



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

**Monitoring Plan**

for

**Barataria Bay Waterway West Side  
Shoreline Protection**

State Project Number BA-23  
Priority Project List 4

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Jefferson Parish

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**MONITORING PLAN**  
**PROJECT NO. BA-23**  
**BARATARIA BAY WATERWAY WEST BANK PROTECTION**

**ORIGINAL DATE: January 5, 1998**  
**REVISED DATES: July 23, 1998, August 14, 2003**

Preface

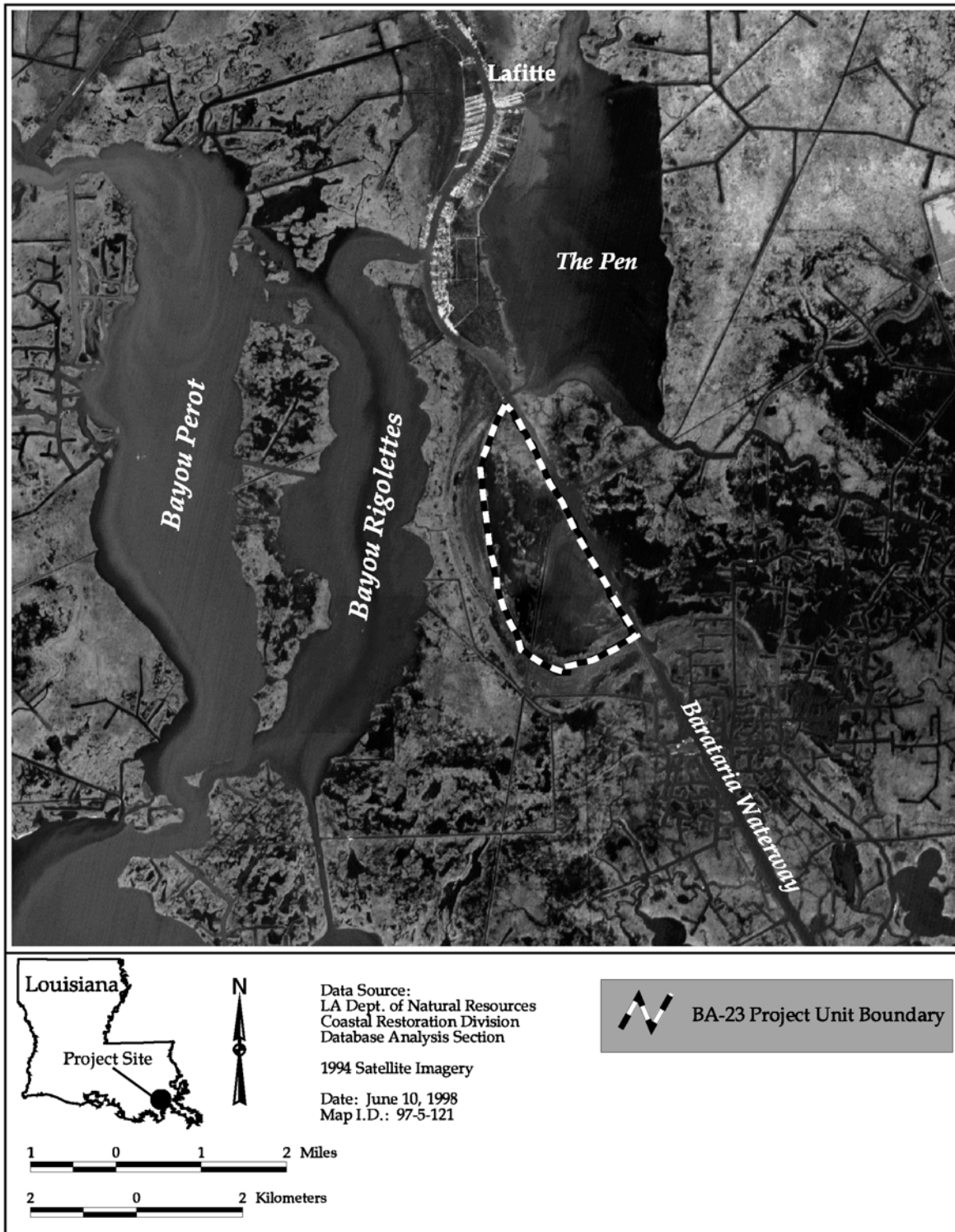
Pursuant to a CWPPRA Task Force decision on April 14, 1998, the original monitoring plan was increased in scope to monitor hydrologic aspects of the project. Specifically, water level and salinity monitoring will be conducted for one year pre-construction and three years post-construction.

