MONITORING PLAN

DEMONSTRATION PROJECT MR-08
BENEFICIAL USE OF HOPPER DREDGED MATERIAL

ORIGINAL DATE: June 26, 1997
REVISED DATE: July 23, 1998

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, the demonstration project was shortened from five years to three years. All post-construction monitoring will occur in year 2001.

Project Description

The Beneficial Use of Hopper Dredged Material Demonstration project is located within the lower Mississippi River Delta (MRD) in Plaquemines Parish. The project area is located on the left-descending bank of Southwest Pass, approximately three miles below Head of Passes (figure 1). This area is approximately 33 ac (13 ha) of freshwater marsh, consisting of a large open-water pond that is interspersed with small islands of emergent vegetation.

Major navigation channels in Louisiana, such as the Mississippi River and lower Atchafalaya River, are maintained through sediment dredging by the United States Army Corps of Engineers (USACE). Consequently, over 90 million cubic yards (69 million m^3) of sediment are dredged from these waterways annually (USACE and Louisiana State University 1995). In the lower MRD, dredged material is disposed of by "stock-piling" materials along the river channel and ocean dumping. With both of these methods, dredged materials become unavailable for marsh creation. Hence, the USACE-New Orleans District has recently developed a long-term plan to utilize dredged material to enhance and create wetland habitats along many of the major navigation channels.

In other regions of the United States, dredged material has successfully been used to develop wetland habitats (Austin 1995). For instance, a 100 ha demonstration marsh was created with dredged material in upper Galveston Bay by the USACE and the Houston Port Authority. Viable wetlands have also been created in the District of Columbia, and in areas within Chesapeake Bay. Success of these projects shows that dredged material can be used to develop wetland habitats, thereby providing an environmentally acceptable alternative for dredge disposal.

Techniques for developing wetlands are important to Louisiana, because it experiences the highest coastal erosion rates in the U. S. (Penland et al. 1990). Within Louisiana, extensive wetland loss occurs in the active MRD region. For instance, land loss is estimated to be 5.37 mi^2/yr (13.9 km^2/yr) for the MRD, which is 21% of the total annual land loss occurring in the Louisiana coastal zone (Dunbar et al. 1992). Causes of land loss in the MRD include a combination of natural processes and human-induced activities, such as subsidence, sea level rise, canal dredging, and levee construction (van Beek and Meyer-Arendt 1982).

