MONITORING PLAN

PROJECT NO. TE-37 NEW CUT DUNE/MARSH RESTORATION

DATE: May 29, 2001

The New Cut Dune/Marsh Restoration (TE-37) project is a 20-year project designed to close the breach between Trinity Island and East Island through dedicated dredging of local sediment sources, and stabilization of the newly deposited sediment through sand fencing and vegetative plantings on Isle Dernieres, Terrebonne Parish, Louisiana (Figure 1). The project is sponsored by the United States Environmental Protection Agency (EPA) and the Louisiana Department of Natural Resources/Coastal Restoration Division (LDNR/CRD) under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA, Public Law 101-646, Title III). The proposed plan would close the breach between Trinity Island and East Island through the direct creation of beach, dune and marsh habitat. This project would also restore the structural integrity of the eastern Isles Dernieres through restoration of the littoral drift system and addition of sediment into the nearshore environment.

The Isle Dernieres barrier island chain, located along the Louisiana coast, is experiencing some of the highest rates of erosion of any coastal region in the world (Figure 1). Between 1887 and 1988 the average annual rate of land loss was 69.6 ac yr^{-1} (28.2 ha yr^{-1}), while the average rate of shoreline retreat was 36.4 ft yr^{-1} (11.1 m yr^{-1}) (McBride et al. 1991). This condition has led to the landward migration (barrier island rollover) and rapid disintegration of the Isle Dernieres, as well as a decrease in its ability to protect the adjacent mainland marshes and wetlands from the effects of storm surge, salt water intrusion, an increased tidal prism, and energetic storm waves (McBride and Byrnes 1997). The Isles Dernieres began to form approximately 500 years ago when the Lafourche delta complex was abandoned by the Mississippi River (Frazier 1967). This shift in the point source of sediment supply deprived the Lafourche Delta complex of nourishment and initiated a phase of inundation, coastal retreat, and barrier arc formation (Penland et al. 1985). The modern Isle Dernieres is the product of hundreds of years of persistent inundation and shoreline transgression, which has led to the formation of five separate islands that include: Wine Island, East Island, Trinity Island, Whiskey Island, and Raccoon Island (Figure 1). A voluminous literature on the modern evolution of these islands attributes high rates of land loss in the region to the synergistic effects of global sea-level rise, subsidence, tropical and extratropical storm activity, inadequate sediment supply, and significant anthropogenic disturbances (Boyd and Penland 1981; Dingler and Reiss 1990; List et al. 1997; McBride et al. 1989; Penland et al. 1988; Penland and Ramsey 1990; Roberts et al. 1987).

Benefits for the New Cut Dune/Marsh Restoration (TE-37) project would be the creation of approximately 261 acres of dune and marsh habitat with dredged material (Figure 2). Also, this project would be the first CWPPRA project to specifically rebuild the Gulf of Mexico shoreline along a barrier island, benefitting approximately 282 acres of habitat with the resultant enhancement of the structural integrity of the eastern Isles Dernieres.

