MONITORING PLAN

PROJECT NO. TE-50 WHISKEY ISLAND BACK BARRIER MARSH CREATION

DATE: November 5, 2007

Preface

The Barrier Island Comprehensive Monitoring (BICM) program has been initiated under the Louisiana Coastal Area Science and Technology (LCA S&T) office as a component of the System-wide Assessment and Monitoring (SWAMP) program (USACE 2004). The BICM program is located along the Louisiana coastal shoreline, specifically those areas where barrier shorelines exist, from the northern tip of the Chandeleur Islands south to include all the Chandeleur Islands; and from Sandy Point west to Raccoon Point, as well as the Chenier Plain from Sabine pass east to the Mermentau Outlet. Currently the program is expected to monitor the sandy shorelines of the Louisiana coast every 5 years.

The advantage of BICM over the current project specific monitoring is that it will provide long term data on all of Louisiana's barrier islands, instead of just those islands with constructed projects. As a result, a greater amount of longer-term data will be available not only to evaluate constructed projects, but for planning and design of future barrier island projects, operations and monitoring (O&M) activities, and determining storm impacts. Because data will be collected for the entire barrier island system concurrently and with the same methodologies, those data will be more consistent, accurate, and complete than the current barrier island data collection efforts.

The objectives of BICM are to:

1. Determine the elevation, longevity, and conservation mass of the barrier islands.
2. Determine major habitat types and the distribution and quantity of each habitat over time on the barrier islands.
3. Determine geotechnical properties of sediments on the barrier islands.
4. Relate available data on environmental forces that affect the ecology and morphology of the barrier islands to other BICM data sets.
5. Determine species composition and diversity of vegetation within major habitat types on the barrier islands.

The BICM program will allow overall assessment of individual projects to be accomplished with additional monies needed only to address time sensitive issues or areas of specific interest not addressed by this comprehensive program such as survival of plantings, initial sediment transport, tidal channel development and fisheries use.

Project Description

The Whiskey Island Back Barrier Marsh Creation (TE-50) project is a barrier island marsh and dune creation restoration project. This project is located on Whiskey Island, which lies within the Louisiana Department of Wildlife and Fisheries (LDWF) administered Isle Dernieres Barrier Islands Refuge. Whiskey Island is positioned approximately 18 mi (29 km) southwest of Cocodrie in Terrebonne Parish, Louisiana (figure 1). The project area consists of 1,038 acres (420 ha) of supratidal, intertidal, and subtidal habitat found on Whiskey Island (figure 2). The marsh creation phase of the TE-50 restoration project will elevate the subtidal area between existing marsh lobes to an intertidal elevation and will construct tidal creeks and ponds to hasten marsh development. The dune creation phase will extend for 13,000 ft (3,962 m) along the Gulf of Mexico shoreline raising the supratidal berm to a dune elevation (figure 3). Whiskey Island is separated from other islands in the Isle Dernieres barrier island arc via the greater than 2 mi (3.2 km) wide Whiskey Pass and Coupe Colin tidal inlets (figure 1) and forms its southern border with the Gulf of Mexico and its northern border with the 10-15 ft (3-4.6 m) NAVD 88 deep Caillou Boca channel (figures 2 & 3).

Whiskey Island and the other Isle Dernieres barrier islands were formed during the Teche and the early Lafourche delta complexes by creation of the Caillou Headland (Frazier 1967 and Peyronnin 1962). Abandonment of the Grand Caillou subdelta 600 to 800 years B.P. shaped this headland using delta front sheet sands and sediment transport processes (Frazier 1967 and Bird 2000). Headland detachment and inlet formation facilitated the fragmentation of Caillou Headland into the Isle Dernieres barrier island arc (McBride et al. 1989; Penland et al. 1985; Saucier 1994; Reed 1995).

The soils on Whiskey Island are composed of Scatlake muck and Felicity loamy fine sand soils. The Scatlake muck soil is a very poorly drained mineral soil that is located in the back barrier marsh areas of the island while the Felicity loamy fine sand soil is distributed along the island's shoreface, beach, and supratidal habitats and consists of a somewhat poorly drained sandy soil (figure 4) (USDA 2007).

The back barrier marsh area has been mapped as *Spartina alterniflora* Loisel. (smooth cordgrass) saline mineral marsh. Slightly elevated areas of this marsh have been found to be dominated by *Distichlis spicata* (L.) Greene (seashore saltgrass) and *Sporobolus virginicus* (L.) Kunth (seashore dropseed) (USDA 2007). *Spartina patens* (Ait.) Muhl. (marshhay cordgrass), *Baccharis halimifolia* L. (eastern baccharis), and *Distichlis spicata* (L.) Greene (seashore saltgrass) have been documented as the primary vegetation species occupying Felicity loamy fine sand soils (USDA 2007). During an October 2007 vegetation survey of supratidal habitats found on Whiskey Island, Panicum *amarum Ell.* (bitter panicum), *Spartina patens* (Ait.) Muhl. (marshhay cordgrass), *Eustoma exaltatum (L.)* Salisb. ex G. Don (catchfly prairie gentian), and *Strophostyles helvula (L.) Ell.* (trailing fuzzybean) were found to be the dominant species populating the higher portions of this habitat while *Spartina patens (*Ait.) Muhl. (marshhay cordgrass), *Distichlis spicata* (L.) Greene (seashore saltgrass), *Panicum amarum* Ell. (bitter panicum), *Baccharis halimifolia* L. (eastern baccharis), *Sporobolus virginicus* (L.) Kunth (seashore dropseed), *Sesuvium portulacastrum* (L.) L. (shoreline seapurslane), and *Salicornia bigelovii* Torr.

