

MONITORING PLAN

PROJECT NO. ME-21 GRAND LAKE SHORELINE PROTECTION

DATE: May 10, 2005

Project Description

The Grand Lake Shoreline Protection (ME-21) project was proposed on the 11th Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) Priority Project List and is located in the Mermentau basin in Cameron Parish, Louisiana (figure 1). The project area encompasses the southern shore of Grand Lake from Superior Canal to the mouth of Catfish Lake and may include an optional structural increment that extends westward around Tebo Point. The total area of the Grand Lake Shoreline Protection project is approximately 1,162 acres (470.24 ha) and is primarily composed of fresh emergent marsh (445 acres) and open water (717 acres) habitats (USACE 2001). Approximately 37,800 ft (12,192 m) of Grand Lake Shoreline will be protected through the construction of a foreshore rock dike, with an additional length of about 5,700 ft (1,737 m) being protected if the optional structure is built around Tebo Point.

Erosion rates calculated by comparing aerial photographs from 1978 - 1979 to those taken in 1997 - 1998 revealed that 11 to 32 ft of shoreline was lost annually (USACE 2001). Construction of the foreshore dike will prevent the lake from breaching into adjacent open water areas (Lake Benoit and Long Lake) and will protect interior marsh, which without the structure, will be subjected to increased wave energy [Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority (LCWCRTF & WCRA) 1999].

Project Goals and Strategies/Coast 2050 Strategies Addressed

Coast 2050 identified elevated water levels and wave energy generated by strong frontal winds as the major factors contributing to the rapid erosion of the southern shore of Grand Lake (LCWCRTF & WCRA 1999). The proposed strategy of protecting and stabilizing the southern shoreline of Grand Lake is supported by the *Coast 2050* Region 4 Ecosystem Strategies which promote the stability and protection of bay, lake, and gulf shorelines for the preservation of interior wetlands and the maintenance of favorable hydrologic conditions. Project goals and strategies are 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 Freshwater Bayou shoreline protection project were provided by the USACE.

Project Goals:

- 1) Stop erosion along the southern bank of Grand Lake from Superior Canal to Tebo Point and as a result, save 445 acres (180 ha) of interior emergent marsh that is expected to be lost over



Figure 1. Grand Lake Shoreline Protection project area and CRMS-Wetlands stations within the general area.

- the 20 year project life.
- 2) Increase submerged aquatic vegetation (SAV) coverage in the open water areas from a baseline of 10% to 80% over the 20 year project life.
 - 3) Create 50 acres (20.2 ha) of emergent marsh between the Grand Lake shoreline and the foreshore rock dike over the 20 year project life.

Project Strategies:

The project goals will be achieved through the construction of a foreshore rock dike along a 37,800 ft (12,192 m) stretch of Grand Lake from Superior Canal to the mouth of Catfish Lake with the option of including an additional 5,700 ft of structure around Tebo Point.

Project Features

A 37,800 ft (12,192 m) foreshore rock dike will be constructed along the southern shore of Grand Lake, 200 ft from the existing shoreline at the -1.0 ft (NAVD-88) contour from Superior Canal to the mouth of Catfish Lake. In addition, a plan is in place to extend the structure an additional 5,700 ft westward around Tebo Point and continuing southwest to protect the entire island if it is determined that no cultural resources in the area will be disturbed. The crest elevation will be built at an approximate height of $+3.0 \pm 0.25$ ft (NAVD-88). The dike will require 24 inch grade "A" stone placed on 200 pound/inch geotextile fabric. Fish dips (gaps in the rock dike) measuring 50 ft wide and lined with geotextile fabric and a layer of rock will be constructed every 1,000 ft to allow some sediment exchange and organism egress and ingress.

The need for a flotation canal to allow access for construction barges and equipment will produce a significant amount of dredged spoil. Maximum allowable dredging depth of the flotation channel will be -5.0 ft (NAVD-88). The spoil will be placed a minimum of 10 ft landward from the toe of the foreshore rock dike and 50 ft seaward of the marsh edge.

Monitoring Goals

As authorized by the CWPPRA Task Force, CWPPRA projects authorized for construction after April 16, 2003 will be monitored only with CRMS-*Wetlands* data, other existing data collection, and any additional data-collection specifically added to the project and funded separately from the normal monitoring. As the ME-21 Grand Lake Shoreline Protection Project is a shoreline protection project, there are no CRMS-*Wetlands* monitoring stations available in the project area, however coastwide aerial photography and satellite imagery collected as part of CRMS-*Wetlands* will be available to assist in evaluating this project.