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. The recommendations for modifying this Monitoring Plan are the result of a joint meeting with DNR, USGS, and the federal sponsor. Specifically, hydrologic (already scheduled to end after 2003) and vegetation monitoring will end after 2003 and the 2017 land:water analysis was eliminated. Vegetation data will be supplemented with vegetation data collected by Chabreck and Linscombe during their periodic coastwide surveys. These recommendations have been incorporated into this revised Monitoring Plan and are described in the Monitoring Elements section.

Project Description

The Barataria Bay Waterway West Bank Protection Project (BA-23) is located in Jefferson Parish, Louisiana approximately 4.5 mi (7.2 km) south of Lafitte on the west side of the Dupre Cut portion of the Barataria Bay Waterway (BBW). The project area is east of Bayou Rigolettes, north of the Lafitte Oil and Gas Field, and southwest of The Pen (figure 1).

Project area wetlands were formed in a protective curve of the natural ridge of Bayou Barataria. The east-west orientation of the ridge, which serves as the southern boundary of the project area, protected the wetlands from the direct influence of salinities and tidal action of the Gulf of Mexico through Barataria Bay. Construction of the Dupre Cut portion of BBW established a direct conduit linking project wetlands with Barataria Bay. Initially, Dupre Cut spoil banks protected the project area from salinity and tidal fluctuations in the waterway. The combination of subsidence and wave erosion from marine traffic, however, has caused a breaching of the spoil banks increasing water exchange and salinity fluctuations.