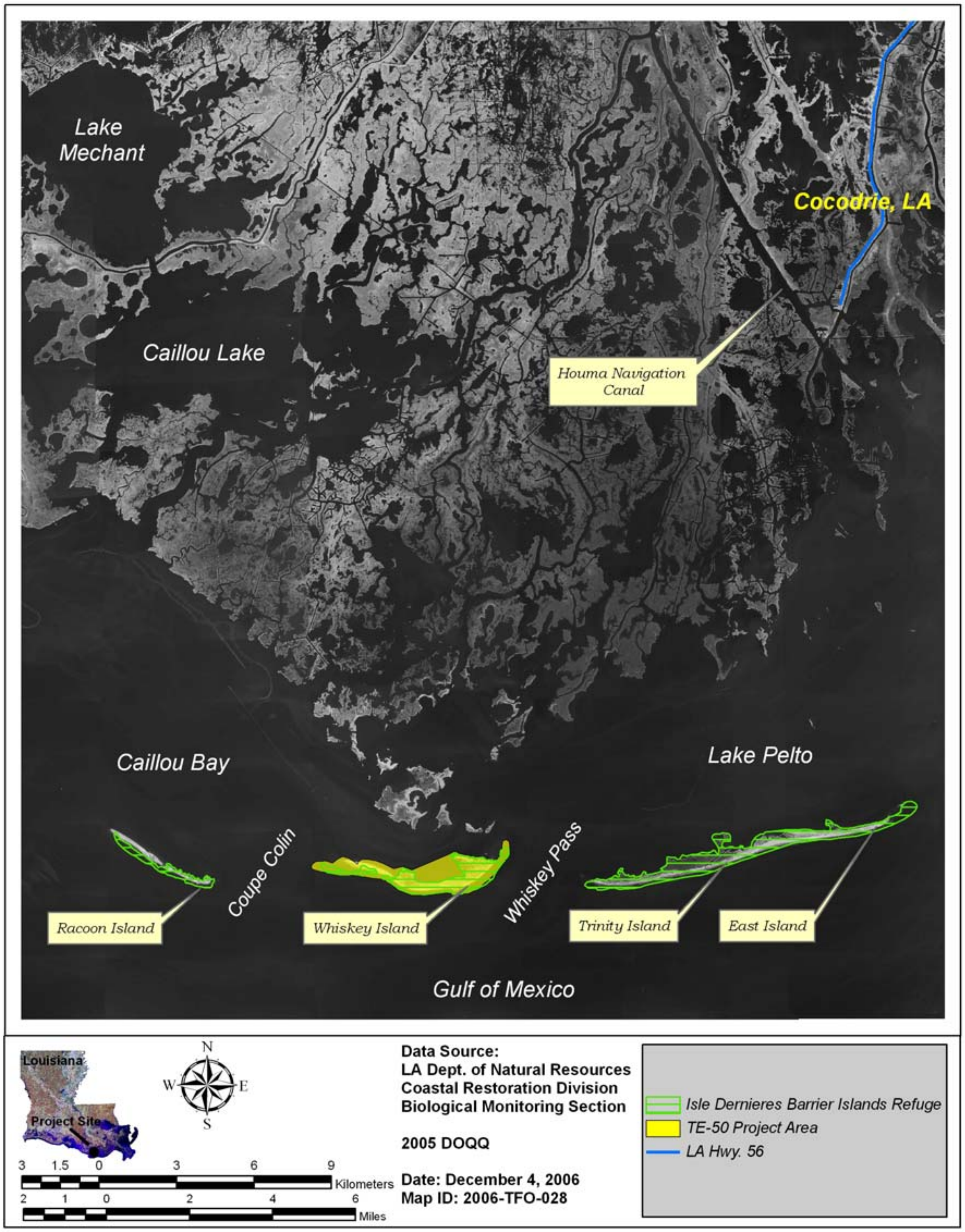

Figure 1. **Location and vicinity of the Whiskey Island Back Barrier Marsh Creation (TE-50) project.**