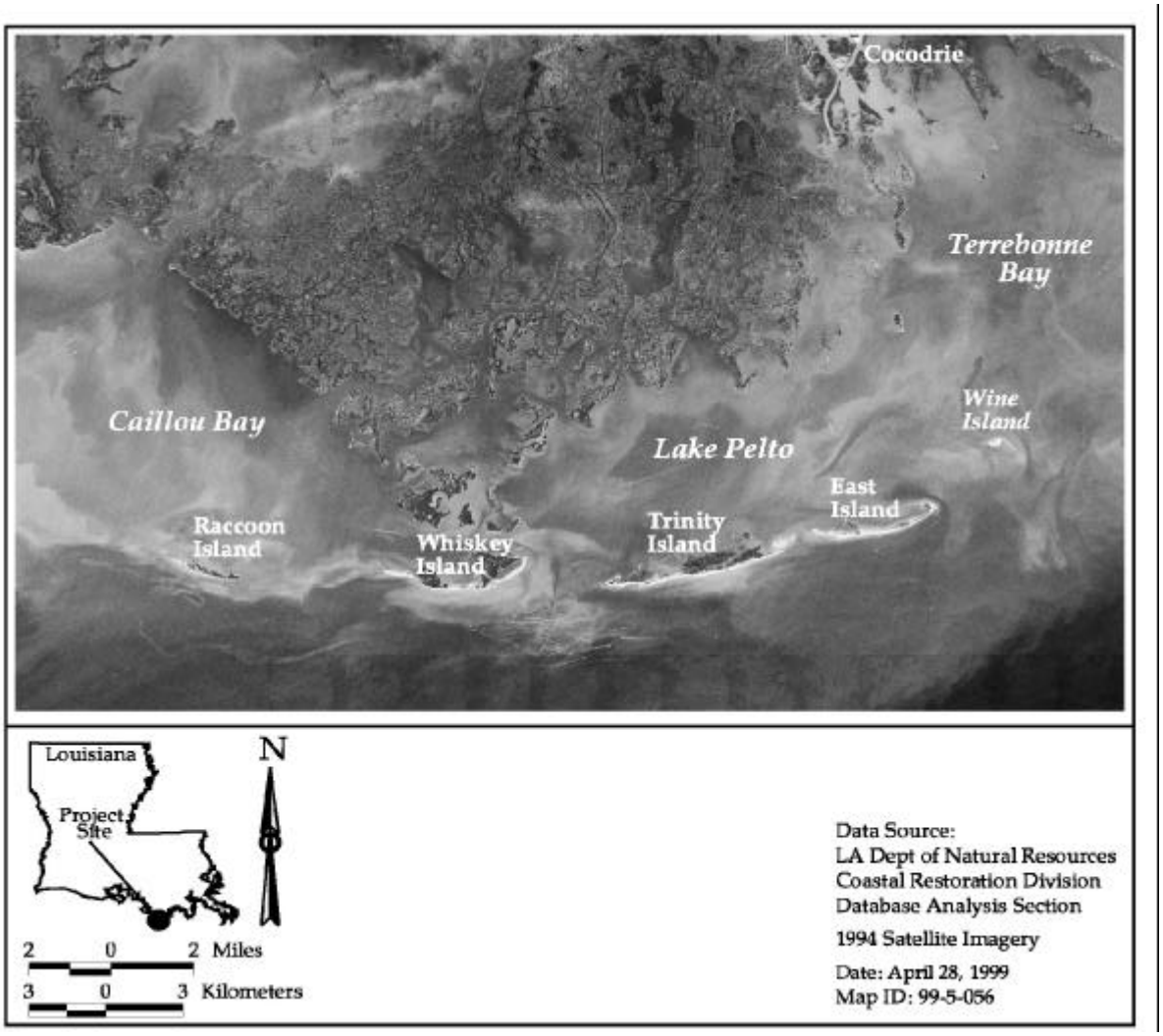

Figure 1. The Isles Dernieres barrier island chain, Terrebonne Parish, Louisiana.

Specifically, the proposed project would include creation of a 150 ft sacrificial beach with an elevation of +2 ft NAVD built on the gulf side (Figure 3). The dune would match up with the dunes on East and Trinity Islands. The dune would have an elevation of +8 ft NAVD with a top width of 300 ft and side slopes of 1 to 15. The marsh platform would have a width of 700 ft with elevations of +4 ft NAVD at the dune and +2 ft NAVD on the bay side. Approximately 2.5 million cubic yards of dredge material would be used in this project. A hydraulic dredge would be used to mine sediments from Wine Island Pass. The project would require that the gap (including the tidal cut) between East and Trinity Island be filled. Sand fencing will be installed and vegetation planted to protect the project from aeolian transport removing sediments (Figure 4).