**Figure 1.** Barataria Waterway Shoreline Protection (BA-23) project location.

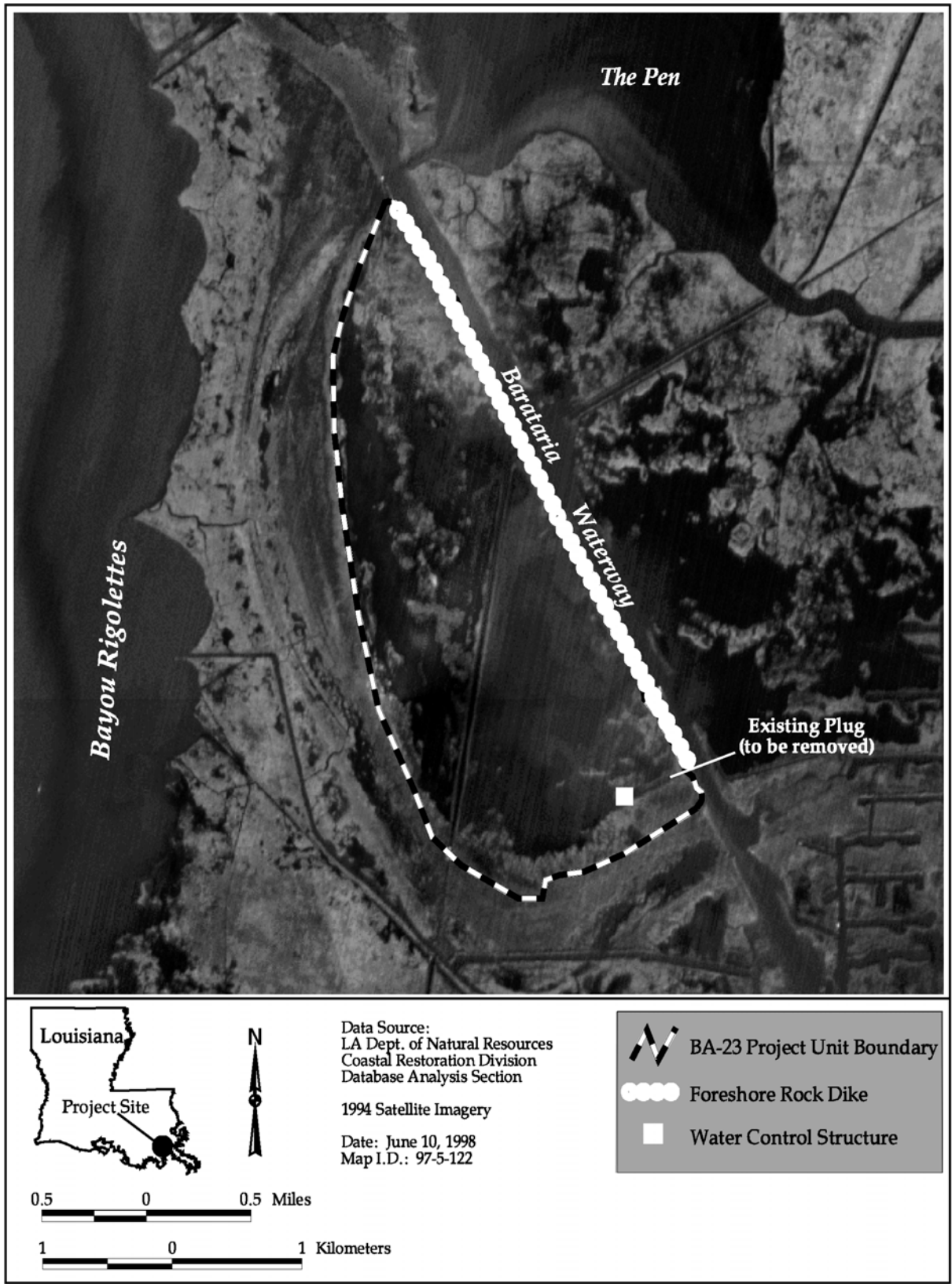
Land loss maps (Britsch and Dunbar 1996) of the area indicate that by the late 1950's and 1960's a majority of the project wetlands had converted to open-water. The land loss rate, used in the 1994 Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) Wetland Value Assessment analysis, was 1.89 percent per year for the years 1983 to 1994 (Louisiana Coastal Wetlands Conservation and Restoration Task Force 1994).

Direct conversion to open-water is but one of the processes affecting the project area. Subsidence of the ridge forming the northern, western, and southern boundaries has changed the ridge from a forested wetland to more of a shrub-scrub environment. Once solid emergent marshes have converted to broken fringe marshes. In 1949, O'Neil classified the marshes in the project area as fresh *Scirpus americanus* (three-cornered grass) marsh. Thirty years later, those remaining marsh areas were classified by Chabreck and Linscombe (1978 and 1988) as brackish.

According to 1988-1990 aerial habitat data the 2,200 ac (880 ha) project area is comprised mostly of open-water (73.5%) followed by brackish marsh (20.4%) and upland scrub (4.3%) (LDNR/CRD and USGS/NWRC 1997). The most recent land/water data from 1993 imagery indicates the area is over 72% open-water (LDNR/CRD and USGS/NWRC 1997). Preliminary field investigations indicate that the emergent brackish marsh vegetative community is dominated by *Spartina patens* (marshhay cordgrass) with *Spartina alterniflora* (smooth cordgrass) being prevalent adjacent to the waterway and in the southern half of the project area. *Distichlis spicata* (saltgrass) is co-dominant in the central portion of the project area. Other common species include: *Vigna luteola* (deer pea), *Aster sp.*, *Setaria magna* (giant foxtail), *Eleocharis sp.* (spikerush), and *Cyperus sp.* (flat-sedge). *Iva frutescens* (Iva), *Ipomoea sagittata* (marsh morning glory), *Baccharis halimifolia* (groundsel bush), *Pluchea camphorata* (camphorweed), *Polygonum sp.* (smartweed), *Amaranthus australis* (pigweed), and *Solidago sempervirens* (goldenrod) occur sporadically throughout the project area. In upland areas *B. halimifolia* is frequently encountered with *Salix nigra* (black willow), *Sabal minor* (palmetto), and *Sapium sebiferum* (Chinese tallow) also occurring. The submergent community is comprised of *Myriophyllum spicatum*. (Eurasian water-milfoil), *Ruppia maritima* (widgeon grass), and *Ceratophyllum demersum* (coontail).

