BASELINE AND CONSTRUCTION MONITORING OF PACKERY CHANNEL, CORPUS CHRISTI, TEXAS

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Abstract: Construction of a new inlet along the Texas Gulf Coast to Corpus Christi Bay, Texas, began October 2003. In preparation for the inlet opening, in August 2003 the U.S. Army Corps of Engineers, Galveston District, initiated baseline and construction monitoring of the existing Packery Channel and adjacent Padre and Mustang Island beaches. The monitoring program, contracted to Texas A&M University-Corpus Christi, includes beach profile surveys, shoreline position surveys, hydrographic surveys, acquisition of aerial photography, current measurement in the existing channel, and data dissemination through a web site called Texas Inlets Online. This paper discusses objectives of the monitoring, elements of the monitoring plan, and selected results.

INTRODUCTION

Historically, Corpus Christi Bay, Texas, was served by two natural inlets (Price 1952) or "passes" in local terminology, Aransas Pass (shared with Aransas Bay to the north) on the north side and Corpus Christi Pass on the south side, in the SSW corner (Fig. 1 and Fig. 2). Dredging of Aransas Pass started in 1924, and its re-direction into Corpus Christi Bay caused Corpus Christi Pass to slowly shoal and become a flat ephemeral overwash pass that can be flooded during more severe tropical storms and hurricanes.

For many years, local interests have wanted to reopen the old Corpus Christi Pass through an existing dead-end channel called Packery Channel for water exchange (environmental enhancement for southern Corpus Christi Bay and upper Laguna Madre) and as a navigational amenity that would allow access to the Gulf of Mexico without having to make a 23-mile additional transit to reach Aransas Pass. In addition, such a new pass would serve as a harbor of refuge for vessels to the south in the Gulf of Mexico.

The North Padre Island (Packery Channel), Nueces County, Texas, Storm Damage Reduction and Environmental Restoration Project was authorized in the Water Resources Development Act (WRDA) 1999 as a Federal project with Nueces County as the original local sponsor. The City of Corpus Christi assumed local sponsorship in 2000. Construction began in October 2003, and the inlet opening is expected in spring or

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summer 2005. The inlet will be stabilized by two parallel jetties spaced 300 ft apart extending 1,430 ft into the Gulf of Mexico from the existing shoreline, protecting a channel to be maintained to a depth of 14 ft Mean Lower Low Water (MLLW), with provision for advanced dredging and overdredging of 2 ft. Sand dredged from the channel as new work and maintenance material will be placed on adjacent beaches as a shore-protection element (USACE 2003). The U.S. Army Corps of Engineers (USACE) recognizes that inlets can alter the adjacent beaches by redistributing sediment. A physical-processes monitoring program and environmental-processes program were implemented to provide baseline data to understand the existing condition and response of the beaches, nearshore, and channel for guiding dredging and dredged material placement practice. In addition, design studies (Kraus and Heilman 1997; Brown and Militello 1997; URS/Dames & Moore 2001) for the project indicated that Packery Channel is located near a divergent nodal point in longshore sediment transport. Monitoring is essential for understanding the acting physical processes as well as for adaptive management of the inlet and adjacent beaches as a sediment-sharing system.

This paper discusses the physical processes monitoring plan and selected results, including availability and location of data for interested parties.

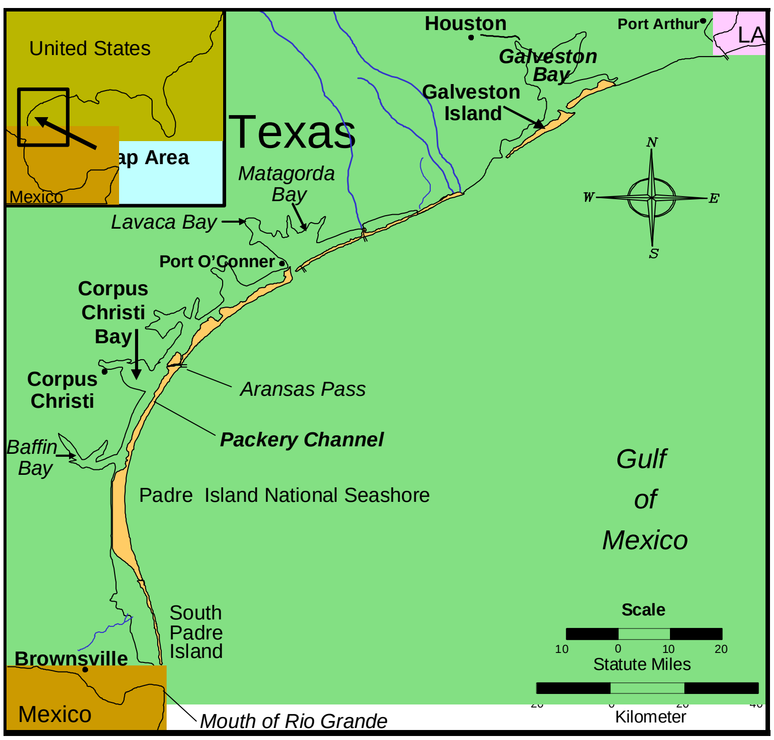

Figure 1. Location of Packery Channel, Corpus Christi, Texas.

MONITORING PROGRAM DESIGN

A baseline and construction monitoring program of nearshore morphology, sediment grain size, channel bathymetry and current at Packery Channel and adjacent beaches was initiated by the U.S. Army Engineer District, Galveston, in August 2003. The study concerns the existing channel and adjacent beach on North Padre Island located along the central Texas coast at Corpus Christi (Fig. 1, Fig. 2). The Galveston District initiated this effort in conjunction with the U.S. Army Engineer Research and Development Center (ERDC), Coastal Inlets Research Program (CIRP), which contracted to the Conrad Blucher Institute for Surveying and Science (CBI) at Texas A&M University-Corpus Christi for the field data collection and data dissemination. The 3-year monitoring program began in anticipation of the commencement of scheduled September 2003 construction activities.

Presently, the channel begins at the Gulf Intracoastal Waterway (GIWW) and extends southeast toward the Gulf of Mexico, where it terminates within Padre Island. For additional historic information on Packery Channel including research and design the reader is directed to a companion conference paper (Kraus et al. 2005).

