South Carolina

Annual State of the Beaches Report

2009

Ocean and Coastal Resource Management

Introduction

The following report summarizes changes to South Carolina's beaches during 2008 (January to December). The results are based on beach profile surveys conducted during 2008 at 415 monitoring stations throughout the state using 668 unique beach profiles (see Table 1). Surveys start at a benchmark located landward of the primary dune or seawall, and at most stations continue down the beach face to a depth of -25 ft or an offshore distance of 3,000 ft, whichever is reached first. Across the dune, data are collected on foot using a Global Positioning System (GPS) receiver. On the upper beach and intertidal beach at low tide, data are collected using a GPS receiver carried on a pole mount or mounted on an ATV 4-wheeler. For the offshore portion of the profile, data are collected from a boat with a GPS receiver and fathometer. These three data sets can then be integrated into one seamless beach profile, which shows a cross-section of the beach shape at the time of the survey. The data can then be compared to similar data from previous years to determine what changes have occurred to the beach profile.

The reference elevation used for data collection and for all elevations discussed in this report is the North American Vertical Datum of 1988 (NAVD88), which is approximately the same as mean sea level. Horizontal data are represented in U.S. Survey Feet, South Carolina State Plane FIPS Zone 3900.

Profiles are analyzed for dune erosion or scarping, changes in beach slope, and changes in unit-width sand volume, the amount of sand from the dune down to a chosen cutoff elevation per linear ft of shoreline. The presence or absence of a berm, the shelf of dry sand between the dune and the high-water mark, is noted, as well as any sand bars and corresponding troughs. Berm width is particularly important, since it represents the amount of recreational dry-sand beach seaward of the dune that is available at high tide.

Most beaches in South Carolina go through a yearly cycle of profile change. In the summer, smaller waves tend to push sand up the beach, forming a wider berm and a steeper beach slope below mean high water. In the winter, higher energy waves erode sand from the berm and move it to an offshore bar, resulting in a narrower high-tide beach and a more gently sloping beach below mean high water. In many cases this

seasonal profile variation is greater in magnitude than the long-term trend for a particular island or beach—that is, the change observed from October to April and then from April back to October can be greater than the change observed for consecutive Aprils or Octobers.

Table 1. The total number of profiles collected each year and the total number of benchmarks or stations occupied in the State.

Year	Number of Profiles	Number of Stations
1987	66	65
1988	383	213
1989	347	198
1990	508	274
1991	560	292
1992	561	295
1993	602	286
1994	682	281
1995	660	292
1996	752	289
1997	682	293
1998	830	347
1999	546	327
2000	405	304
2001	265	255
2002	332	291
2003	267	193
2004	332	279
2005	314	273
2006	243	221
2007	485	399
2008	668	415

As called for under the Beachfront Management Act, all beaches in the state have been classified as standard zones or inlet zones. Inlet zones are regions in close proximity to a tidal inlet, where the presence of the inlet plays a dominant role in erosion or accretion patterns on the beach. Most inlet zones are unstabilized, meaning the inlet channel is not anchored by jetties or groins, and the surrounding shoreline is often quite dynamic. In general, the larger Sea Islands in Charleston and Beaufort counties consist of a standard zone in the central portion of the island and an inlet zone at either end. The smaller Sea Islands are entirely inlet zones. In the Grand Strand, the shoreline is a continuous standard zone, interrupted by small inlet zones at the swashes.

The remainder of this report contains individual summaries for each island or beach in the state surveyed during the past year. The area from Capers Island to North Island is essentially undeveloped and is not surveyed. Summaries are presented in a south-to-north progression. The geographic setting of each beach is discussed, along with any significant long-term trends. A location map is also provided showing survey monument locations. Finally, a state-wide summary is found at the end of the report.

Plots for any individual monitoring station can be viewed on the internet at http://gis.coastal.edu/pmas, a web site developed and maintained by Dr. Scott Harris (College of Charleston). The DHEC website at www.scdhec.gov/environment/ocrm will also provide information on any changes to this beach profile website.

Regional Summaries

Daufuskie Island

Daufuskie Island is located to the south of Hilton Head Island, between Calibogue Sound to the northeast and Mungen Creek to the southwest. The entire island has been classified as an unstabilized inlet zone. A renourishment project was constructed here in December 1998, and has performed very well over the past 9 years. Long-term erosion rates on the island average -4 ft per year but go as high as -7 ft per year in places. Beginning at the northeast end of the island in the Melrose Tract and moving southwest, erosion rates begin around zero but quickly increase to -5 ft per year near the clubhouse, then reach a maximum of about -8 ft per year along the southern end of the Melrose Tract and in the northern end of the Oakridge Tract. There is a wooden bulkhead approximately 4,000 ft long in this area.