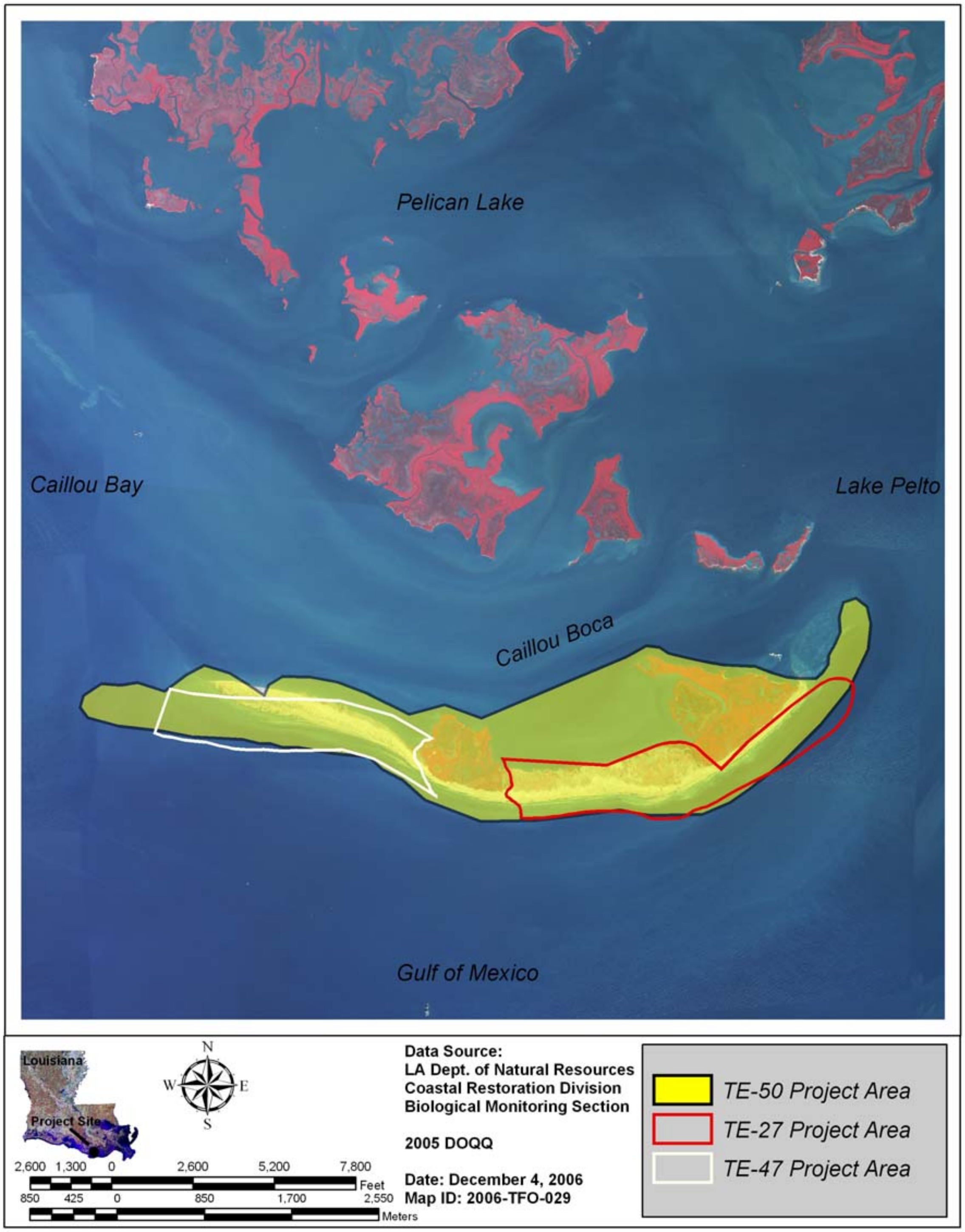

Figure 2. **Location of the Whiskey Island Back Barrier Marsh Creation (TE-50) project area.**

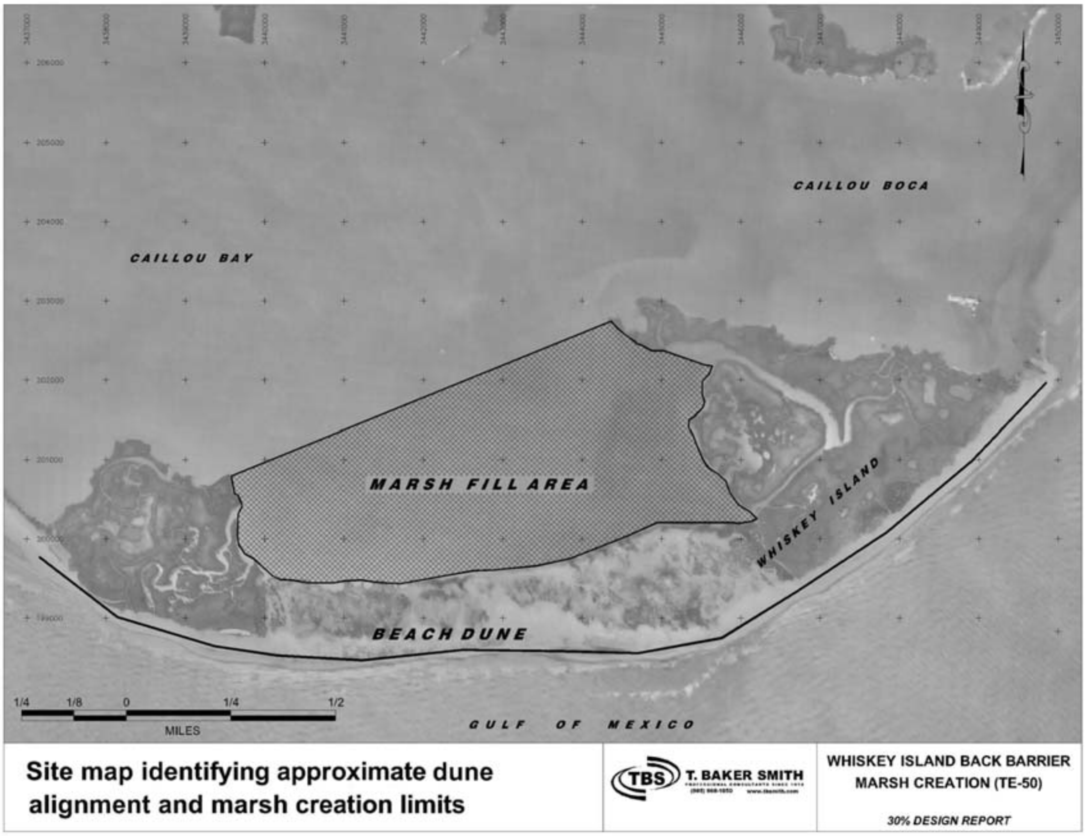

Figure 3. Location of the Whiskey Island Back Barrier Marsh Creation (TE-50) project features.

(dwarf saltwort) were the principal species found in the swale portion of this habitat. Chabreck and Linscombe (1997) classified Whiskey Island as salt marsh habitat.

Delta switching, longshore transport, and tropical storms and cold fronts, have increased subsidence and shoreline transgressions on Whiskey Island. The creation of the Plaquemine and Morden delta lobes substantially reduced the sediment supply to the Isle Dernieres barrier islands (Frazier 1967; Peyronnin 1962; Boyd and Penland 1981; Saucier 1994; Reed 1995; Pilkey and Frasier 2003). The sediment deficit contributes to the more than 0.4 in/yr (1.0 cm/yr) subsidence rate experienced in the area (Coleman and Smith 1964; Penland and Ramsey 1990; Roberts et al. 1994). Moreover, subsidence has been postulated as the main cause of back barrier marsh loss (Peyronnin 1962). Net longshore transport flows in a western direction on Whiskey Island transporting sediments to the spit and Coupe Colin tidal inlet (Stone and Zhang 2001; Georgiou et al. 2005; Peyronnin 1962). In addition, the longshore transport is localized on Whiskey Island due to the presence of two wide wave dominated tidal passes (Levin 1993). As a result, the tidal passes act as sediment sinks and increase the rate of shoreline erosion. The shoreline change rate on Whiskey Island has been estimated to be -56 ft/yr (17.1 m/yr) in the long-term (1887-2002) and -86 ft/yr (26.2 m/yr) in the short-term (1988-2002) (Penland et al. 2005). Numerous tropical storms (Peyronnin 1962; Stone et al. 1997; Stone et al. 1993; Georgiou et al. 2005) and cold fronts (Dingler and Reiss 1990; Boyd and Penland 1981