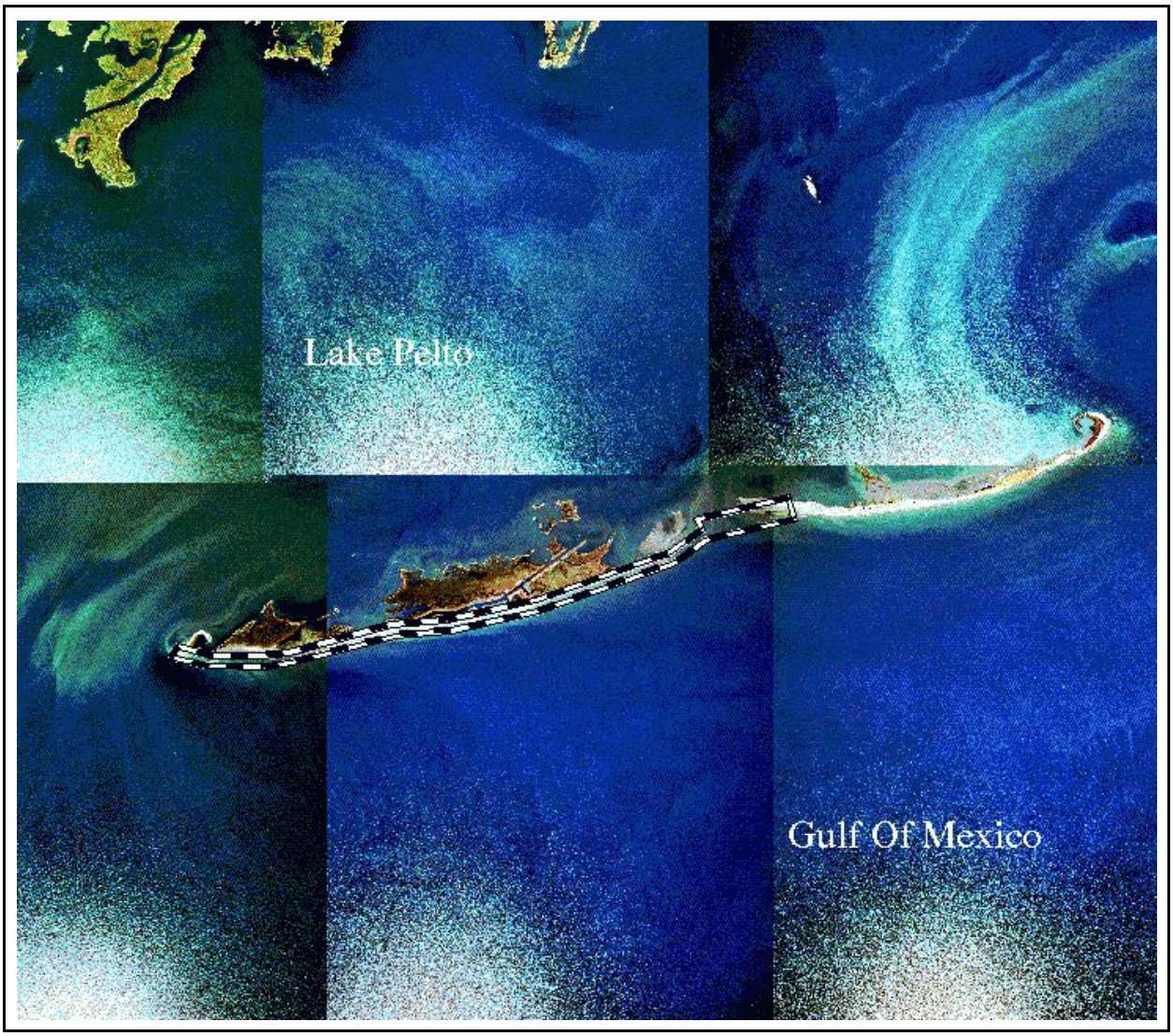

Figure 2. Location of the New Cut Dune/Marsh Restoration (TE-37) project.