Figure 1. Station numbers for Daufuskie Island.

Table 2. Beach profile data for Daufuskie Island.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
1380	03/18	04/17	None	1988	21
1360	03/18	04/17	None	1988	25
1340	03/18	04/17	None	1988	22
1320	03/18	04/17	None	1988	25
1300	None	04/17	None	1988	23

At the southwest end of the Oakridge Tract the long-term erosion rate decreases to about -6 ft per year, and continues to decrease to about -4.5 ft per year through much of the Bloody Point tract. At the southern end of the Bloody Point tract, at Bloody Point, the rate increases again to a maximum of approximately -8.5 ft per year. This area is very dynamic; it experienced extreme short-term erosion during much of 2001 and 2002, and then became highly accretional in 2003.

There are a total of 12 monitoring stations on Daufuskie Island, with the earliest beach survey data collected in 1988. Five of these 12 stations were surveyed most recently in October 2002, August 2005, April 2007, and March 2008. At station 1300, in the Oak Ridge tract just south of the bulkhead, the 2007 survey was the most recent since 2002. At station 1320, in the Melrose Tract about 1200 ft north of the southern end of the bulkhead, the beach has migrated landward approximately 32 ft with the loss of the primary berm. At 1340, the other station along the bulkhead in the Melrose Tract, the upper beach eroded back over 100 ft and dropped in elevation between five and eight ft between the 2002 and 2007 survey, eroding 8.5 ft between 2007 and 2008. North of the bulkhead the beach at station 1360 eroded about 40 ft between 2002 and 2007, and still shows a substantial beach renourishment sand berm, accreting 6 ft between April 2007 and March 2008. At station 1380, located at the northeast end of the development, the renourishment sand has eroded over 90 ft between 2002 and 2007 leaving a remnant berm that was forty ft wide and over seven ft high. Between 2007 and 2008, the beach eroded approximately 8 ft.

Hilton Head Island

Hilton Head Island, located between Calibogue Sound to the southwest and Port Royal Sound to the northeast, is one of the state's largest barrier islands. Hilton Head Island can be divided into five geomorphologic reaches, which are each discussed below. A beach renourishment project placed 2.5 million cubic yards of sand on the Hilton Head shoreline between May and November 1997. Most recent beach survey data was collected in July 2004, August 2005, April 2007, and March 2008.

Figure 2. Station numbers for Hilton Head Island.

Table 3. Beach profile data for Hilton Head Island.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
1478	03/19	04/18	None	1988	31
1477	03/19	04/18	None	1990	24
1475	03/19	04/18	None	1988	35
1474	03/19	04/18	None	1990	23
1472	03/19	04/18	None	1988	29
1468	03/19	04/18	None	1998	6
1466	03/19	04/18	None	1998	6
1465	03/19	04/18	None	1998	7
1463	03/19	04/18	None	1988	30
1462	03/19	04/18	None	1990	30
1460	03/19	04/18	None	1988	31
1457	03/19	04/18	None	1988	30
1456	03/19	04/18	None	2002	3
1454	03/19	04/16	None	1988	36
1451	03/19	04/16	None	1988	31
1448	03/19	04/16	None	1998	1
1446	03/19	04/16	None	1990	24
1445	None	04/16	None	1988	36
1444	03/19	04/16	None	1990	23
1442	03/19	04/16	None	1988	31
1440	03/19	04/16	None	1990	25
1439	03/19	04/16	None	1988	31
1438	03/19	04/16	None	1990	30
1437	03/19	04/16	None	1990	12
1436	03/19	04/16	None	1998	7
1433	03/19	04/16	None	1988	32
1430	03/19	04/16	None	1988	36
1427	03/19	04/16	None	1988	30
1424	03/19	04/16	None	1998	7
1421	03/19	04/16	None	1988	30
1418	03/19	04/16	None	1988	36
1417	03/19	04/16	None	1990	23
1415	03/19	04/17	None	1988	29
1412	03/19	04/17	None	1988	32
1409	03/19	04/17	None	1998	5

The portion of Sea Pines Plantation bordering on Calibogue Sound is an unstabilized inlet zone, subject to the influence of the Sound and tidal processes. The long-term shoreline change rate is accretional. This area experienced moderate erosion during the mid 1990's and was not renourished as part of the big 1997 project, but was renourished in the winter of 1999. SCCC monuments 1400-1409 are located here. As a result of the 1999 renourishment the beach width here was increased by as much as 250

ft, and even with some erosion over the past 8 years is still more than adequate. Most stations here were stable to slightly accretional during the most recent survey period, with the development of a pronounced beach berm in some areas.