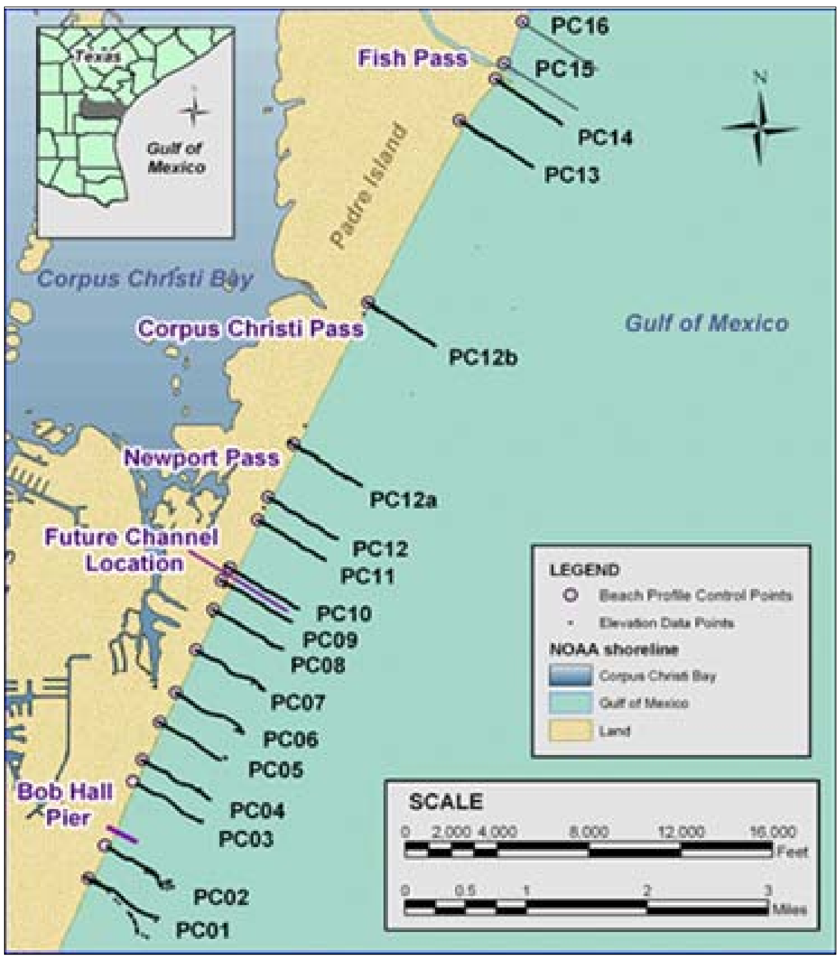

Figure 2. Study area and beach profile locations, Padre and Mustang Island beaches.

Kraus and Heilman (1997), URS/Dames & Moore (2001), and Kraus et al. (2005) describe the initial data collection and analytical studies leading to functional design of Packery Channel Inlet. Beach profile surveys and sediment samples were taken during the course of the initial study and are available for comparison to present study data. Mobilization and construction began during October 2003, with 55% of the project completed as of December 2004. Table 1 summarizes the timeline of construction progress and anticipated progress over the course of the 2005 fiscal year. The project is on schedule with a completion date of August 2005.

Table 1. Packery Channel Construction Timeline			
Task Description	**Initiated/Issued**	**Completed**	**Comment**
Contract Award	July 31, 2003	--	--
Notice to Proceed	August, 22 2003	--	--
Construction Starts	October 2003	--	--
Construct Permanent Fill	October 2003	January 2005	--
Construct Shoreline Protection	September 2004	December 2004	--
Construct Jetties	August 2004	--	--
Dredge Reach 1/Bypass Sand	January 2005	--	--
Dredge Reach 2	December 2003	April 2004	110,000 cy removed
Install Sand-Bypass/Utility Casing	January 2004	January 2004	--
Contract Completion Date	--	August 2005	Anticipated

Monitoring Tasks

The monitoring effort is to provide a dynamic local network of research and technical support to compliment Galveston District and CIRP initiatives for monitoring existing inlets and the response of the coast to development of new inlet infrastructure. The project encompasses data collection and analysis in support of present and continuing studies of Packery Channel and other existing and proposed inlets along the Texas coast either managed or permitted through regulatory authority by the Galveston District. Increased understanding of the hydrodynamics and sediment transport of these inlet systems will assist in improving inlet design and channel maintenance, thereby optimizing operation and maintenance benefits.

The purpose of the 3-year Packery Channel monitoring project is to document baseline conditions as well as changes during and immediately after construction for both the existing channel and along the Gulf of Mexico beaches of Padre and Mustang Island. The monitoring program includes the following tasks:

Task 1. Geographic Information System for Central Texas Inlets Analysis

Develop/operate web-based data dissemination center
Develop baseline Arc GIS Packery Channel Inlet Project
Obtain aerial photography

Task 2. Inlet and Channel Morphology Surveys

Conduct beach profile surveys
Conduct channel hydrographic surveys
Conduct shoreline position surveys

Task 3. Current Monitoring

Install/maintain current monitoring station in Packery Channel at GIWW intersection.
Establish/maintain real-time link to CBI database and web site

Texas Inlets Online, Task 1

The Texas coast contains 24 natural and engineered inlets (exact number depending on storms) providing for water exchange and navigation between the Gulf of Mexico and the inland bays and lagunal systems. In particular, it is served by eight federally maintained ship channels together with a number of natural inlets and river mouths of interest to the Galveston District. The data collected at Packery Channel was arranged in a webpage[1], shown in Figure 3, that serves as a prototype for development of online data archives for other inlets along the Texas coast.