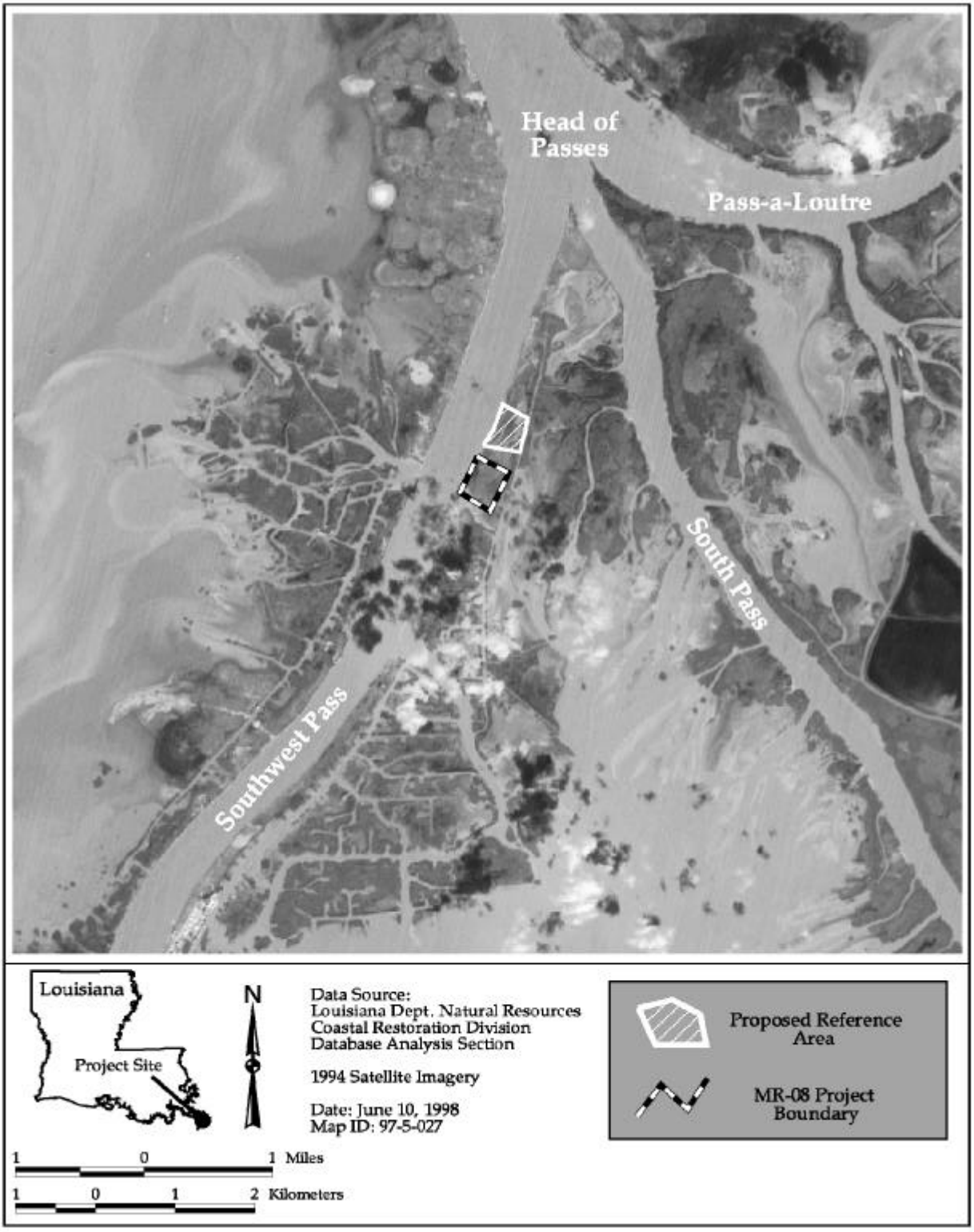

Figure 1. Beneficial Use of Hopper Dredged Material (MR-08) project boundary.

The goal of this 3 year demonstration project is to create a vegetated wetland through the beneficial use of dredged material. Approximately 360,000 cubic yards (275,256 m^3) of dredged material will be obtained from maintenance dredging operations along the Mississippi River between Mile 3.5 Above Head of Passes (AHP) and Mile 2.0 Below Head of Passes (BHP). Dredged material will be discharged from a hopper dredge by nozzle discharge into a shallow open-water area located on the left descending bank of Southwest Pass between Mile 2.95 BHP and Mile 3.2 BHP (figure 1). Dredged material will be deposited behind the river levee within the project area, and placement will continue eastward. Dredged material will be placed as uniformly as possible at or below elevation +3.5 ft to +4.0 ft (1.07 to 1.22 m) Mean Low Gulf (MLG). Although containment levees will not be constructed, dredged material is expected to encompass approximately 33 ac (13.4 ha) within the disposal area.

Project Objective

Utilize dredged material from a hopper dredge to create emergent vegetated marsh in an area that is currently a shallow, open-water pond.

Specific Goals

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

1. To create one acre of emergent vegetated marsh for every 15,000 cubic yards (11,469 m^3) of dredged material deposited in the project area.

2. To increase mean elevation in the project area to a level that is conducive to the establishment of emergent wetland vegetation.

3. To increase mean abundance of emergent wetland vegetation in the project area.

Reference Area

Monitoring both project and reference areas allows statistically valid comparisons, and is therefore, the most effective means of evaluating project effectiveness. An area located immediately northeast of the project area was selected as the reference area (figure 1). This site was chosen based on its close proximity to the project area, and because it has a similar vegetative community, soil type and hydrology. The project and reference area are classified as freshwater marsh and contain very poorly drained, mineral Balize and Larose soils as well as dredged, frequently flooded Aquent soils (unpublished data, Natural Resource Conservation Service).

Monitoring Elements

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

1. Habitat Mapping — Near-vertical, color-infrared aerial photography **(**1:6,000 scale) will be taken of the project and reference area. Photography will be georectified, photo interpreted, mapped, and analyzed with GIS by the National Wetlands Research Center (NWRC) following procedures outlined in Steyer et al. (1995). Aerial photography, at a scale of 1:12,000, was taken of the project and reference areas in January, 1996, by the U. S. Army Corps of Engineers. It will be enlarged to a scale of 1:6,000 and used for pre-project habitat mapping. Post-construction photography will be obtained in year 2001 at the earliest possible time between August 1 and October 1, prior to the first fall frost. Additionally, photography may be obtained in response to storm or major flood events.