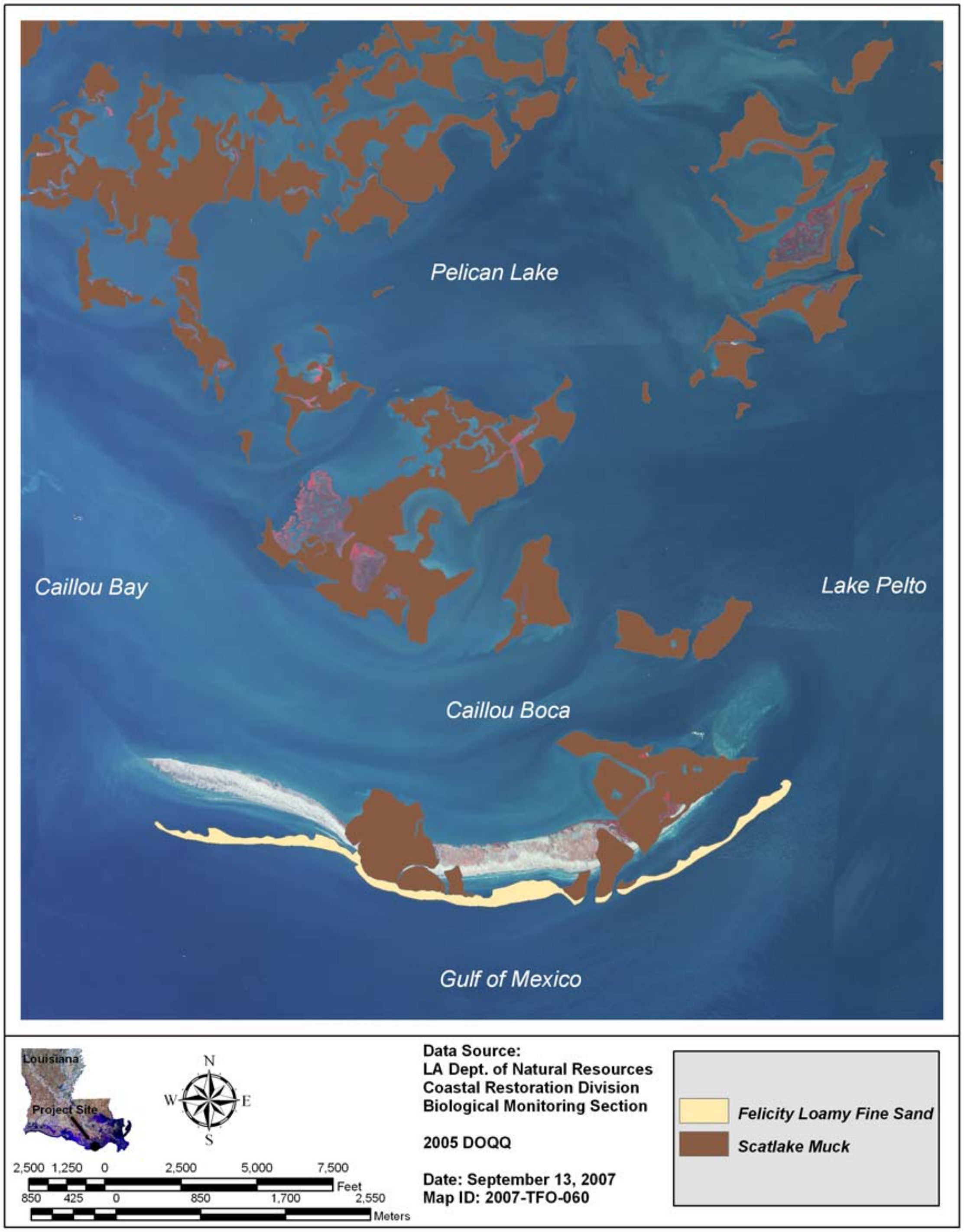

Figure 4. Dominant soils found on Whiskey Island.

Georgiou et al. 2005) have elevated water levels high enough to cause partial or total overwash along this low profile barrier island. Therefore, tropical storms and cold fronts have altered the geomorphology of Whiskey Island through cross-shore sediment transport. Due to the above processes, Whiskey Island has experienced reductions in sediment volume and island narrowing (McBride et al. 1989; Penland et al. 1985).

In 1998, the Louisiana Department of Natural Resources/Coastal Restoration Division (LDNR/CRD) and the Environmental Protection Agency (EPA) initiated the Whiskey Island Restoration (TE-27) project (figure 2). This project discharged approximately 2.9 million yd^3 (2.2 million m^3) of sediment on to Whiskey Island creating 355 acres (177 ha) of supratidal and intertidal habitats. The TE-27 project was successful in increasing the sediment volume and area of Whiskey Island (West and Dearmond 2007; Penland et al. 2003). However, the passage of coastal storms and other geomorphic processes have led to shoreline erosion, island narrowing, and reductions in sediment volume (West and Dearmond 2007). A third restoration project has been proposed for Whiskey Island, Ship Shoal: Whiskey West Flank Restoration (TE-47) project (figure 2). If constructed, this project would create dune, supratidal, intertidal, and subtidal habitats on the spit portion of Whiskey Island (M & N 2004). While the TE-47 project has been designed, it has not been fully funded.

Project Goals and Strategies/Coast 2050 Strategies Addressed

Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) projects are reviewed prior to authorization of construction funds for compatibility of project goals with those in Coast 2050, and for probability that proposed restoration strategies will accomplish those goals. The Whiskey Island Back Barrier Marsh Creation (TE-50) project goals are consistent with the Coast 2050 Region 3 ecosystem strategy to restore barrier islands and gulf shorelines. Project goals and strategies are provided to the Louisiana Department of Natural Resources (LDNR) by the sponsoring federal agency through the environmental assessment (EA) and/or wetland value assessment (WVA). For the TE-50 project they were provided by the Environmental Protection Agency (EPA 2003). Project goal 2 was modified because of the inclusion of a tidal creek and pond reference area. The original WVA goal stipulated that 6, 1 acre ponds and 10,000 ft of tidal creeks would be created. The present configuration will attempt to establish performance standards to measure the effectiveness of constructing tidal creeks and ponds in back barrier marsh creation areas.