Soils in the project area consist mostly of those in the Lafitte-Clovelly Association (93%)(USDA/NRCS 1997). These organic soils are found typically in brackish marshes and are level and poorly drained, resulting in flooded or ponded conditions most of the time. The remaining soils are comprised of Sharkey Clay (4%) along the natural levees and Fausse Clay (3%) in swamps of subsided natural levees.

The BA-23 project, as currently designed, consists of approximately 9,400 linear feet (2,865 m) of rock bankline protection (foreshore rock dike) along the west bank of the BBW to protect the adjacent marsh from excessive water exchange and subsequent erosion (figure 2). The project will supplement a dredge-and-fill operation previously completed by the U.S. Army Corps of Engineers (USACE). The Natural Resources Conservation Service (NRCS) will fill in gaps in the spoilbank excluded from the USACE operation thereupon reinforcing and forming a continuous protection levee.



**Figure 2.** Barataria Waterway Shoreline Protection (BA-23) project area boundary and location of project features.

The USACE dedicated dredging operation in the BBW will utilize sediments taken from the waterway in an attempt to create new marsh within the project area. The USACE will deposit approximately 750,000 cubic yards (555,556 m<sup>3</sup>) of cutterhead dredged material in semi-confined, shallow open-water areas adjacent to the BBW. This one-time operation is designed to create conditions conducive to the establishment of emergent marsh. As a part of the project, NRCS will manage marsh water levels through the use of a water control structure placed in the southern portion of the project area. The structure is expected to remain open most of the year, allowing unimpeded ingress and egress of marine organisms. During waterfowl hunting season (November through January), however, water levels will be managed to a height not to exceed 6 in (15 cm) below marsh elevation.

The project features include approximately 9,400 linear feet (2,865 m) of bankline protection combined with a water control structure consisting of two 48 in (1.22 m) corrugated pipe culverts with stop logs to allow for management of water levels and the movement of marine organisms within the project area.

#### Project Objective

1. The primary objective of this project is to re-establish a hydrologic barrier to protect approximately 2,200 ac (880 ha) of combined marsh and open-water from excessive wave energy, water level fluctuations, and saltwater intrusion from the BBW.

#### Specific Goal

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

1. Maintain or increase marsh to open-water ratio in the project area.

#### Reference Area

Potential reference sites for the vegetation and aerial photography monitoring were evaluated based upon the criteria that both the project area and the reference area share similar vegetative communities, soil types, and hydrology. To the east, adjacent to the project and across the BBW, is an area that fulfills the requirements for a reference area as stated above. However, the site is itself a future restoration project (BA-26) and additionally is included as a portion of another restoration project (BA-03c). This site was therefore excluded from further consideration. To the south is the Lafitte Oil and Gas Field, unsuitable as a reference area because of heavy interior traffic and extensive canals. Lands to the north and west do not have acceptable reference sites either as they differ in hydrology, soils, and vegetative composition. For these reasons no proximate reference area will be used to compare vegetation and aerial photographs to the project area. However, a continuous recorder will be placed in the Barataria Bay Waterway adjacent to the project area to serve as a reference site for monitoring salinity and water level variability.

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 Limitations

BA-23 was classified as a shoreline protection project and as such has limited funding with which to evaluate an area that would have been more accurately defined as an hydrologic restoration. Budgetary constraints severely limited the amount of hydrologic monitoring which could be conducted on this project; however, the four years of hydrologic monitoring will allow an evaluation of water level and salinity variability. Additionally, without a reference area with which to compare and the difficulty of separating the effects of the CWPPRA project from the USACE operation, project assessment is limited to pre- and post- comparisons and does not necessarily indicate a project induced condition.

### Monitoring Elements

1.      Aerial Photography      To evaluate land to water ratios in the project area, near vertical, color infrared aerial photography (1:12,000 scale, with ground controls) will be obtained in 1997 (pre-construction) and in 2003, and 2009. The photography will be georectified by National Wetlands Research Center (NWRC) personnel using standard operating procedures described in Steyer et al. (1995).