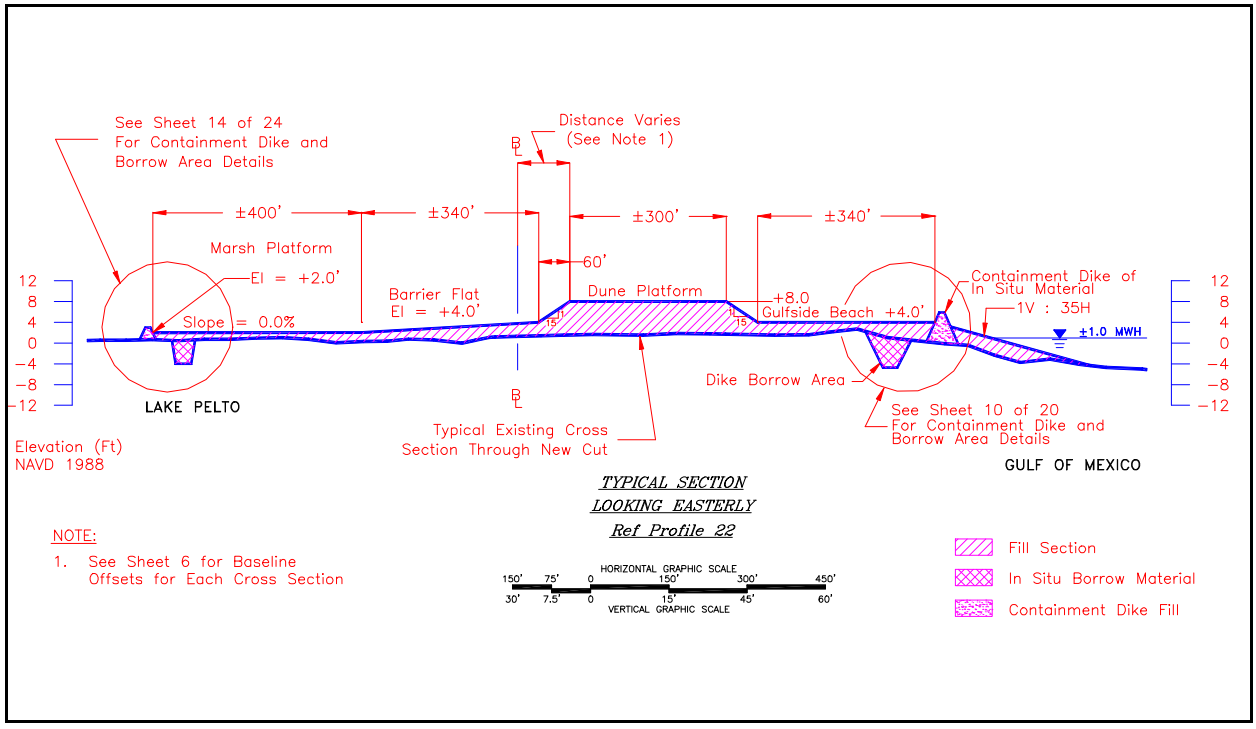

Figure 3. Typical design cross-section of the New Cut Dune/Marsh Restoration (TE-37) project.