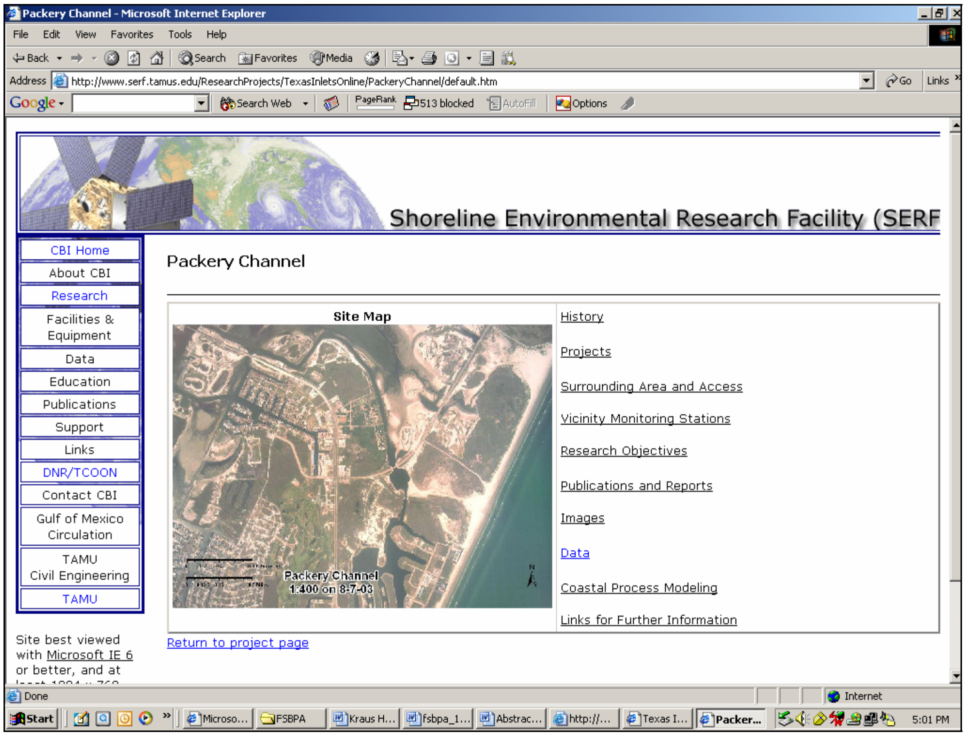

Figure 3. Packery Channel web-based data dissemination site interface.

Geographic Information System for Texas Inlets Analysis, Task 1

An Arc GIS Geodatabase was established to archive all data describing coastal parameters related to inlets of interest. Elevation data collected to date have been processed in the Arc GIS 8.3 environment. These data and the appropriate vector base map layers are stored in the ESRI Personal Geodatabase format of MS Access (*.mdb). This format allows for export of the standard *.shp format. The ongoing GIS effort is in preparation for the migration of point and vector data into the Enterprise Geodatabase on a MS sequel Server. This format will allow for importing the historic, current and future imagery as raster layers in the Geodatabase.

Aerial Photography, Task 1

Comprehensive sets of color aerial photographs were taken during September 2003 and September 2004 to document the existing shoreline and dunes, as well as to serve as a baseline for changes occurring during and after construction. Additional coverage is

1) (http://www.serf.tamus.edu/ResearchProjects/TexasInletsOnline/PackeryChannel/default.htm).

planned for early 2005 to document completion of jetty construction and initiation of dredging and beach nourishment. The web-based image library contains low-resolution thumbnails for direct download and access to higher resolution imagery. Aerial coverage extends from Aransas Pass to just south of Bob Hall Pier (scale of 1″=2000′) with lower altitude (1″=1000′) coverage across the shoreline extent fronting Packery Channel (Fig. 4). Coverage continues inland following the existing channel to the GIWW. The Packery Channel imagery joins other Texas Inlet images archived in The Texas Inlets Online image library and is accessible through the web-based dissemination site. Figure 5 shows shoreline change along the Gulf of Mexico between September 2003 and September 2004 approximately 1 year after construction began.

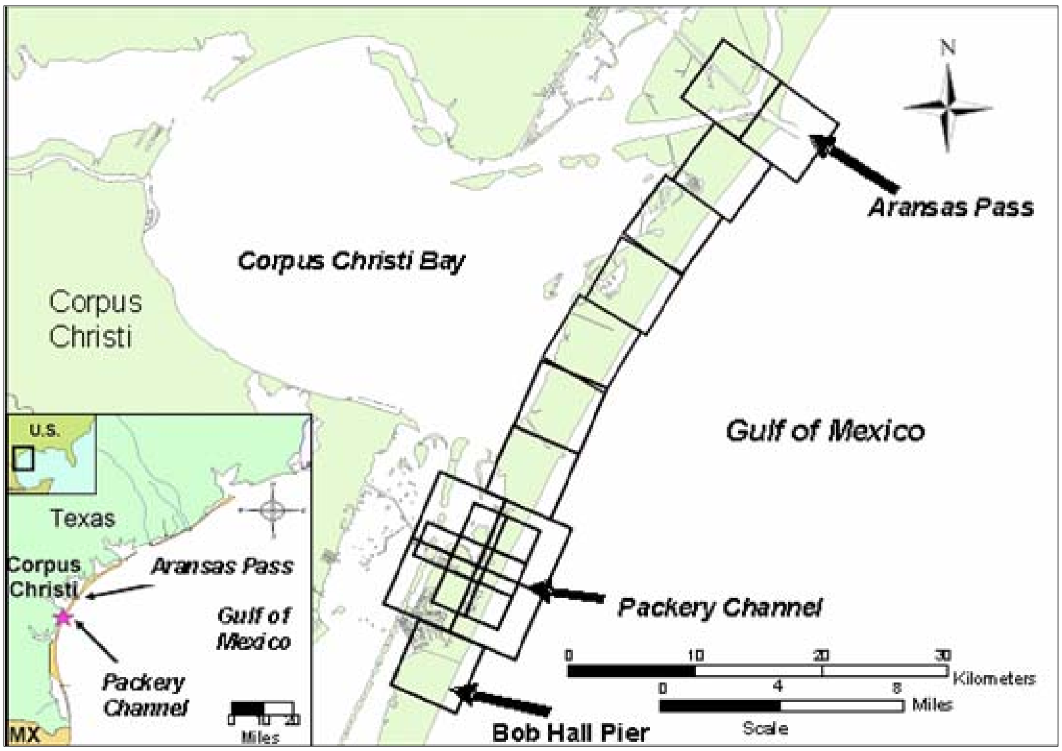

Figure 4. Alongshore and cross shore extent of aerial image coverage, Packery Channel.

Beach Profile Surveys, Task 2

Baseline profile data will allow quantitative assessments to be made of morphology and volume of sand distribution in the nearshore in response to opening of Packery Channel Inlet. The beach profile was surveyed during August 2003 and July 2004 along the stretch of coast from approximately 5 miles north to 5 miles south of the Packery Channel entrance. This region corresponds to control points PC01 through PC16 (Fig. 2). The southern boundary of the survey was just south of Bob Hall Pier at the Nueces/Kleberg County Line, and the northern boundary was just south of Fish Pass during 2003 and north of the Fish Pass during 2004 surveys. The 2003 survey did not include PC15 and PC16 due to navigation, safety, and mechanical issues.