Priorities:

The Grand Lake Shore Protection project is predominantly a shoreline protection project, and rock-dike structures have been successful at eliminating shoreline erosion at a number of sites. Consequently, shoreline erosion and integrity of the rock dike will be evaluated only with annual inspections by LDNR's Operations and Maintenance Section in coordination with the Corps of Engineers. The primary importance of the shoreline protection is to preserve 445 acres (180 ha) of existing marsh. Sediment is expected to collect behind the rock dike and prograde as in other shoreline protection projects including ME-04 (Raynie and Visser 2002) and TV-09 (Thibodeaux 1998). Aerial photography and /or satellite imagery will be utilized to monitor the effects of the shoreline project on land loss and gain.

Specific Monitoring Goals:

1. To document shoreline change along the south shore of Grand Lake.

Reference Area:

Collecting monitoring data on both project and reference areas provides a way to achieve statistically valid comparisons and thus a reliable evaluation of project effectiveness. Due to increasing difficulty of finding adequate reference areas for CWPPRA projects, one intent of the CRMS was to provide a suite of reference stations to be used for this purpose. CRMS-*Wetlands* will not provide direct information on shoreline erosion, however, we can compare our observations on this project with those on similar projects.

Monitoring Strategies

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

CRMS-*Wetlands* Strategies

1. Spatial Data
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, but the photography collected over this project area will be available to qualitatively assess shoreline movement. 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 ME-21 project area at a coarse (25 m) resolution. Photography and satellite imagery for the Mermentau Basin will be collected and analyzed for years 2005, 2008, and every 3 years thereafter.

Project Specific Strategies:

1. Integrity of rock dike
Annual inspections by LDNR's O&M Section in coordination with the Corps of Engineers will be used to evaluate the structural integrity of the rock dike along the south shore of Grand Lake.
2. Accretion
The accretion will be evaluated using ocular cover estimates, hand held digital photography and species composition to coincide with annual inspections conducted with CED personnel.

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 compare estimated rates of shoreline movement with historical values for the area. This will allow for the analysis and long term documentation of shoreline movement along the Grand Lake project area (goal 1). Data will be obtained from aerial photography and satellite imagery.

Goal: Decrease the rate of shoreline erosion along the south shore of Grand Lake from Superior Canal to Tebo Point

NOTE: Available ecological data, including both descriptive and quantitative data, will be evaluated in concert with the statistical analyses of all of the above data to aid in the determination of 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 (USACE, USFWS, USGS, LSU, DNR, etc.).

Notes

1. Proposed Implementation: Start Construction: August 2005
End Construction: December 2005
2. USACE Project Manager: Chris Monnerjahn (504) 862-2415
3. DNR Project Manager: Ken Duffy (225) 342-4106
DNR Monitoring Manager: Mark Mouledous (337) 482-0661
DNR RTS Manager: Mark Stead (225) 342-9430
4. Periodic monitoring reports will describe the status and effectiveness of the project.
5. Monitoring of the rock breakwater will be conducted to observe settlement and slumping in order to determine maintenance requirements.
6. Although SAV is an important factor within the WVA and the goals of the project, funding restraints do not allow for SAV monitoring. Ocular estimates during field surveys will be used to document the condition of SAV.
7. References:

Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority. 1999. Coast 2050: Toward a sustainable coastal Louisiana, the appendices. Appendix E–Region 3 supplemental information. Louisiana Department of Natural Resources. Baton Rouge, Louisiana. 173 pp.

Raynie, R. C., J. M. Visser. 2002. CWPPRA Adaptive Management Review Final Report.

Prepared for CWPPRA Planning and Evaluation Subcommittee, Technical Committee, and Task Force. Baton Rouge, Louisiana. 47 pp. Plus appendices.

Thibodeaux, C. 1998. Boston Canal Vermilion Bay Shoreline Protection (TV-09) three-year comprehensive monitoring report. Louisiana Department of Natural Resources. Baton Rouge, Louisiana. 21 pp.

U.S. Army Corps of Engineers. 2001. Candidate Project Information Sheet for Wetland Value Assessment: Grand Lake Shoreline Protection /Marsh Creation, Superior Canal to Tebo Point (Unpublished) 7 pp.