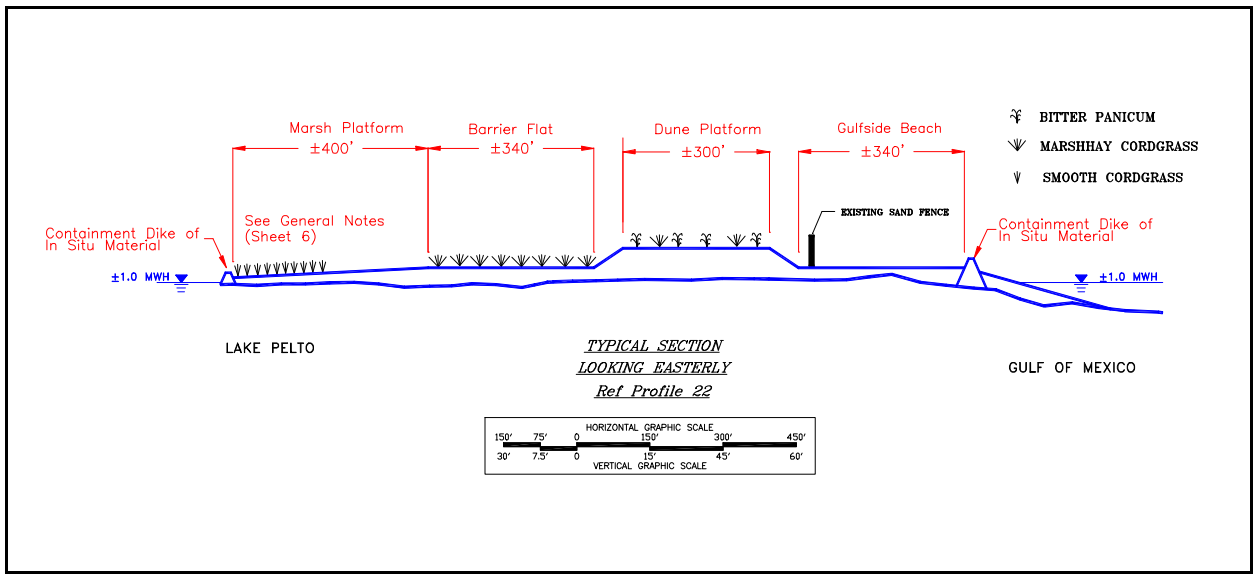

Figure 4. Typical vegetative design cross-section of the New Cut Dune/Marsh Restoration (TE-37) project.

Project Objective

To close New Cut (the pass between Trinity Island and East Island) using dredge material and restore intertidal and supra-tidal habitats similar to those restored on Trinity and East Islands.

Project Goals

Create approximately 261 acres of island, with intertidal and supratidal habitats using sediments dredged from Wine Island Pass.

Establish and stabilize a primary dune system several hundred feet seaward of the dune platform using sand fencing.

Stabilize dune platform using sand fencing and vegetation plantings.

Establish vegetation cover of planted species along the newly constructed marsh platform as well as the dune platform and primary dune system. The target for vegetation cover 3 years post-planting will be 80%.

Contribute to the restoration of the littoral drift system along the eastern Isle Dernieres.

Monitoring Elements

1. Topography

LiDAR surveys will be conducted to quantify adjustments of post-construction profiles. Transect lines were established at 250 ft (76.20 m) intervals by professional surveyors pre-construction in 2000, and will be re-occupied immediately post-dredging under the construction contract (Figure 5). Surveys will be conducted in fall to correspond with vegetation sampling and to avoid disturbance of nesting birds on the island. Beginning in Fall of 2001, the post-construction airborne LiDAR surveys will be conducted in conjunction with the other CWPPRA restoration projects on Isle Dernieres. The airborne LiDAR surveys will collect data for the length and width of the Isle Dernieres islands. Data collected will be used to develop elevation transects and topographic models. The LiDAR surveys will be conducted in fall 2001 (as-built), and conducted post-construction in 2003, 2007, and 2016.