The spacing of the profile lines is denser around the Packery Channel entrance and the nourished beach located adjacent to the inlet. The profile-transect locations were set as closely as possible to those occupied during a survey conducted in April 1996 by CBI

(Kraus and Heilman 1997). Although the original control benchmarks were deep driven (20 to 60-ft rods), installed in capped PCV pipe and encased in a concrete kickbox, only one of the 1996 benchmarks (PC06) was recovered. Loss of the benchmarks is attributed to erosion of the dunes, burial by wind-blown sand, vandalism, and uncertainty in exact positioning. PC06 was located on top of the seawall adjacent to the project site, but there was no other such infrastructure to protect the remaining benchmarks. The PC09 and PC10 benchmarks established for the 2003 survey were replaced during the 2004 survey by two new permanent benchmarks placed on either side of the channel boundaries by the Galveston District. These permanent benchmarks, located on the headwalls of the sand bypass casing, were occupied in anticipation of elimination of the PC09 and PC10 benchmarks during construction activities.

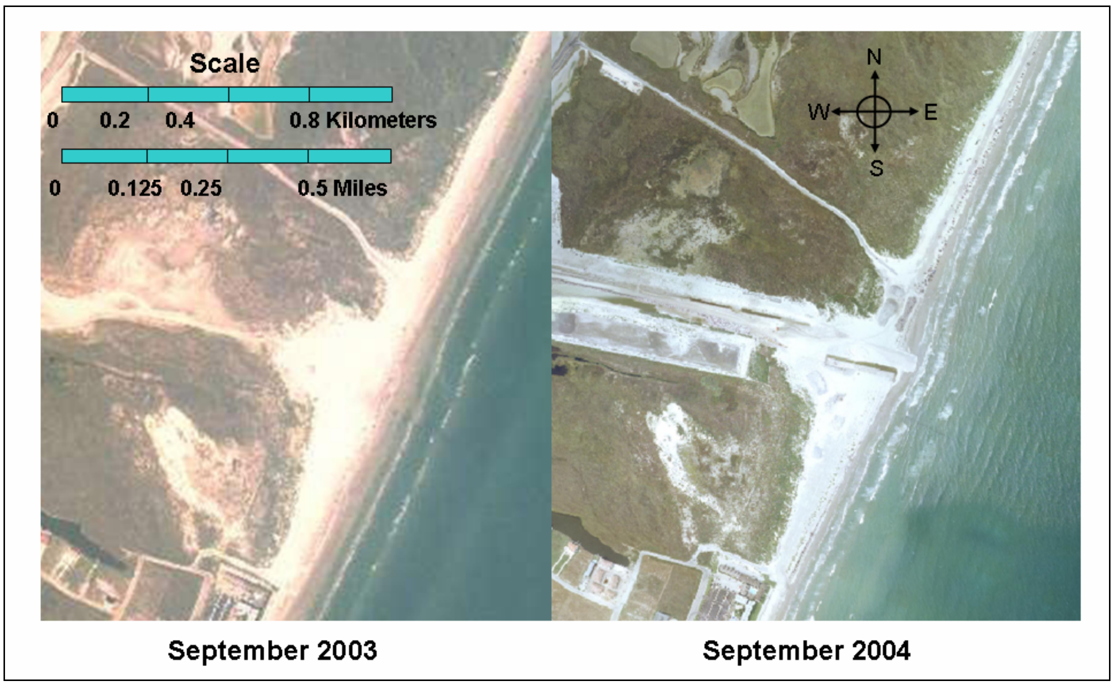

Figure 5. Aerial images showing shoreline change 1 year after start of construction. Photography by Lanmon Aerial Inc. (left), and Tobin International (right).

Although traditional surveying techniques were applied during the beach and wading portion of the 2003 and 2004 surveys, two different techniques were employed for the offshore portion of the profile. During the 2003 and 2004 wading surveys, a total station with a rod mounted prism functioning as the target were utilized for measurements extending offshore to an approximate elevation of -5 ft (NAVD 88). The nearshore and offshore portions of the 2003 survey were done with a sea sled (Grosskopf and Kraus 1994; Kraus and Heilman 1997). The sled had a 360-degree prism halo on top of a 31-ft high mast that served as the target of an infrared beam emitted from a total survey station. Vertical accuracy is estimated to at on the order of 0.5 inch and horizontal accuracy is estimated at 0.5 inch for a stationary sled and 1 to 3 ft for a moving sled, dependent on sled speed.

To increase efficiency, the nearshore and offshore portions of the 2004 survey were conducted with a jet ski instrumented with Real-Time Kinematic-Global Positioning System (RTK-GPS) equipment and a two-way radio link. The accuracy of the RTK-GPS portion of the survey is estimated as within 0.4 inch in the horizontal and on the order of 1 inch in the vertical. Utilizing RTK-GPS for the hydrographic portion of the survey eliminated the need for adjusting elevation measurement for tide or squat. Position was determined by a WAAS-enabled GPS mounted on the jet ski, and RTK corrections were received from an onshore base station. An echo sounder with a 200 kHz pinger was employed to measure depth, adjusted to represent proper sound velocity in the water column. Jet ski navigation was accomplished via portable GPS receiver. The RTK-GPS jet ski survey method provided faster and less labor-intensive product than the sea sled and will therefore be utilized for upcoming surveys during 2005. However, two limiting factors were associated with the RTK-GPS jet ski method: 1) measurements in water shallower than 4 ft were less reliable than for the sea sled, and this restricted data overlap between wading and offshore portions of the survey; and 2) accuracy of measurements decreased with increasing seas (> 2 ft), so that highest-accuracy surveying is limited to periods of calm sea.

Each profile transect extended from landward of the primary dune (or to other backshore limiting feature) to a minimum offshore elevation of -24 ft (NAVD 88). The data collected during the 2004 survey reached elevations in excess of -30 ft (NAVD 88). Beach and wading measurements were taken at 5- to 10-ft intervals, dependent on morphology, and offshore measurements were collected at 10- to 20-ft intervals. National Ocean Service benchmark elevations at Bob Hall Pier tide gauge were applied to determine the relationship of MSL to NAVD 88 (NAVD 88 + 0.48 = MSL). An overlap of 100 ft (at least five elevation locations) between land and marine surveys was maintained throughout the 2003 and 2004 surveys (Figs. 6 and 7).