The second zone on Hilton Head is a 10 mile-long standard zone that extends from station 1412 in Sea Pines Plantation to station 1469, just south of the Folly. This area includes South Forest Beach, North Forest Beach, and Palmetto Dunes. Both North Forest Beach and Palmetto Dunes were included in the 1997 renourishment project, which began at the Hilton Head Inn. The 2006 renourishment added between 100 and 150+ ft of new beach in this area. Long-term shoreline change rates vary in this zone--they are accretional south of Coligny Circle and erosional north of Coligny Circle, with the rate of erosion increasing with distance from the Circle and reaching a maximum of -8 ft per year in Palmetto Dunes.

All stations in Sea Pines, from monument 1412 through 1424, were stable or showed slight accretion on the intertidal beach with some movement and growth of dunes in the upper beach. This area is generally the most stable to accretional section of Hilton Head Island, and has a well-established dune. Most stations in South Forest Beach, 1427 through 1436, showed considerable growth in the upper beach due to the renourishment in 2006 through 2007, with a readjustment of 10 to 20 ft loss since that time in the upper beach, and slight accretion and erosion in the lower beach. This area is fairly stable in the long-term, with a well-established dune.

In North Forest Beach and Palmetto Dunes the long-term shoreline change rates become erosional. Beach profiles here showed sand deficits prior to renourishment, but unit-width volumes increased dramatically as a result of the 1997 and 2006 beach fill projects. Stations 1437 through 1448, located in North Forest Beach, showed substantial erosion of the renourishment berm between September 1998 and November 1999, but only minimal loss of renourishment sand since then. A steep profile still existed in the 2007 survey data, indicating the project was still equalizing to the wave climate. Between 2007 and 2008 the upper beach has moved landward between 30 and 100 ft, while the toe of the beach has extended seaward similar distances. A prominent scarp formed in the upper beach as well.

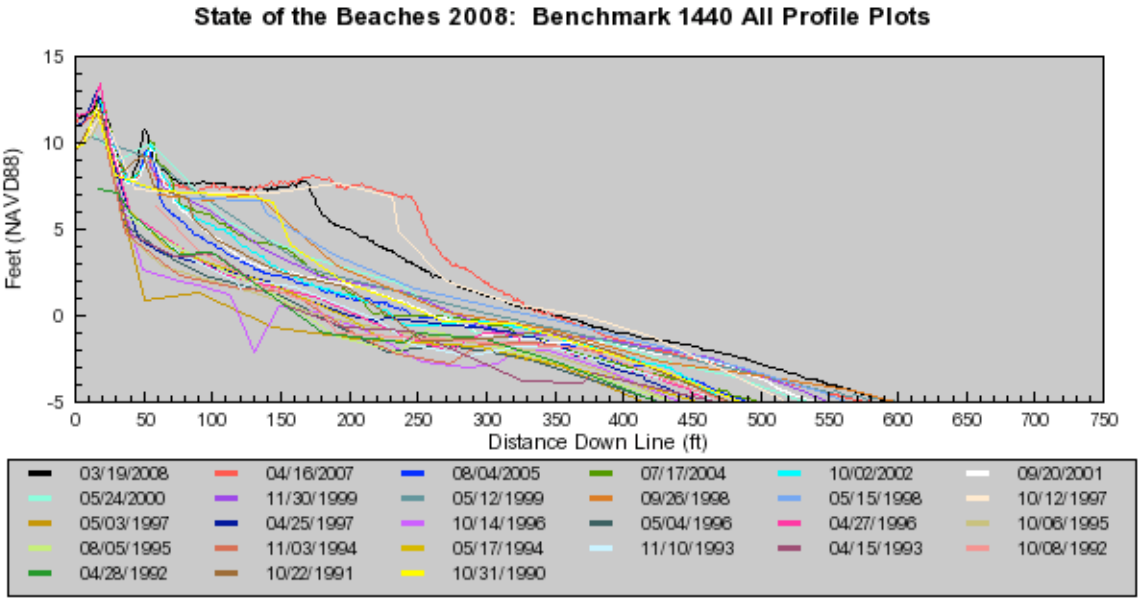

Figure 3. Benchmark 1440 on Hilton Head Island.