2. Elevation — Elevation transects will be established across the project area to document changes in mean elevation (figure 2). Permanent and temporary benchmarks will be established with a global positioning system (GPS) before project construction. A 1,350 ft (411 m) survey baseline will be established parallel to the river levee. Three elevation transect lines, spaced at 400 ft (122 m) intervals, will run through the project area perpendicular to this baseline. Elevations will be recorded at 50 ft (15.2 m) intervals along each transect as well as any significant changes in elevations within those intervals. Elevation surveys will be conducted pre-construction in 1997, and in post-construction year 2001.

3. Vegetation — Plant species composition, relative abundance, and total abundance will be recorded along vegetation transects to document plant succession in the project and reference area (figure 2). The Braun-Blanquet method, as described in Steyer et al. (1995), will be used to conduct these vegetation surveys. Surveys will be conducted along previously established elevation transect lines in the project area and three additional lines in the reference area. Vegetation sampling stations will correspond with elevation samples whenever possible. Sample stations along each transect will be established to intersect the major plant communities within the marsh, with at least five plots within each community. Vegetation surveys will be conducted in early fall, prior to the first frost, during pre-construction in 1997 and during post-construction in 2001. The survey conducted in year 2001 will be done in concert with the aerial photography flight.

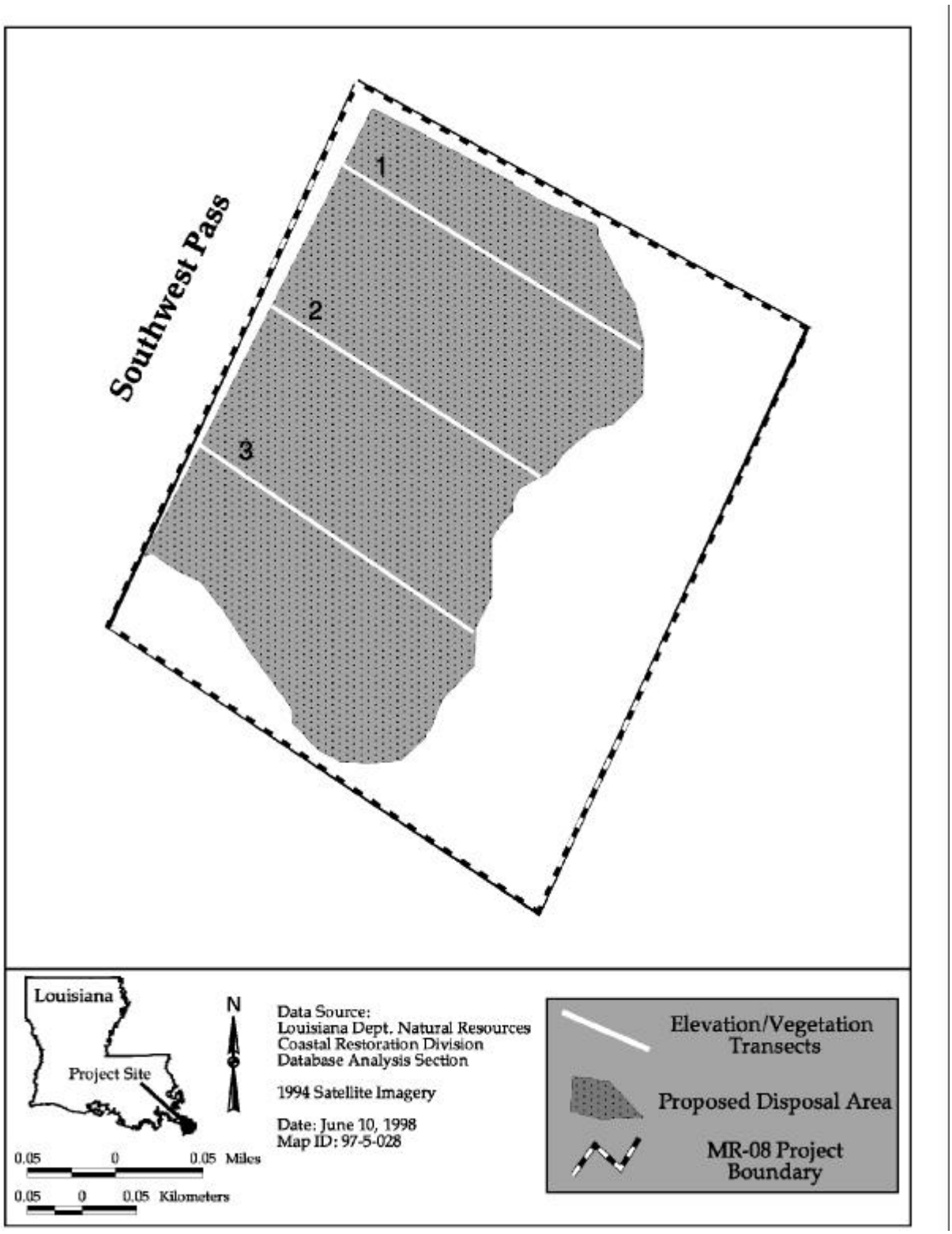

Figure 2. Beneficial Use of Hopper Dredged Material (MR-08) project boundary, location of proposed marsh creation, and elevation and vegetation transects.

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 on historical data (for 1956, 1978, and 1988) and data from color-infrared aerial photography 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 and reference areas. Habitat mapping data may also be used in the analyses of emergent vegetation, to evaluate the project goal of increasing the abundance of emergent marsh vegetation in the project area, as discussed under item 3 below.

2. A paired t-test will be used to compare mean elevation within the project area over time (pre-project vs. post-project). In addition, analysis of variance (ANOVA) may also be used to compare elevations among transects or stations within transects for given time period (pre-project or post-project).

   Goal: Increase mean elevation in the project area to a level that is conducive to the establishment of emergent marsh vegetation.

   Hypothesis:

   H_0: Mean elevation in the project area at year 3 will not be significantly greater than mean elevation in the project before project construction.

   H_a: Mean elevation in the project area at year 3 will be significantly greater than mean elevation in the project area before project construction.