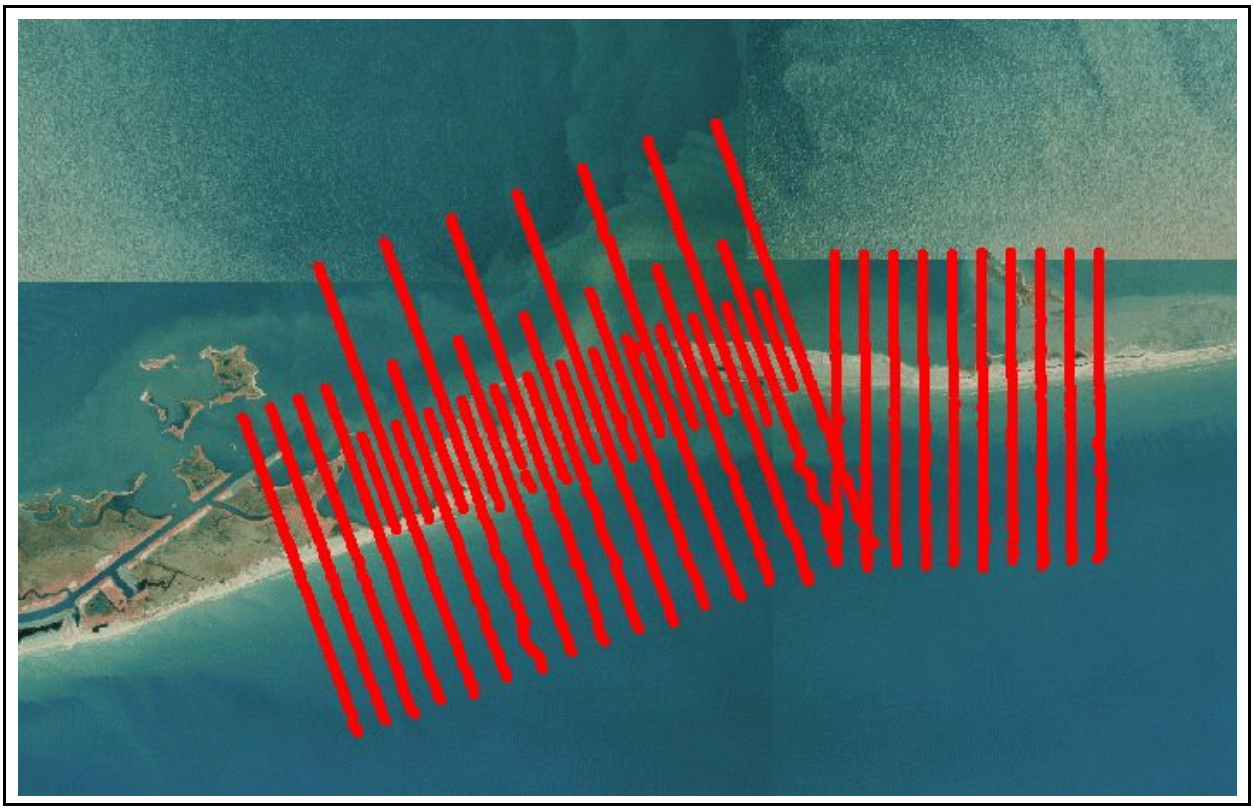

Figure 5. Pre-construction topographic and hydrographic survey lines as surveyed by Morris P. Hebert, Inc. in October 2000 at the New Cut Dune/Marsh Restoration (TE-37) project.

Monitoring Limitations

Due to other island restoration projects on the majority of adjacent barrier islands, an ecologically similar reference area is unavailable. Without comparisons between the project area and a reference area, proper assessment of whether or not changes are the result of the project will be difficult. Additionally, the lack of funds to collect information on bathymetry and habitat mapping do not allow for proper assessment of the projects impact. Funding limits do not allow measures of the littoral drift or the beach fill response over the life of the project. Additionally, habitat types cannot be adequately measured to assess the project designs effects on habitats created. If future funding is approved the priority will be placed on collection of bathymetry data to assess the beach fill response.

Bathymetric surveys would be conducted to quantify elevation and shoreline changes, adjustments of post-construction profiles, and assess beach fill performance change. Offshore transect lines approximately 3000 ft (914 m) long, were established at 250 ft (76.20 m) intervals by professional surveyors pre-construction in 2000 (Figure 5). These lines will be re-occupied immediately post-construction, under the construction contract. If funding is allocated, these survey lines would be re-occupied to document beach shoreface adjustments. Depending on funding amounts, potential

additional bathymetric lines would be added to the west along the shoreface of Trinity Island to document the potential projects affects on littoral drift. Surveys would be conducted in fall to correspond with LiDAR surveys and to avoid disturbance of nesting birds on the island. Bathymetry surveys would be conducted post-construction in 2003, 2007, and 2016 if funding were allocated.

Anticipated Statistical Tests and Hypotheses

The following statements correspond with the monitoring elements and will be used to evaluate the accomplishment of the project goals:

1. Descriptive and summary statistics for topography will be to determine differences in mean elevations, habitat class area differences, and width as evaluated by a elevation model that will consider both spatial and temporal changes. This basic model will determine changes in island elevation, habitat classes, the volume of island sediment, and width of the project area after construction.

   Goals: Create approximately 261 acres of island, with intertidal and supratidal habitats using sediments dredged from Wine Island Pass, establish and stabilize a primary dune system several hundred feet seaward of the dune platform using sand fencing, and stabilize dune platform using sand fencing.

   Statement: The mean width of the project area after construction will be greater than or equal to the project design width. Additionally, mean height as well as elevation habitat classes above intertidal will be greater than pre-construction.