Stations 1451 through 1466 are located in Palmetto Dunes, where long-term erosion rates range from -4 to -8 ft per year. These stations showed the same general trend as North Forest Beach—most stations had been stable from 2000 through July 2004 but experienced 20 to 40 ft of upper-beach berm erosion through August 2005. The renourishment in this zone still maintained a beach berm of 100 to 150+ ft in 2007 in most places, but has eroded between 50 and 100 ft in the upper beach and fairly stable to slightly erosional in the lower beach from 2007 to 2008.

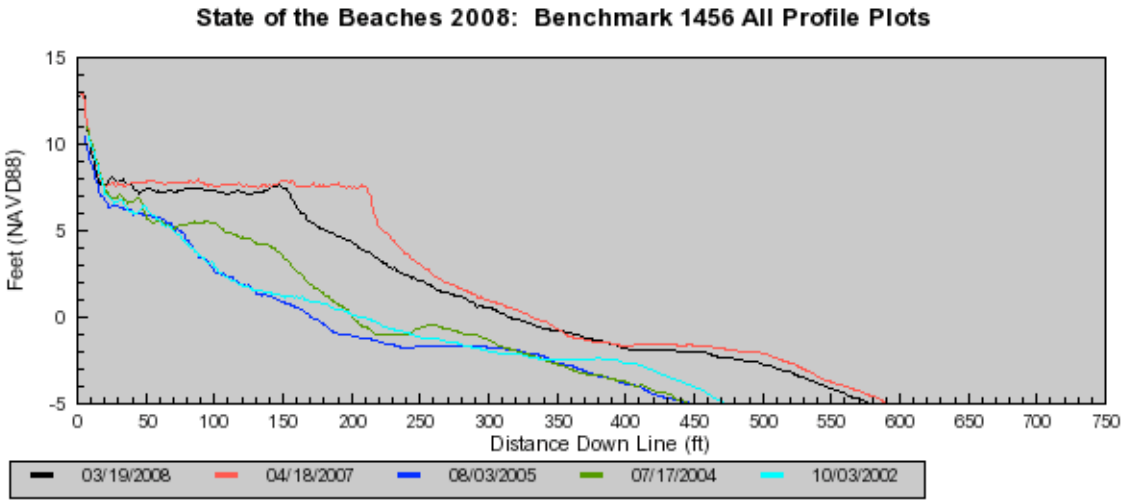

Figure 4. Station 1456 on Hilton Head Island.

The third zone on Hilton Head is a 2,200-ft long inlet zone, located on either side of the Folly. Stations 1468, 1469 and 1472 are the monitoring stations in this reach, which historically was very dynamic because of the inlet channel. However, a small jetty constructed on the south side of the Folly in 1997 has helped stabilize this region. Long-term erosion rates here are around -6 ft per year. Between the 2005 and 2007 surveys, station 1468 still has a 100+ foot berm from the renourishment, while a new dune was formed at station 1472 with little change in the berm profile. The 2008 profiles indicate a significant landward movement of the upper beach at station 1468, with seaward movement of the beach berm at 1472.

The fourth zone is a 1.3 mile-long standard zone that extends from just north of Burke's Beach Road to the Westin Hotel and includes stations 1474 through 1478. Long-term shoreline change rates here are stable to -3 ft per year of erosion. Between 2005 and 2007, the upper beach accreted between 100 and 150 ft throughout the upper profile. From 2007 to 2008, station 1474 saw a loss of ten to twenty ft of the berm, with accretion in the lower beach. The remainder of this zone showed a similar trend.

