermilion Bay (i.e. Hell Hole) to the north shoreline of Lake Portage, and from the south shoreline of Lake Portage to a revetment mattress placed on the Gulf of Mexico shoreline. Approximately 44,000 yd<sup>3</sup> (33,640 m<sup>3</sup>) of dedicated dredge material to fill the canal would be excavated from an “L” shaped borrow area in Vermilion Bay directly north of the project area (i.e. Hell Hole). This borrow area was selected from a group of several borrow configurations due to its proximity to the project area and the minimal impacts to fish, oyster, and other significant natural resources in the vicinity of the project. Final volume of dredge fill material and settled elevation of the backfilled canal will be documented by the LDNR Coastal Engineering Division (CED) Engineering Section with their Construction Completion Report and subsequent Operations and Maintenance (O&M) to ensure that project strategies 1-3, as well as their ability to meet Coast 2050 strategy expectations, have been met. Dredge fill elevation is especially critical to project success, as the creation of wetland habitat is the desired outcome of construction and not upland or sub-aqueous structures. A target elevation of 2.0 ft (0.61 m) NAVD88 has been designed for the project, as stated in project design drawings provided by the federal sponsors with a final elevation of 0.9 ft NAVD88 after one year of settling.

## Monitoring Goals

### Priorities:

The Lake Portage Land Bridge Protection Project is a shoreline protection project that is also expected to create marsh directly, through the backfilling of the Trunkline natural gas pipeline canal. The creation of wetland habitat, and not upland or sub-aqueous habitat, is a focus. This presents the problem of having insufficient resources for an evaluation of all anticipated project benefits. Therefore, monitoring efforts will focus on evaluating project effects on land/water ratios and vegetation type and condition on the created habitat. Additional monitoring via visual inspections by the Engineering Section of CED during O&M surveys and aerial photography and/or digital satellite imagery collected for the land/water analysis will also be conducted. Any variation from expected results will be documented and evaluated.

### Specific Monitoring Goals:

- 1) Evaluate land/water ratios in the project area.
- 2) Evaluate the condition of the emergent vegetation in the project area.
- 3) Determine the continued presence of hydrologic separation between the project area and the Gulf of Mexico (i.e., the prevention of the formation of a tidal channel/connection between Lake Portage-Vermilion Bay and the Gulf of Mexico).

### Reference Area:

Although monitoring of both project and reference areas provides a means to achieve statistically valid comparisons, and is the most effective means of evaluating project impacts, no appropriate reference area could be established for the project. Based on the project design (the canal spoilbanks will not be degraded after filling) the marsh created with the dredged material within the filled canal will not be comparable to the adjacent marsh hydrologically or functionally. As the primary goal of the project is to maintain a separation between the Gulf of Mexico and Lake Portage and prevent the creation of a new tidal channel through the project area, measurements of project area versus reference area erosion rates are not appropriate.

Therefore, it was determined that the most appropriate means to monitor whether or not the filled canal is successfully maintaining this barrier is through periodic visual inspections and photographic documentation through oblique, color aerial photography collected in cooperation with the Coastal Management Divisions coastal flights.

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.

### Monitoring Strategies

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

#### *CRMS-Wetlands Strategies:*

1. Land:Water analysis Aerial photography and satellite imagery will be collected for the entire coast through CRMS-Wetlands. The aerial photography will only be analyzed for CRMS-Wetlands stations, however the satellite imagery will be analyzed to determine land and water areas for the entire coast. This imagery will be subset and used to qualitatively evaluate changes in land and water areas within the TV-17 project area at a coarse (25m) resolution. Photography and satellite imagery for the Teche/Vermilion Basin will be collected and analyzed for years 2005, 2008, and every 3 years thereafter. The CRMS imagery will replace the CIR photography originally proposed for 2002 and 2010 and will provide a much higher frequency of land:water analyses than originally proposed.

#### Supplemental project-specific information:

2. Emergent Vegetation Aerial oblique photographs will be acquired of the backfills pipeline canal and associated project area to assess the type and condition of the emergent vegetation present. Vegetation abundance will be estimated and condition will be documented at regular intervals.

In addition, Chabreck and Linscombe vegetation transect data will also be used from coastwide surveys to document changes in vegetation classification.

3. Additional Data Concurrent with emergent vegetation evaluation, aerial oblique photographs will be acquired of the backfilled pipeline canal and associated project area to assess the width and depth of existing channels to determine the presence of increased tidal scour and to assess the integrity of the Gulf shoreline and sheetpile plug.



The following describes hypotheses and associated statistical tests, if applicable, used to evaluate each of the quantifiable goals and thus effectiveness of the project. These are followed by statements of the project goals and the hypotheses that will be used in the evaluation.

Descriptive and summary statistics on historical data, as part of the CRMS-Wetlands strategy (for 1956, 1978, 1988, and for any subsequent years) and basin-level data from aerial photography and/or digital satellite imagery collected pre- and post-construction will be used, along with GIS interpretations of these data sets, to evaluate marsh to open water ratios and changes in the rate of marsh loss/gain in the project area.

1. Proposed Implementation: Start Construction: March 1, 2003  
End Construction: April 1, 2004
2. NRCS/EPA Point of Contact: Richard Abshire (337) 291-3060
3. DNR Project Manager: Clay Menard (337) 482-0683  
DNR Monitoring Manager: Justin Price (337) 482-0658  
DNR RTS Manager: Kyle Balkum (225) 342-4122
4. The twenty year monitoring plan development and implementation budget for this project is \$87,096. Pursuant to the CRMS review, it was authorized by the Task Force to maintain \$37,602 with the project, and utilize \$49,494 to support CRMS. The status and effectiveness of the project will be reported in comprehensive basin-level reports and periodic Operations, Maintenance and Monitoring Reports.
5. The marsh to open water ratio in the TV-17 project area will be compared with GIS interpretations of historical data sets available in digitized format for 1956, 1978, 1988, and for any subsequent years that become available during the life of this project to document changes in the marsh to open water ratio within the TV-17 project area.
6. In the event that the dredge placement and/or vegetation fail to establish as emergent marsh and protect the backfilled canal, water level may be monitored.
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