Project Goals:

1. To create approximately 300 acres of back barrier, intertidal marsh by the end of project construction.

2. To create a minimum of 3, 1-acre tidal ponds and approximately 5,800 feet of tidal creeks.

3. To increase the longevity of the natural and previously-restored portions of the island by increasing the width of the island to help retain sand volumes and elevations.

Project Strategies:

1. Construction of a back barrier marsh platform through the use of material dredged in the vicinity of Whiskey Island.

2. Establishment of tidal connectivity throughout the newly placed material with the construction of tidal creeks and ponds.

3. Placement of sand on top of the existing dunes to increase their height and width.

4. Planting of vegetation and construction of sand fencing to stabilize and conserve newly placed sediments.

Placement and settlement of dredged sediments will create intertidal back barrier marsh and will appreciably increase the width and sustainability of Whiskey Island. Vegetative plantings in back barrier marsh area will hasten the development of marsh communities and will support sediment retention. Creation of tidal creeks and ponds within the constructed back barrier marshes will facilitate tidal exchange with surrounding bays and will enhance intertidal habitat development. Dune formation, vegetative plantings, and sand fencing will aid in sediment retention and prevent overwash during small cross-shore events.

Project Features

The Whiskey Island Back Barrier Marsh Creation (TE-50) project consists of two major features, a marsh creation area and a dune creation area. The marsh creation phase of the TE-50 project will elevate the subtidal area between existing marsh lobes to an intertidal elevation (figure 3). The dune feature of this restoration project extends 13,000 ft (3,962 m) along the Gulf of Mexico shoreline raising the supratidal berm to a dune elevation (figure 3).

The marsh creation phase of this project will consist of four project components: containment dikes, marsh creation in open water areas, vegetation plantings, and tidal creeks and ponds. Primary earthen containment dikes will be placed along 5,000 ft (1,524 m) of the northern border of the back barrier marsh creation area (figures 3 and 5). These structures will be built to an elevation of 4.5 ft (1.4 m) NAVD 88, have a 20 ft (6.1 m) crown, and a 5H:1V slope on each side. Secondary earthen containment dikes will be placed along 12,000 ft (3,658 m) of the eastern, western, and southern border of the back barrier marsh creation area (figures 3 and 5) (M&N 2007). These dikes will have the same dimensions as the primary dike except the crown will be 10 ft (3.0 m) wide. The containment dikes will be constructed using 167,000 yd^3 (128,000 m^3) of sediments bucket dredged from the marsh creation area. The borrow area for the containment dikes will be dredged to a depth not to exceed -8 ft (-2.4 m), and will be located approximately 25 ft (7.6 m) from the toe of the earthen structures (figure 5) (M&N 2007). The southern dike's borrow area maximum depth will be -4 ft (-1.2 m). These borrow areas will be filled in during the marsh creation phase.

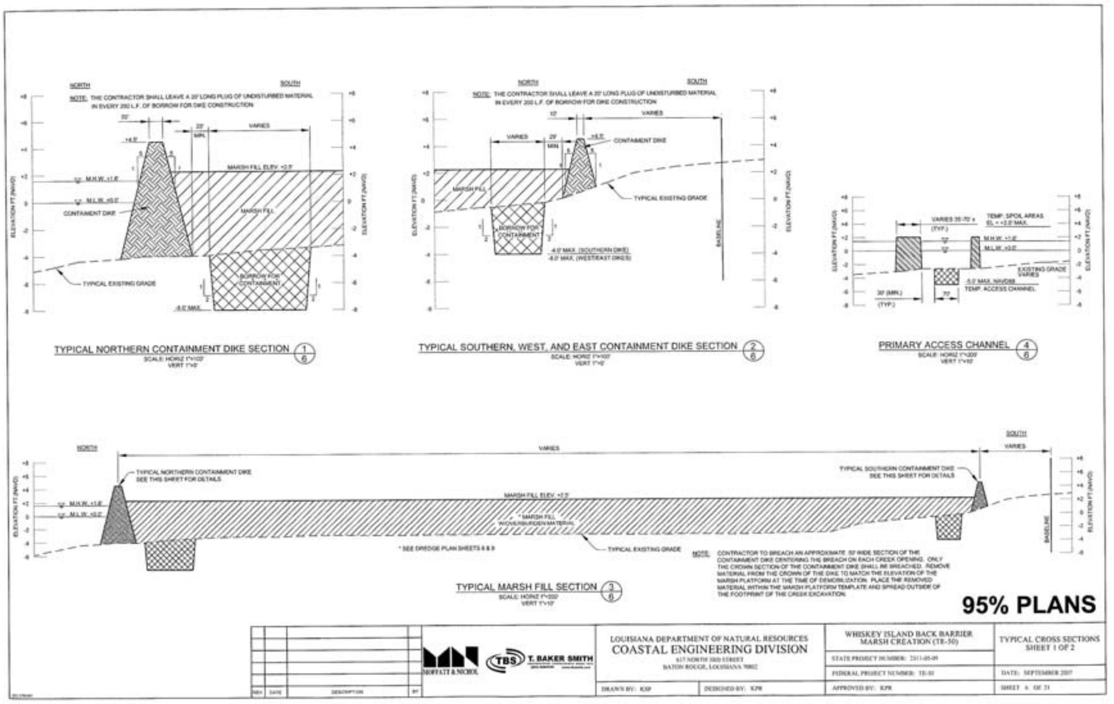

Figure 5. Typical cross sections showing the Whiskey Island Back Barrier Marsh Creation (TE-50) containment dikes and marsh creation area.