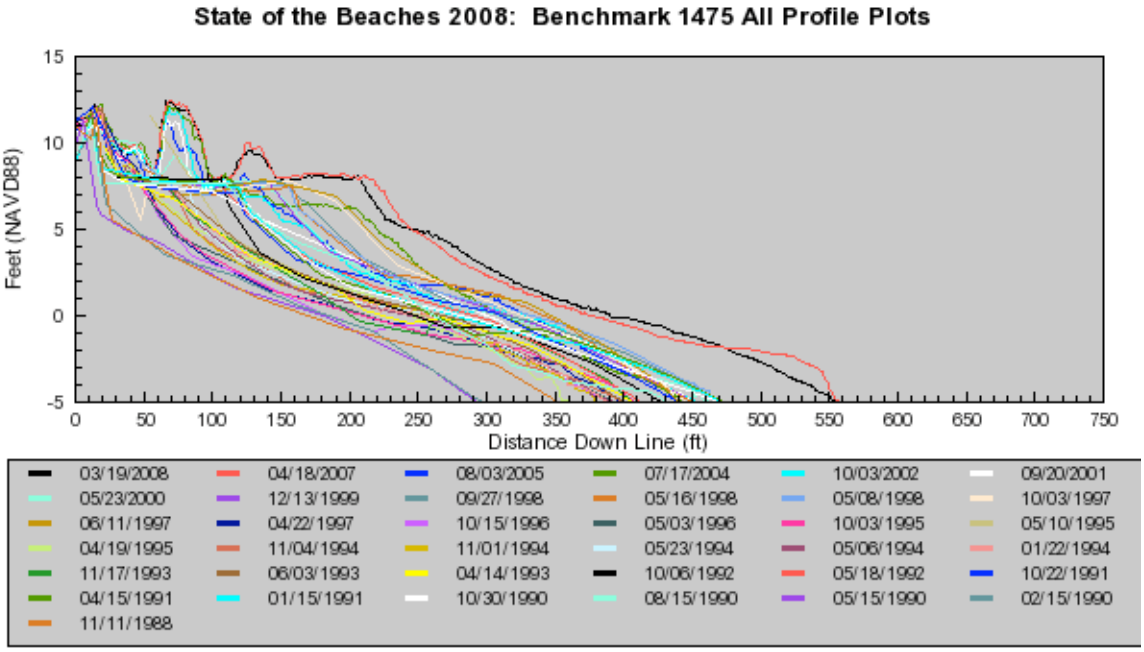

Figure 5. Station 1475 in the fourth zone of Hilton Head Island.

The fifth zone is an unstabilized inlet zone that includes all of the Port Royal Plantation shoreline. Survey stations 1481 through 1496 are located here. This region shows two distinct shoreline trends, with long-term accretion along the Atlantic shoreline to station 1484, and erosion of -2 to -5 ft per year along Port Royal Sound. Although stations 1481 and 1484 are accretional in the long-term, there had been an area of extreme erosion along a 1,100 ft section of shoreline centered around station 1484. This area of erosion is landward of a portion of Joiner Bank that has dissipated in recent years, exposing this section of shoreline to increased wave energy. Between 2007 and 2008, this zone still shows landward migration of the majority of the beach of fifteen to twenty ft. Houses in this area are still well landward of the erosion line.

Fripp Island

Fripp Island is a three-mile long barrier island located between Pritchards Island and Skull Inlet to the southwest, and Hunting Island and Fripp Inlet to the northeast. Development on the island is primarily single family residential, and the island is almost continuously armored with revetments. The central portion of the island is classified as a standard zone, with an unstabilized inlet zone at the southwest end and a stabilized inlet zone at the northeast end. An analysis of long-term erosion trends has shown the southern third of the island to be erosional, with rates of -1 to -3 ft per year, while the rest of the ocean-fronting shoreline is stable, although sand-bypassing events across Fripp Inlet, with a period of decades, can cause significant changes to the beach profiles on the island. The Fripp Inlet shoreline is erosional, with a rate of about -2 ft per year.

Figure 6. Station numbers for Fripp Island.

Table 4. Beach profile data for Fripp Island.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
1765	06/04	06/07	None	1998	3
1760	06/04	06/07	None	1998	3
1755	06/04	06/07	None	1990	23
1745	06/04	06/07	None	1988	33
1735	06/04	06/07	None	1989	21
1730	06/04	06/07	None	1988	26
1720	06/04	06/06	None	1989	36
1715	06/04	06/06	None	1988	30