2. Descriptive and summary statistics for bathymetry will be to determine differences in mean elevations, as evaluated by an elevation model that will consider both spatial and temporal changes. This basic model will determine changes in elevation, and the volume of sediment.

   Goals: Create approximately 261 acres of island, with intertidal and supratidal habitats using sediments dredged from Wine Island Pass. Contribute to the restoration of the littoral drift system along the eastern Isle Dernieres.

   Statement: The sediment volume and average elevation, will be greater than pre-construction. Additionally, shoreline erosion will be lower than long-term erosion rates.

Notes

1.	Implementation:	Start Construction:	July 1, 2001
		End Construction:	June 1, 2002
2.	EPA Point of Contact:	David McQuiddy	(504) 389-0736
3.	DNR Project Manager:	Chris Williams	(225) 342-7308
	DNR Monitoring Manager:	Todd Hubbell	(985) 447-0991

4. The twenty year monitoring plan development and implementation budget for this project is $178,619. Annual Summary Graphics will be available in June 2004 and comprehensive reports will be available in June 2008, and June 2017. These reports will describe the status and effectiveness of the project. Additional cost for bathymetric surveys as described under monitoring limitations would require an addition of approximately $72,000 depending on coverage of surveys.

5. References:

Boyd, R., and S. Penland 1981. Washover of deltaic barriers on the Louisiana coast. Transactions, Gulf Coast Association of Geological Societies 31: 243-248

Dingler, J.R., and T. E. Reiss 1990. Cold-front driven storm erosion and overwash in the central part of the Isles Dernieres, a Louisiana barrier-island arc. Marine Geology 91: 195-206.

Frazier, D.E. 1967. Recent deposits of the Mississippi River, their development and chronology. Transactions, Gulf Coast Association of Geological Societies 17: 287-311.

List, J. H., B. E. Jaffe, A. H. Sallenger Jr., S. J. Williams, R. A. McBride, and S. Penland 1994. Louisiana Barrier Island Erosion Study: atlas of sea-floor changes from 1878-1989. U.S. Geological Survey Miscellaneous Investigation Series I-2150-B, 82p.

McBride, R.A., and M. R. Byrnes 1997. Regional variations in shore response along barrier island systems of the Mississippi River Delta Plain: historical change and future prediction. Journal of Coastal Research 13 (3): 628-655.

McBride, R.A., S. Penland, B. E. Jaffe, S. J. Williams, A. H. Sallenger Jr., and K. A. Westphal. 1989. Erosion and deterioration of the Isles Dernieres barrier island arc-Louisiana, U. S.A.: 1853-1988. Transactions, Gulf Coast Association of Geological Societies 39:431-444.

McBride, R.A., M. W. Hiland, S. Penland, S. J. Williams, M. R. Byrnes, K. A. Westphal, B. E. Jaffee, and A. H. Sallenger, Jr. 1991. Mapping barrier island changes in Louisiana: techniques, accuracy, and results. Coastal Sediments '91 Proceedings. Seattle, Washington, American Society of Civil Engineers. pp. 1011-1025.

Penland, S., and K. E. Ramsey 1990. Relative sea-level rise in Louisiana and the Gulf of Mexico: 1908-1988. Journal of Coastal Research 6(2): 323-342.

Penland, S., Suter, J. R. and Boyd R. 1985. Barrier island arcs along abandoned Mississippi River deltas. In: G. F. Ortel and S. P. Leatherman (Editors), Barrier Islands. Marine Geology, 63: 197-233.

Penland, S., R. Boyd, and J. R. Suter 1988. Transgressive depositional systems of the Mississippi Delta plain: a model for barrier shoreline and shelf sand development. Journal of Sedimentary Petrology 58: 932-949.

Roberts, H. H., O. K. Huh, S. A. Hsu, L. J. Rouse, Jr., and D. Rickman 1987. Impact of cold-front passages on geomorphic evolution and sediment dynamics of the complex Louisiana coast. Coastal Sediments '87 Proceedings. New Orleans Louisiana, American Society of Civil Engineers. pp. 1950-1963.