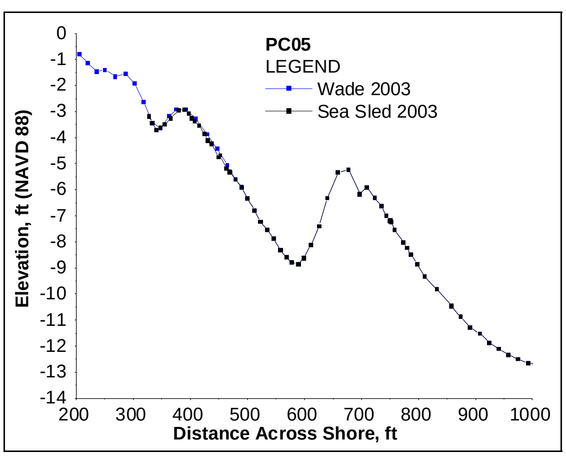

Figure 6. Wading and sea sled data overlap during the 2003 survey.

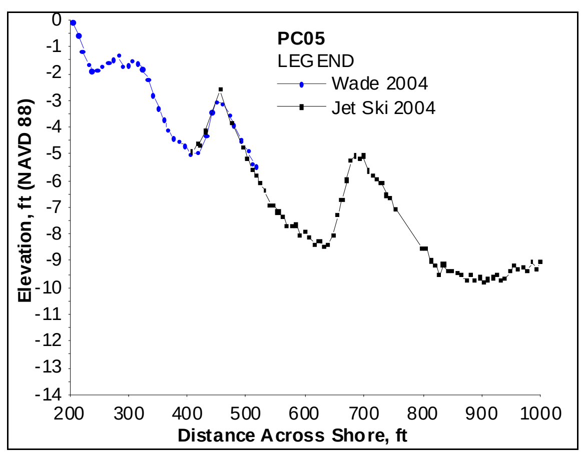

Figure 7. Wading and jet ski data overlap during the 2004 survey.

Verification and review of the 2003, 2004, and 1996 beach profile survey data show reasonable vertical agreement for all profiles. Figure 8 shows that good agreement was observed at PC06, the only original control point, as well as for profiles such as PC10 where new control was established and later relocated to a nearby more stable Galveston District benchmark (Fig. 9).

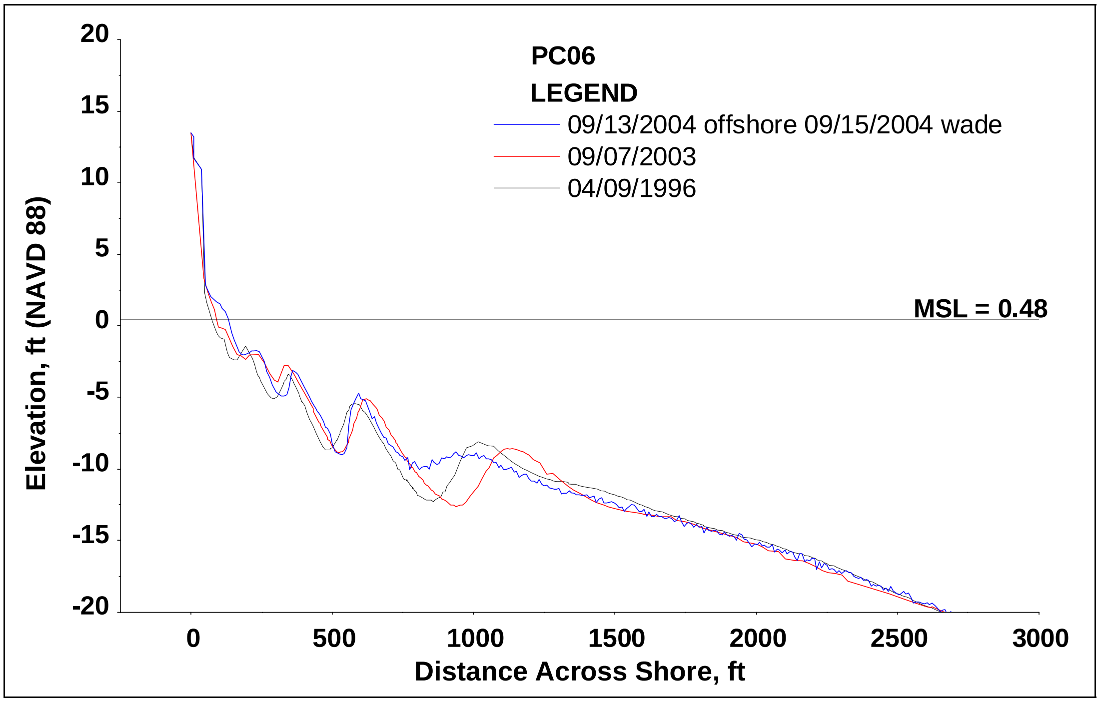

Figure 8. Profile agreement over the study period at original PC06 location.

Comparison plots of the 1996 and 2003/2004 profile data indicate significant change in the backshore features such as dune toe position. The region from PC01 to PC10 has experienced a large amount of mechanical sand manipulation. The dune toe shown by the 2003 data indicates the seaward extent of the mechanically placed dunes. The placement of piles of sand and beach debris (generally seaweed) at the existing dune toe is standard practice in this area in an effort to combine routine beach cleaning and maintenance with dune reinforcement. An example of sand accretion on the backshore by natural processes is evident along PC13 (Fig. 10). This profile is located at Mustang Island State Park in the center of the park facilities. Nearly all of the park picnic facilities were completely covered by sand at the time of the 2003 and 2004 surveys (Fig. 11). Wind-driven transport and extended periods of higher-than-average water levels are likely responsible for the accretion observed at this location.

The 1996, 2003, and 2004 beach profile survey data show that all nearshore to –25 ft (NAVD 88) profile lines contained three longshore bars, with four bars present on some lines. The bar system corresponds spatially and in bar number with the three-bar system typically found along this region of the Texas coast as described by Davis and Fox (1972, 1975). Figures 8-10 show the inner bar is located ≈ 230 to 280 ft offshore (-3 ft NAVD 88); the second bar is located ≈ 500 to 600 ft offshore (-5 ft NAVD 88); and the third bar is located ≈ 800 to 900 ft offshore (-7 ft NAVD 88). As described by Kraus and Heilman (1997), the consistency in profile shape across the study area indicates that the Gulf bottom contours are parallel to the shoreline. Mid-term (order of decades) depth of closure appears to be located around 15-ft depth, MSL.