There are 15 beach survey monuments located on Fripp Island. Most recent profile data was collected at most of these stations during July 2005, June 2007, and June 2008. Station 1700, on Skull Inlet, is sheltered from the open ocean and shows virtually no change from year to year. Stations 1715 through 1735 face the Atlantic Ocean along the southern half of Fripp Island. The beach width is narrower here, and at high tide there is little to no dry sand seaward of the substantial rock revetment. This beach is also fairly stable, and from June 2004 to July 2005 the profile data showed only minor changes on the intertidal beach. Between July 2005 and June 2007, the beach continued to be stabilized in this area. Between June 2007 and June 2008, the primary dune has lost some elevation and a landward erosion of approximately ten ft is seen. The beach condition changes at station 1745, on Winter Trout Rd. Northeast of here and up to station 1760 at house #763 on Marlin Drive, the beach has been strongly accretional in recent years. A large offshore sand shoal attached to the shoreline here in 2004, and as a result the beach gained a tremendous amount of sand. The 2008 dataset shows the shoal offshore the 2005 beach position, with a large increase of beach width. This section of beach is hundreds of feet wider than along the southern half of the island. At station 1745 the dune field is over 200 ft wide but actually decreased in width by about 50 ft from 2004 to 2005 and by another 50 ft between 2005 and 2007. Station 1750 on Seahorse Drive showed a similar trend. The apex of the shoal attachment was located at station 1755 on Tautog Drive, where the increase in beach width reached a maximum. The northeastern limit of the sand shoal attachment is located at station 1760, near house 763 Marlin Drive, where the beach width decreased considerably since shoal attachment.

However, between 2005 and the 2007 survey year, the dune has increased in height by four ft and the beach has widened considerably.

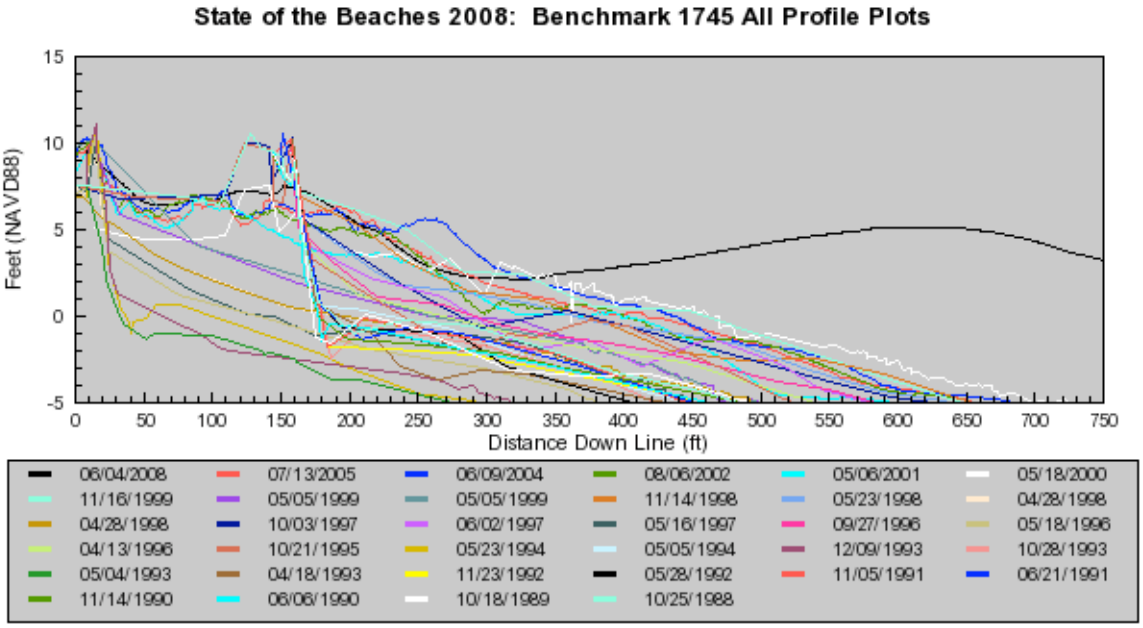

Figure 7. Bar welding event on Fripp Island at station 1745.

Stations 1765 to 1790, on the northeastern end of the island, are the last two monitoring stations that face the Atlantic Ocean. During the mid-1990's a massive sand bar attached onto the beach here, increasing the beach width by hundreds of feet, but during the late 1990's that sand was eroded away. Between the 2007 and 2008 survey, a large sand bar has welded to that end of the beach, creating a profile similar to those of the late 1990s. The final two monitoring stations on Fripp Island are 1795 and 1798, located on Fripp Inlet. These stations show typical inlet profiles—very steep, no dry-sand beach, and only minor changes from year to year.

Hunting Island

Hunting Island is a state park located between Fripp Island and Harbor Island. The island has historically been very erosional, with long-term rates ranging from -7 up to -20 ft per year. Short-term erosion rates over the past few years have been even higher. The central portion of the island is a standard zone, while the southern end along Fripp Inlet is an unstabilized inlet zone and the northern end along St. Helena Sound is an inlet zone stabilized by an 800-ft terminal groin. Hunting Island has been renourished several times in the past 20 years, and was in a critically eroded state prior to the latest renourishment project in 2006. Six new groins were constructed as part of that project.