Once construction of the containment dikes are complete, marsh creation activities will be initiated by dredging sediments from the borrow area (subarea 2A). Subarea 2A is located approximately 20,000 ft (6,096 m) southeast of Whiskey Island. Sediments will be dredged to a maximum depth of -30 ft (-9.1 m) NAVD 88 (M&N 2007). The subsurface media in the portion of subarea 2A that will be used to construct the back barrier marsh creation area consists of clays, silts, and mixed sediment profiles. These sediments also have been classified as overburden because they overlie sand deposits (OSI 2007). An estimated 2,760,000 yd^3 (2,110,000 m^3) of benthic sediments will be removed from the 230 acre (93.1 ha) borrow area to create the back barrier marsh (M&N 2007).

The sediments dredged from subarea 2A will be pumped into the back barrier marsh creation disposal area. Open water areas in the disposal area will be filled to a maximum elevation of 2.5 ft (0.8 m) NAVD 88 to create new marsh (figures 3 and 5). Approximately, 2,300,000 yd^3 (1,760,000 m^3) of dredged material will be used to create 316 acres (128 ha) of intertidal habitat. Following consolidation, the disposal area is anticipated to have an average elevation of 2.18 ft (0.7 m) NAVD 88 (M&N 2007).

To stabilize the marsh creation disposal area and increase emergent marsh vegetation cover, 250,000 multi-stem *Spartina alterniflora* Loisel. (smooth cordgrass) plugs will be planted. In addition, 5,000 *Avicennia germinans* (L.) L (black mangrove) saplings will be planted on higher elevated areas within the back barrier marsh creation area. Plantings will begin as soon as the dredged sediments have consolidated and will be conducted in phases (Green and Stead 2007).

The tidal creeks and ponds will be constructed using a pre-excavation technique. This will be achieved by excavating 5,800 ft (1,770 m) of creeks and three 1-acre ponds from the back barrier marsh creation area before disposal activities begin. The creeks and ponds will be dredged to a depth of -6 ft (-1.8m) NAVD 88 and will have 3H:1V side slopes. The creeks will be constructed in a sinuous pattern and will have 50 ft (15.2 m), 30 ft (9.1 m), and 20 ft (6.1 m) bottom widths (figures 6 & 7). These creeks will be designated as primary (50 ft bottom width), secondary (30 ft bottom width), and tertiary (20 ft bottom width) (M&N 2007). The ponds will be formed in a round pattern, will have a bottom diameter of 240 ft (73.1 m), and will be built at the intersections between creeks (figures 6 & 7). The excavated material will be placed a minimum of 25 ft (7.6 m) from the edge of the creeks and ponds and will be stacked no higher than 1.5 ft (0.5 m) NAVD 88. Once the marsh creation area is constructed, the creeks and ponds are expected to have bottom elevations of -0.5 to -1 ft (-0.1 to -0.3 m) NAVD 88. Approximately, 49,000 yd^3 (37,000 m^3) of benthic material will be removed to construct the tidal creeks and ponds (M&N 2007).

The dune creation phase of this project will consist of three project components: dune creation in supratidal areas, sand fencing, and vegetation plantings. Dune creation activities will be initiated by dredging sediments from subarea 2A. Sediments will be dredged to a maximum depth of -30 ft (-9.1 m) NAVD 88. The subsurface media in the portion of subarea 2A that will be used to construct the dune creation area consists of sand deposits (OSI 2007). An estimated 360,000 yd^3 (275,000 m^3) of subsurface sand will be removed from the 230 acre (93.1 ha) borrow area to create the dune (M&N 2007).

The sand dredged from subarea 2A will be pumped into the dune creation area (figure 3). Supratidal habitat in the disposal area will be filled and shaped to form the dune (figure 9). The dune will have an elevation of 6 ft (1.8 m) NAVD 88, a 100 ft (30.5 m) crown, and a 30H:1V side slope (figure 6). Approximately, 225,000 yd^3 (172,000 m^3) of sand will be used to create the 13,000 ft (3,962 m) dune (M&N 2007).

Once the dune has been constructed, sand fencing will be installed along the entire 13,000 ft (3,962 m) length of the dune. A single fence will be built and will be located 20 ft (6.1 m) north of the southern toe of the dune (M&N 2007).

To stabilize the dune and increase vegetation cover, 10,400 four inch (ten cm) containers of *Panicum amarum* Ell. (bitter panicum) will be planted. In addition, 5,200 four inch (ten cm) containers of *Schizachyrium maritimum* (Chapman) Nash (gulf bluestem), *Sporobolus virginicus* (L.) Kunth (seashore dropseed), *Spartina patens* (Ait.) Muhl. (marshhay cordgrass), and *Uniola paniculata* L. (sea oats) will be planted on the dune. Plantings will begin as soon as dune construction is complete (Green and Stead 2007).