3. A paired t-test will be used to determine differences in mean species composition, relative abundance, and total abundance of wetland vegetation within the project and reference area over time (pre-project vs. post-project). In addition, ANOVA may also be used to compare these same variables between the project and reference area within a given time period (pre-project or post-project).

   Goal: Increase mean abundance of emergent wetland vegetation within the project area.

   Hypothesis:

   H_0: Mean abundance of emergent wetland vegetation at year 3 will not be significantly greater than mean abundance of emergent vegetation before project construction.

H_a: Mean abundance of emergent wetland vegetation at year 3 will be significantly greater than mean abundance of emergent vegetation before project construction.

Hypothesis:

H_0: Mean abundance of emergent wetland vegetation in the project area at year 3 will not be significantly different from mean abundance of emergent vegetation in the reference area at year three.

H_a: Mean abundance of emergent wetland vegetation in the project area at year 3 will be significantly different from mean abundance of emergent vegetation within the reference area at year three.

Notes:

1.	Implementation:	Start Construction:	June 1, 1998
		End Construction:	September 1, 1998
2.	USACE Point of Contact:	Bill Hicks	(504) 862-2626
3.	DNR Project Manager:	Rachel Wilson	(504) 342-2532
	DNR Monitoring Manager:	John Troutman	(504) 342-1952
	DNR DAS Assistant:	Brian Zielinski	(504) 342-1952

4. The twenty year monitoring plan development and implementation budget for this project is $36,954. A comprehensive report will be available in November 2002. This report will describe the status and effectiveness of the project.

5. References:

Austin, T. 1995. A second life for dredged material. Civil Engineering. November: 60-63.

Dunbar, J. B., L. D. Britsch, and E. B. Kemp 1992. Land loss rates. Report 3. Louisiana Coastal Plain. New Orleans: U. S. Army Corps of Engineers. 28 pp.

Penland, S., H. H. Roberts, S. J. Williams, A. H. Sallenger, D. R. Cahoon, D. W. Davis, and C. G. Groat 1990. Coastal land loss in Louisiana. Transactions of the Gulf Coast Association of Geological Societies. 90: 685-699.

Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E. Swenson 1995. Quality management plan for the Coastal Wetlands Planning, Protection, and Restoration Act Monitoring Program. Open-file report no. 95-01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division. 97 pp. plus appendices.

USACE and Louisiana State University 1995. Dredge Material Beneficial Use Monitoring Program. New Orleans: U. S. Army Corps of Engineers. 31pp.

van Beek, J. L., and K. J. Meyer-Arendt 1975. Louisiana's eroding coastline: recommendations for protection. Unpublished report for the Louisiana Department of Natural Resources. Baton Rouge: Coastal Restoration and Management Division. 49 pp.

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