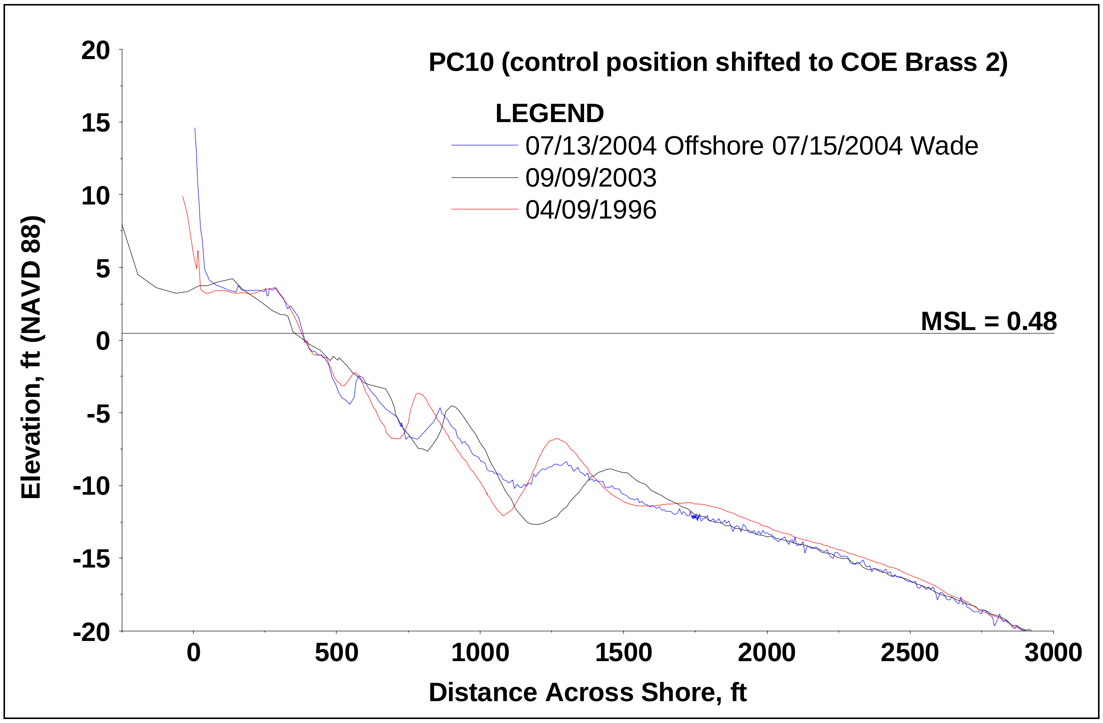

Figure 9. Profile agreement over the study period at newly located profile PC10.

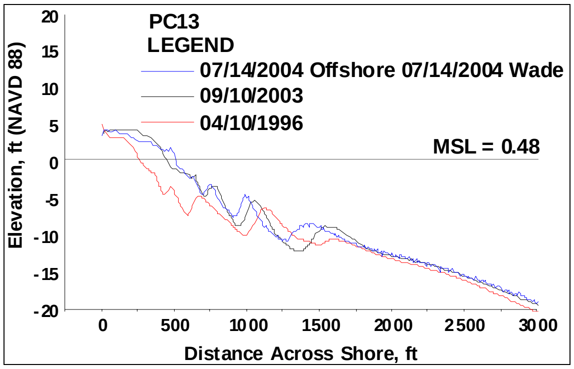

Figure 10. Region of intensified accretion identified on PC13 at Mustang Island State Park.

Figure 11. Wind-blown sand covering picnic facilities at Mustang Island State Park (September 2003).

Sediment Grain Size

Sediment samples were collected at six locations along each profile (dune toe, mid berm, shoreline, and -3 ft, -12 ft, and -24 ft elevations). Approximately 100 samples were collected among the 16 profile lines during 2003 and along 18 profile lines during 2004. Analysis showed consistency in grain size characteristics at onshore locations for all profiles, with variability increasing at nearshore and offshore locations throughout the study site. Statistical grain size parameters for size distribution (median, mode and inclusive graphic standard deviation) were analyzed with the Coastal Engineering and Design System (CEDAS) software Automated Coastal Engineering System (ACES). Inclusive graphic standard deviation is given as a measure of sorting that has been applied to describe the sediments of Mustang Island (Mason and Folk 1958). The formula described by Folk (1974) includes 90% of the distribution and is the best overall measure of sorting.

The sediment grain size characteristics along Padre and Mustang Island beaches showed little variation over the study period. The median grain size was on the order of that reported by other studies along North Padre and Mustang Islands (Mason and Folk 1958, Gage 1970, Kraus and Heilman 1996, and others). The sediment in the study area was classified as Fine Sand with a median grain size ranging from 0.14 mm to 0.17 mm. Table 2 summarizes the mean and range of values determined for all profiles (PC01-PC16) at the location indicated.

Table 2. Summary of Grain Size Statistics for Profiles (PC01-PC16)

	Median Grain Size (mm)				Inclusive Graphic Standard Deviation (Phi)			
Location	**Range**		**Mean**		**Range**		**Mean**	
	2003	2004	2003	2004	2003	2004	2003	2004
Toe of Dune	0.14-0.16	0.14-0.16	0.15	0.15	0.22-0.30	0.21-0.27	0.24	0.23
Mid Berm	0.14-0.17	0.14-0.16	0.15	0.15	0.20-0.34	0.16-0.28	0.28	0.23
Shoreline	0.14-0.17	0.14-0.16	0.15	0.15	0.22-0.66	0.23-0.33	0.36	0.27
- 3 ft	0.14-0.16	0.14-0.17	0.14	0.14	0.21-0.48	0.25-0.38	0.34	0.30
-12 ft	0.11-0.15	0.11-0.16	0.14	0.12	0.17-0.63	0.35-0.81	0.37	0.48
-24 ft	0.11-0.15	0.12-0.16	0.13	0.13	0.24-0.97	0.58-1.34	0.60	0.79

Shoreline Position Survey, Task 2

Shoreline surveys are a relatively inexpensive means of determining the response of the beach to structures and storms. During 2004, shoreline position was surveyed twice along the Padre and Mustang Island beaches. The first survey was conducted in June and extended from Aransas Pass to Bob Hall Pier, and a second survey in October extended from approximately 2 miles north of the northern Fish Pass jetty south to the Nueces/Kleberg County Line (Fig. 12). The surveys were performed during the period of lowest tide possible to capture the envelope of MLLW and MHHW shoreline position while still maintaining adequate satellite coverage. Therefore, the surveys required several days. Elevation measurements were collected every two seconds which allowed a point spacing of approximately 5 to 10 ft dependent on vehicle speed.