Figure 8. Station numbers for Hunting Island.

Table 5. Beach profile data for Hunting Island

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
1895	06/04	06/07	None	1988	19
1890	06/04	06/07	None	1988	17
1880	06/04	06/07	None	1988	20
1870	06/04	06/07	None	1988	18
1860	06/04	06/07	None	1988	23
1850	06/04	06/07	None	1988	29
1840	06/04	06/07	None	1988	27
1830	06/04	06/07	None	1988	34
1820	06/04	06/07	None	1988	29
1810	06/04	06/07	None	1988	20
1800	06/04	06/07	None	1988	10

The 11 beach monitoring stations on Hunting Island are unique in that their identification numbers increase from north to south. The most recent surveys, conducted during June and December 2004 and then again in June 2007, show that the beach at Hunting Island continues to wash away. Almost all stations experienced erosion, typically ranging in magnitude from 10 to 50 ft where surveyed. Erosion was slightly less at the northern end of the island, at station 1800, which benefits from the stabilizing effect of the terminal groin about 500 ft to the north. At the south end of the island the erosion has been significant in recent years and several oceanfront cabins have been lost.

With the exception of the extreme southwest and northeast ends of the island there are no sand dunes or high-tide beach at Hunting. Instead, the subtropical maritime forest vegetation literally falls off into the ocean, creating a bone yard of trees trunks and overturned root systems on the beach. In order to protect Cabin Road, the beachfront access road to the southern end of the island and the houses located there, the US Army Corps of Engineers has conducted two Emergency Shoreline Protection Projects over the past few years along a 2,500 ft section of beach where the road is threatened. This work involves dredging about 250,000 cubic yards of sand from Fripp Inlet and pumping it onto the beach at Cabin Road. In addition to this work the SC Dept. of Parks, Recreation and Tourism, as owner of the island, constructed a large-scale renourishment project in 2006 that placed 570,000 cubic yards of sand on the beach. The beach has been adjusting to fit a more natural profile since then, and has shown erosion of the upper beach between two and twenty ft.

Harbor Island

Harbor Island is located between Hunting Island and Johnson Creek to the southwest and St. Helena Sound to the northeast. Beachfront development is primarily single-family residential, with a few condominium buildings. The entire island is classified as an unstabilized inlet zone, and while the shoreline is very dynamic it can be generally accretional in the long term. The north-central portion of the island has a long-term erosion rate of about -2 ft per year. The beach width decreases dramatically from south to north. There are a total of six beach monitoring stations on Harbor Island. Beach survey data was not collected here during the past year, so comments on the relative condition of the beach are based on recent qualitative field observations.

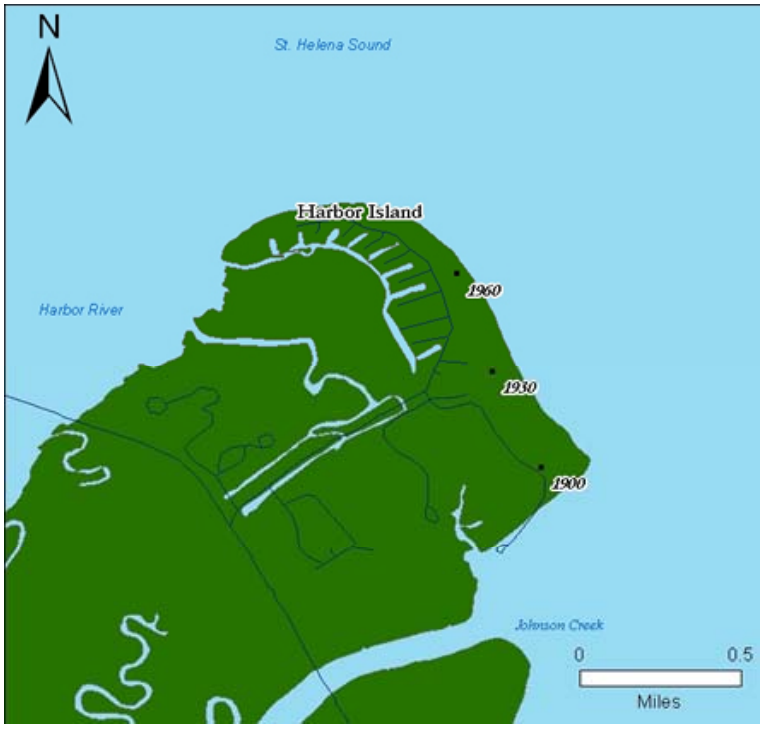

Figure 9. Station numbers for Harbor Island.