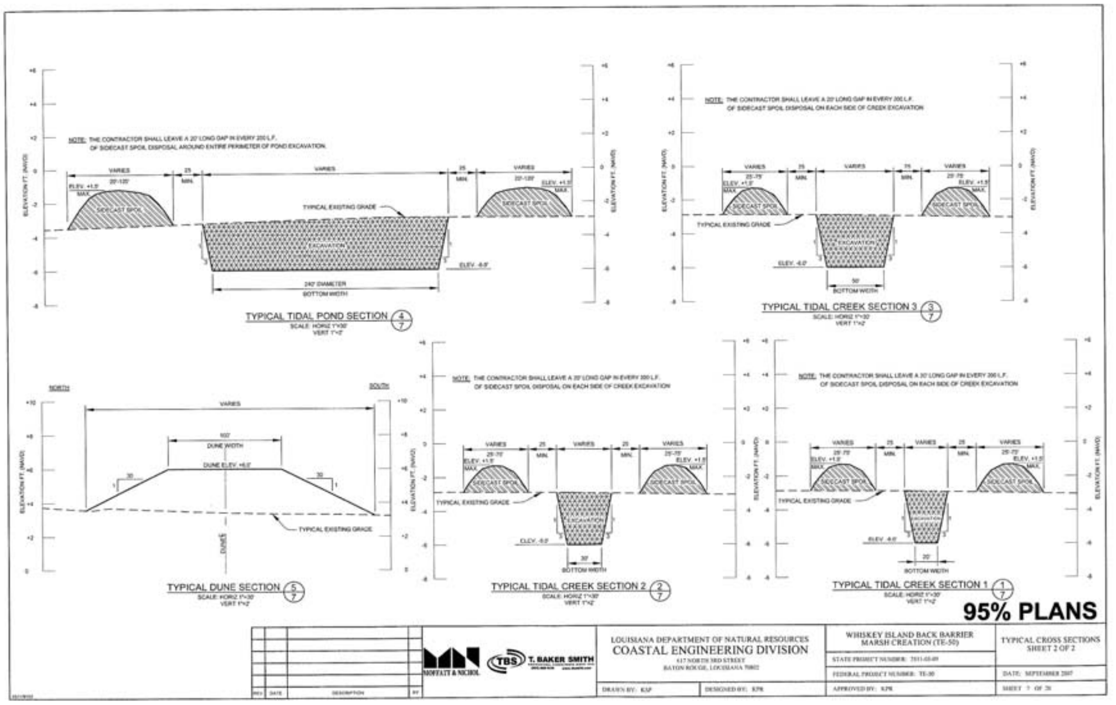

Figure 6. **Typical cross sections showing the Whiskey Island Back Barrier Marsh Creation (TE-50) tidal creek, pond, and dune features.**

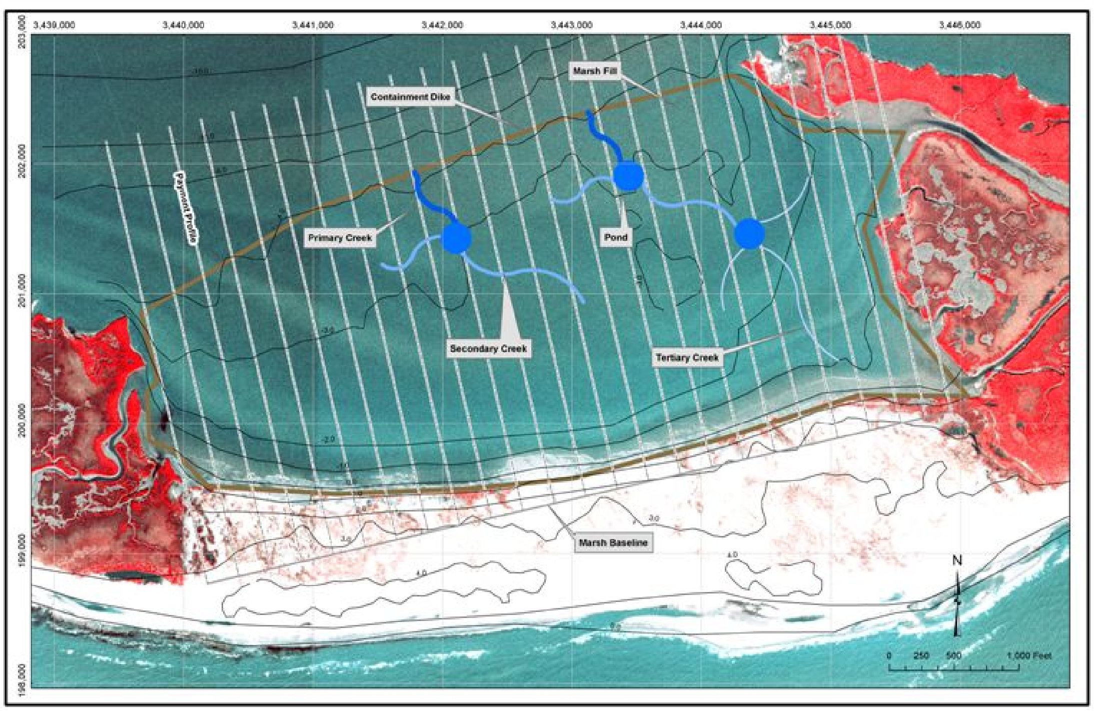

Figure 7. **Aerial view depicting the location of the Whiskey Island Back Barrier Marsh Creation (TE-50) tidal creeks and ponds.**

Monitoring Goals

1. Determine the area, average width, and length of Whiskey Island and the project area over time.
2. Determine the effectiveness of project features in reducing the rate of erosion as compared to historical rates of erosion.
3. Determine the evolution of tidal channel development both natural and manmade.
4. Determine elevation, volume, and habitat classes in the project area.
5. Determine sediment characteristics and their change over time.

Reference Area:

Monitoring on both project and reference areas provides a means to establish performance standards that can compare wetland structure and ecological function, and is therefore the most effective means of assessing project effectiveness (Brinson and Rheinhardt 1996). Coastal salt marshes and barrier islands are very dynamic in nature. Therefore, reference areas in these saline environments need to be monitored over time to determine community structure and function (Moy and Levin 1991; Simenstad and Thom1996; Zelder 1993; Mitsch and Wilson 1996). To measure the development of tidal creeks and ponds, a reference area will be established in the western portion of the TE-50 back barrier marsh creation area (figure 7). The tidal creek and pond reference area will be micro-topographically surveyed and aerially photographed along with the created creeks and ponds to determine natural and constructed succession in this unnaturally formed ecosystem. In addition, the evolution of these creeks and ponds will be compared to natural creek and pond development on two other back barrier marsh creation projects, the Timbalier Island Dune and Marsh Creation (TE-40) project and the Raccoon Island Shoreline Protection/Marsh Creation (TE-48). Due to scientific and economic constraints, no other reference areas will be established for this project.

Monitoring Strategies

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

1. Micro-topography	To document the evolution of created primary creeks, secondary creeks, tertiary creeks, ponds, and reference areas; 12 randomly selected 100 ft (30.5 m) study areas will be micro-topographically surveyed for each treatment. Each study area will contain 10 cross sectional survey transects separated on 10 ft (3.1 m) intervals. Elevation points will be spaced 10 ft (3.1 m) apart and will also be established at noteworthy changes in relief. These cross sections will begin 50 ft (15.2 m) from the edge of the shoreline extend across the channel or pond and end 50 ft (15.2 m) inland of the opposite shoreline. The reference area transects will extend for 150 ft (45.7 m) from the point

of origin. Data collected will be used to develop elevation models to compare elevation and volumetric changes using procedures established in Ormsby and Alvi (1999). Micro-topographic surveys will be conducted after construction in 2009 (as-built), 2011, and 2013. Micro-topography will be funded through the TE-50 monitoring budget.