The data were collected in a zigzag pattern, as shown in Fig. 13, starting as close as possible to the dune toe (often restricted due to loose sand and large accumulations of glass bottles) or other limiting feature. In this way, beach volume and any shoreline definition by elevation or by interpreted morphology can be obtained. Both surveys were conducted by GPS with an antenna mounted to the top of a 4WD vehicle. The data collected during the first survey were post-processed due to range limitations of the RTK base station. The coverage of this data set was acceptable, with only a few gaps due to post-processing limitations. This method proved problematic during subsequent surveys, and, therefore, an RTK-GPS system accessing two proprietary base stations offering complete coverage of the often-remote regions of the study area was employed. Future surveys will continue to access this duel base station RTK-GPS system.

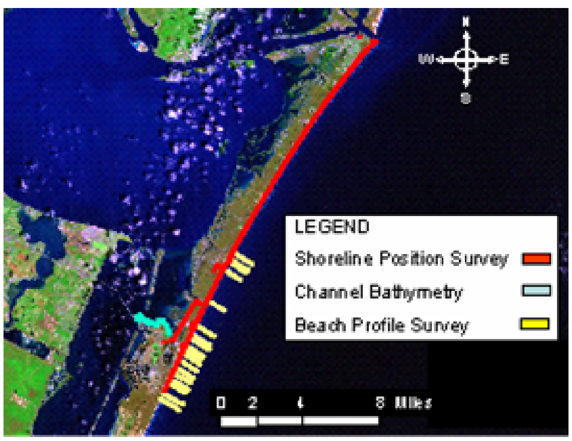

Figure 12. Shoreline position survey (red), channel hydrographic (green) and beach profile survey (yellow) data coverage.

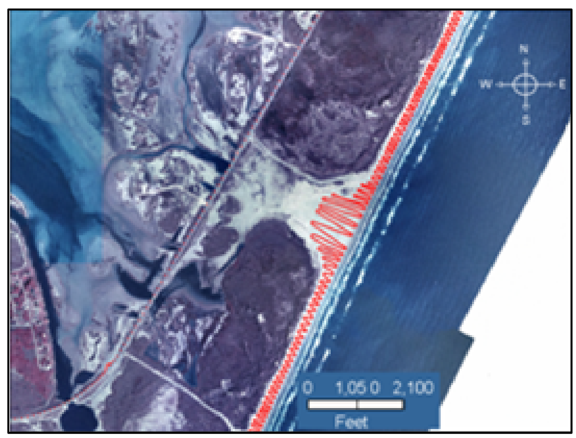

Figure 13. Zigzag pattern of shoreline position survey data coverage.

The shoreline surveys have an estimated horizontal accuracy of on the order of 1.0 inch and vertical accuracy of 1-4 inches, which is primarily location dependent and related to differences in sand compaction across the beach. Sand compaction typically varied from very loose at the dune toe to firm at the shoreline. Relative compaction between surveys depended on how recently the beach was last inundated by either high water or substantial rain. Elevation differences were estimated at 1-4 inches on the dry back beach and < 1 inch on the fore beach and wetted shoreline.

Channel Hydrographic Surveys, Task 2

A hydrographic survey of Packery channel including sediment collection and analysis was conducted during July 2004 to document post-channel dredging conditions prior to completion of the channel opening to the Gulf of Mexico. Figure 12 (green) shows the hydrographic coverage from west of the HWY 361 Bridge to the GIWW. The coverage includes approximately 600-800 ft on either side of the JFK Causeway in the GIWW. The survey included 61 transects spaced at 200 ft intervals as well as definition of the centerline along a greater-than-2-mile stretch of the channel. An additional 6 transects were surveyed in the GIWW at the intersection with Packery Channel. Position and elevation were measured with a RTK-GPS system with accuracy on the order of 0.5 inch. The jet ski was navigated by a WAAS-enabled GPS with an antenna mounted directly above the transducer on the rear of the vessel. A sonar system provided depth measurements and stored digital charts. The sonar passed a National Marine Electronics Association (NMEA) string to the GPS with time, position (used for quality control), and depth below transducer.

Sediment samples were collected with a Ponar grab sampler along the centerline on alternating transects, and additional samples were taken to the north and south of the centerline to, at the channel bank margins, and along transects in regions of channel inflection. A laser light diffraction instrument was employed to determine sediment grain-size due to the high content of silt and very fine sand in the samples. The median grain size ranged from 0.02 to 0.18 mm over the study area, with finer sediment (0.02 to 0.08 mm) found consistently over a nearly 0.5-mile region from the GIWW eastward toward Padre Island.

During 2004, surveying in this region was limited by ongoing construction and bridge protection practices. Therefore, additional surveys planned for Fiscal Year 2005 will include the region south of the HWY 261 Bridge, continuing west 0.5 miles prior to inlet completion.

Current Monitoring and Measurement, Task 3

After Packery Channel Inlet is opened, the current velocity at the intersection with the GIWW is expected to increase, which might increase sedimentation in the GIWW. Monitoring of the current will assist in interpreting sedimentation patterns and quantities.

Three instruments have been deployed near the intersection of Packery Channel and the GIWW: 1) an ADCP, 2) a current, salinity, and temperature sensor, and 3) a horizontal (side looking) HADCP. On 30 Sep 03, a bottom-mounted 1200-kHz ADCP was installed in Packery Channel near its intersection with the GIWW (Fig. 14). The ADCP monitors the vertical profile of horizontal currents. It was placed near the middle of the channel in about 9-ft water depth in a trawl-resistant-bottom-mount to protect it from normal ship traffic. The ADCP was configured to sample 5-min averages in 0.66-ft depth increments (bins). The observations were transmitted through cable to a nearby monitoring station on the north edge of the channel. Figure 15 shows the ADCP currents at five depths, water level, and wind speed and direction at Bob Hall Pier, for the period 23 Oct 03 to 10 Nov 03. For comparison with the currents, the wind direction has been converted to oceanographic direction. The results suggest the surface layer of water current is driven by the local wind, whereas the deeper current may be controlled by horizontal pressure gradients forced by wind-driven setup and setdown of Corpus Christi Bay and/or the Laguna Madre.