Based on the CRMS review, the land:water analysis originally scheduled for 2017 was eliminated.

2.      Vegetation      Plant species composition and relative abundance of wetland vegetation will be documented in the project area in 1997 (pre-construction) and in 2003 post-construction. Utilizing random stratified sampling with two strata of ten stations each (20 stations total), a modification of the Braun-Blanquet technique (Mueller-Dombois and Ellenberg 1974) will be used for emergent vegetation and the “rake” method used for submergent vegetation (Nyman and Chabreck 1996). Strata are defined as a northern and southern section divided by an oil field canal that essentially bisects the project area. Expected changes in land to open-water ratios require flexibility in vegetative sampling. Current open-water stations will be sampled for submergent vegetation. If these stations subsequently convert to emergent marsh, they will be sampled accordingly. The converse will also occur. All procedures will follow methods

outlined in Steyer et al. (1995). Vegetation surveys will be conducted in early fall, prior to the first frost.

Based on the CRMS review, vegetation data collection originally scheduled for 2009 and 2017 was eliminated. Vegetation data will be supplemented with vegetation data collected by Chabreck and Linscombe during their periodic coastwide surveys.

3.      Water Level      To monitor water level variability, one continuous recorder will be located within the project area and one recorder located in the Barataria Bay Waterway. Mean daily water level variability will be monitored continuously prior to construction in 1998-2000, and after construction in 2001-2003.
4.      Salinity      To monitor salinity variability, one continuous recorder will be located within the project area and one recorder located in the Barataria Bay Waterway. Mean daily salinity variability will be monitored continuously prior to construction in 1998-2000, and after construction in 2001-2003.

#### Anticipated Statistical Tests and Hypotheses

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

1.      Descriptive and summary statistics from color-infrared aerial photography collected pre- and post-construction will be used to evaluate land to open-water ratios and changes in the rate of marsh loss/gain in the project area. With available historic information available in digitized format from years 1956, 1978, 1988, and 1993 to use in comparison, regression analyses will be conducted to test for changes in slope between pre- and post-construction conditions.

*Goal:* Maintain or increase land to open-water ratio within the project area.

2.      Vegetation characterization will be compared to the coast-wide reference system, should it become available. Descriptive and summary statistics will be generated on species diversity and composition.

NOTE:      Available ecological data, including both descriptive and quantitative data, will be evaluated in concert with the above analysis to aid in determination of the overall project effectiveness. This includes ancillary data collected in the monitoring project but not used directly in statistical analysis, as well as data available from other sources (NRCS, USACE, USFWS, USGS, LSU, DNR, etc.)



1. Implementation: Start Construction: April 1, 1999  
End Construction: November 15, 2000
2. NRCS Point of Contact: Marty Floyd (318) 473-7690  
USACE Point of Contact: Mike Salyer (504) 862-2037  
NWRC Point of Contact: Bill Jones (318)266-8581
3. DNR Project Manager: Hilary Thibodaux (985) 449-5105  
DNR Monitoring Manager: Jonathan Barmore (504) 280-4073
4. The twenty year monitoring plan development and implementation budget for this project is \$131,332. Pursuant to the CRMS review, it was authorized by the Task Force to maintain \$111,427 with the project, and utilize \$19,905 to support CRMS. Progress reports will be available in 2000, and 2001. Comprehensive reports on coastal restoration efforts in the Barataria hydrologic basin will be available in 2005, 2008, 2011, 2014, and 2017. These reports will describe the status and effectiveness of the project as well as cumulative effects of restoration projects in the basin.
5. References:  
  
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Mueller-Dombois, D., and H. Ellenberg 1974. Aims and Methods of Vegetation Ecology. John Wiley and Sons. New York. 547

- Nyman, J. A., and R. H. Chabreck 1996. Some effects of 30 years of wier management on coastal marsh aquatic vegetation implications to waterfowl management. Gulf of Mexico Science 1:16-25.
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- United States Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS) 1997. Barataria Bay Waterway West Bank Protection Project (PBA-12a). Draft Project Plan and Environmental Assessment, September 1997.