2. Topography

To estimate elevation and volume changes in the project areas and other barrier island habitats over time, Light Detection and Ranging (LiDAR) and traditional ground surveys will be employed. LiDAR data will be collected, filtered, and analyzed by the United States Geological Survey/Coastal and Marine Geology Program (USGS/CMGP) and will topographically establish elevations for the subaerial extent of the island (Troutman et al. 2003). Since the LiDAR surveys include the dune and the marsh creation areas, these elevation data will be used to conduct elevation and sediment volume analysis for both features as per Ormsby and Alvi (1999). Additionally, topographic surveys will be performed along 25 cross sectional survey transects in the marsh creation area in accordance with Steyer et al. (1995). These survey transects will be separated on 250 ft (76.2 m) intervals with elevation points collected 100 ft (30.5 m) apart. Elevation and volume changes in the marsh creation area will be detected using both the cross section and LiDAR surveys (Ormsby and Alvi 1999). LiDAR surveys will be flown in 2006 (pre-construction) and post-construction in 2011, 2016, and 2021. The cross sectional topographic survey data will be collected in 2006 (pre-construction) and 2009 (as-built). LiDAR data will be funded through BICM while the topographic surveys will be funded by the TE-50 construction budget.

3. Bathymetry

To approximate subaqueous elevation and volumetric alterations in the island shoreface, gulf, and bay environments, bathymetric surveys will be undertaken by USGS/CMGP. These survey transects will be separated on 1500 ft (457.2 m) intervals and will extend for 1.2 miles (2.0 km) outward from the island into the gulf and bay habitats. On the gulf side of the island, the transects will stretch past the 1.2 mile (2.0 km) boundary to 3.7 miles (6.0 km) on 4500 ft (1371.6 m) intervals. Data collected will be used to develop elevation models to compare elevation and volumetric changes using procedures established in Ormsby and Alvi (1999). Bathymetric survey data will be collected in 2006 (pre-construction) and post-construction in 2011, 2016, and 2021. Bathymetry data collection will be funded through BICM.

4. Habitat Classification — To document vegetated and non-vegetated island habitats, 1:24,000 scale color infrared aerial photography (CIR) will be obtained. The photography will be photointerpreted, scanned, mosaicked, georectified, and analyzed by University of New Orleans/Coastal Research Laboratory (UNO/CRL) personnel according to the standard operating procedure described in Cowardin et al. (1979), Steyer et al. (1995) and Troutman et al. (2003). The photography will be obtained in 2006 (pre-construction), and post-construction in 2009 (as-built), 2011, 2013, 2016, and 2021. Habitat classification data will be funded through BICM in 2006, 2011, 2016, and 2021. The 2009 and 2013 habitat classification data will be funded through the TE-50 monitoring budget.

5. Sediment Properties/ Geotechnical — To characterize the median grain size and grain size distributions in the shoreface and other barrier island habitats, grab or push core samples will be obtained along 8 cross-shore transects by UNO/CRL. These sediment transects will be separated on 3000 ft (914.4 m) intervals. The transect lines will begin on the gulf side of the island at the -15 ft (-4.6 m) contour and continue across the island into the back barrier marshes. One sample will be obtained from each distinguishable location: -15 ft (-4.6 m) contour, middle of shoreface, upper shoreface at mean low water, beach berm, dune, and back-barrier marsh. Each sample will measure sediment grain size, sorting, percent sand and fines, organic matter content, and bulk density (Troutman et al. 2003). Samples will be acquired and analyzed in 2008 (pre-construction) and post-construction in 2011, 2016, and 2021. Geotechnical data will be funded through BICM.

<u>Anticipated Statistical Tests</u>

1. Descriptive and summary statistics for micro-topography will be used to determine differences in mean elevations, habitat class, width and development and evolution of tidal creeks and ponds as evaluated by an elevation model that will consider both spatial and temporal changes. Micro-topography will be funded through the TE-50 monitoring budget.

Goal: Determine the evolution of tidal channel development both natural and manmade.

2. Descriptive and summary statistics for topography will be used to determine differences in mean elevations, habitat class, and width as evaluated by an elevation model that will consider both spatial and temporal changes. The basic model will determine changes in island elevation, habitat classes, volume of island sediment, width of the project area, and shoreline position. LiDAR data will be funded through BICM while the topographic surveys will be funded by the TE-50 construction budget.

   Goal: Determine the area, average width, and length of Whiskey Island and the project area over time.

   Goal: Determine elevation, volume, and habitat classes in the project area.

3. Descriptive and summary statistics for bathymetry will be used 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. Bathymetry data collection will be funded through BICM.

   Goal: Determine the area, average width, and length of Whiskey Island and the project area over time.

4. Descriptive and summary statistics using the habitat classification data will be used to determine changes in barrier island habitats over time. Habitat classification data will be funded through BICM in 2006, 2011, 2016, and 2021. The 2009 and 2013 habitat classification data will be funded through the TE-50 monitoring budget.

   Goal: Determine elevation, volume, and habitat classes in the project area.

   Goal: Determine the evolution of tidal channel development both natural and manmade.

   Goal: Determine the effectiveness of project features in reducing the rate of erosion as compared to historical rates of erosion.

5. Descriptive and summary statistics using the geotechnical and sediment property data will be used to determine changes in the sediment content of the shoreface and other island habitats over time. Geotechnical data will be funded through BICM.

   Goal: Determine sediment characteristics and their change over time.

Notes:

1.	Planned Implementation:	Start Construction:	May 1, 2008
		End Construction:	May 1, 2009
	EPA Point of Contact:	Tim Landers	214-665-6608
2.	DNR Project Manager:	Brad Miller	225-342-7549
	DNR Monitoring Manager:	Glen Curole	985-447-0995

3. The twenty year monitoring plan development and implementation budget for this project is $200,000.00. Comprehensive reports will be available in 2012, 2014, 2017 and 2022. These reports will describe the status and effectiveness of the project.

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