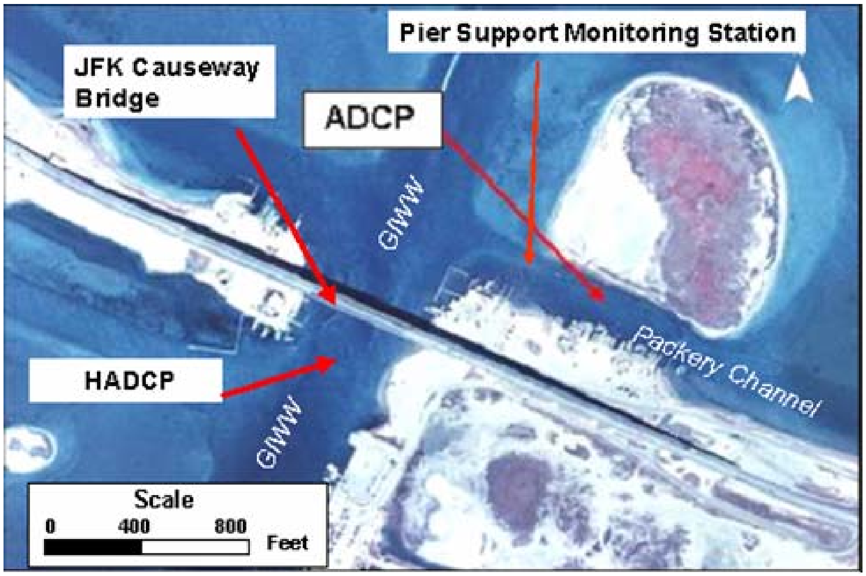

Figure 14. Location of instruments in Packery Channel and GIWW.

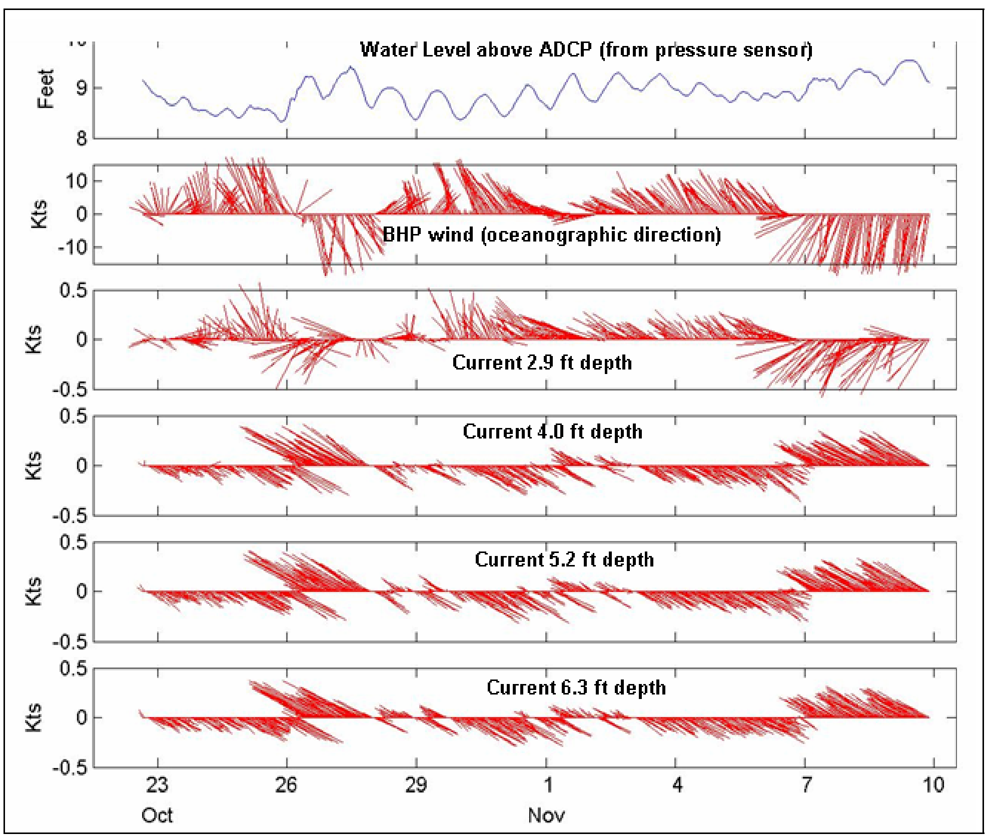

Figure 15. Current at five depths, water level, and wind, Bob Hall Pier, 23 Oct to 10 Nov 2003

Water level and water temperature were obtained from the ADCP. Water level was computed from the measured subsurface pressure, temperature, barometric pressure, and an assumed salinity. Figure 15 shows that the daily water-level fluctuations are not well correlated with the currents during this period of time.

The ADCP was removed from the channel on 29 Jun 04 because of channel dredging and constant passage of deep-draft barges that damaged the instrument. In its place, a current meter with temperature and salinity sensors was deployed on the side of the channel at a depth of 2.6 ft on 9 Aug 04. This system provides a near surface flow measurement with temperature and salinity observations. This system will remain in place until the bottom-mounted ADCP can be redeployed (anticipated in March or April 2005), for comparison with the top good bin of velocity data from the ADCP. To provide information on the baseline currents in the GIWW, a HADCP was deployed in the GIWW under the JFK Causeway Bridge on 19 Nov 04 (Fig. 14.)

CONCLUSIONS

The U.S. Army Engineer District, Galveston, the USACE's Coastal Inlets Research Program, and TAMU-CC are monitoring and documenting the morphology along the adjacent beaches at Padre and Mustang Island and bathymetry around Packery Channel. The resultant data set will enable assessment of response of the nearshore, adjacent beaches, navigation channel, and GIWW to construction of Packery Channel Inlet. Monitoring has intensified since inception in August 2003 with additional components such as shoreline position surveys to increase opportunities to document and quantify the response of coastal processes and morphology to the construction. During the 2003 and 2004 monitoring period, the program included beach profile surveys, channel hydrographic surveys, shoreline position surveys, sediment grain size analysis, and acquisition of aerial photography, all supported by Arc GIS data management and a web-based data dissemination site, Texas Inlets Online.

The data sets collected in this program continue and extend the original baseline data for this project initiated during the 1996 design study. The monitoring program will expand during 2005 to include additional focused surveys scheduled to document changes relative to key milestones in project construction.

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