Stations 1900 and 1930 are located at the southern end of the island, where the beach is wide and the long-term trend is accretional. Station 1900 is located closest to Johnson Creek and the beach profile here is extremely wide, over 2,000 ft. A series of intertidal sand bars and troughs are constantly shifting back and forth in this area, changing the shape of the lower beach profile. At present a moderate-sized sand bar

located offshore at the heel of the island is in the process of welding onto the intertidal beach. At station 1930, near the multi-family units, the beach sand volume is also greater than average and the profiles appear to be accretional. The northern end of the offshore sand bar is located just southwest of this station.

The beach width narrows significantly to the north at stations 1960 and 1980, on Harbor Island Drive North. The beach here goes through cycles of erosion and accretion that typically last for a few years. It was erosional during the late 1990's, stabilized in 2001, accreted some during 2002, and now appears to be somewhat erosional again. There is still no sand dune here, no dry-sand beach, and the high-tide swash line comes very close to several houses. At station 1995, located where the shoreline begins to curve onto St. Helena Sound, the dune field is wider, with a series of small, well-vegetated dunes. The intertidal beach is fairly narrow but this is typical of an inlet vs. open-coast shoreline. This section appears to be accreting. Station 1998 is also located within the lower wave energy environment of St. Helena Sound, so that the beach profile drops off fairly rapidly. The beach here shows only minor changes from year to year and is stable at present.

Edisto Beach

Edisto Beach is a barrier island situated between the South Edisto River and Jeremy Inlet. The northeastern portion of Edisto Beach is a state park, which includes camping sites, while the remainder of the island is primarily single-family residential. An extensive groin field on the island serves to stabilize the shoreline position. South of station 2160 (Marianne St.), the island is classified as an unstabilized inlet zone and is slightly accretional. The rest of the island, including the state park, is a standard zone with low long-term erosion rates, around -2 ft per year but an extreme lack of sand. Erosion rates in the state park are as high as -6 ft per year. There are 27 beach survey monuments on Edisto Beach, which were surveyed in August 2004, July 2005, November 2006, December 2007, and December 2008.

Figure 10. Station numbers for Edisto Beach.

Table 6. Beach profile data for Edisto Beach.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
2230	12/16	12/05	11/29	1988	37
2200	12/16	12/05	11/29	1988	35
2198	12/16	12/05	None	1998	4
2195	12/16	12/05	11/29	1988	36
2193	12/16	12/05	11/29	1990	31
2190	12/16	12/05	11/29	1988	34
2185	12/16	12/05	11/29	1990	32
2180	12/16	12/05	11/29	1988	36
2178	12/16	12/05	11/29	1990	31
2173	12/16	12/05	11/29	1990	30
2170	12/16	12/05	11/29	1988	23
2165	12/16	12/05	11/29	1990	21
2160	12/16	12/05	11/29	1988	22
2155	12/16	12/05	11/29	1990	19
2150	12/16	12/05	11/29	2006	1
2145	12/16	12/05	11/29	2006	1
2135	12/16	12/05	11/29	2006	1
2130	12/16	12/05	11/29	2006	1
2120	12/16	12/05	11/29	2006	1
2113	12/16	12/05	11/29	2006	1
2110	12/16	12/05	None	1988	22

Stations 2110-2130 are located along the South Edisto Inlet shoreline. These stations are sheltered from the open ocean and generally experience only modest seasonal changes on the intertidal beach. Stations 2135 at Edisto Street and 2140 at Billow Street are located on The Point, the shoreline curve between the South Edisto River and the Atlantic Ocean. Historically this section of beach can be very dynamic but has remained stable in recent years, with some recent erosion in the upper beach and accretion in the lower beach at station 2135. The upper beach has accreted between 50 and 100 ft since the 2006 survey on the southern point, but the profiles around the point on the oceanfront are eroding. The deep runnel has been filled and the beach wider below the berm has widened in this area between 2007 and 2008

The oceanfront southern half of Edisto Beach, from stations 2145 to 2165, has the widest oceanfront beach on Edisto. Most stations here experienced only minor seasonal changes through July 2005. The 2006 renourishment to this section of Edisto added a 100-ft berm, which eroded 10 to 25 ft between 2006 and 2007, with a similar change between 2007 and 2008 surveys.

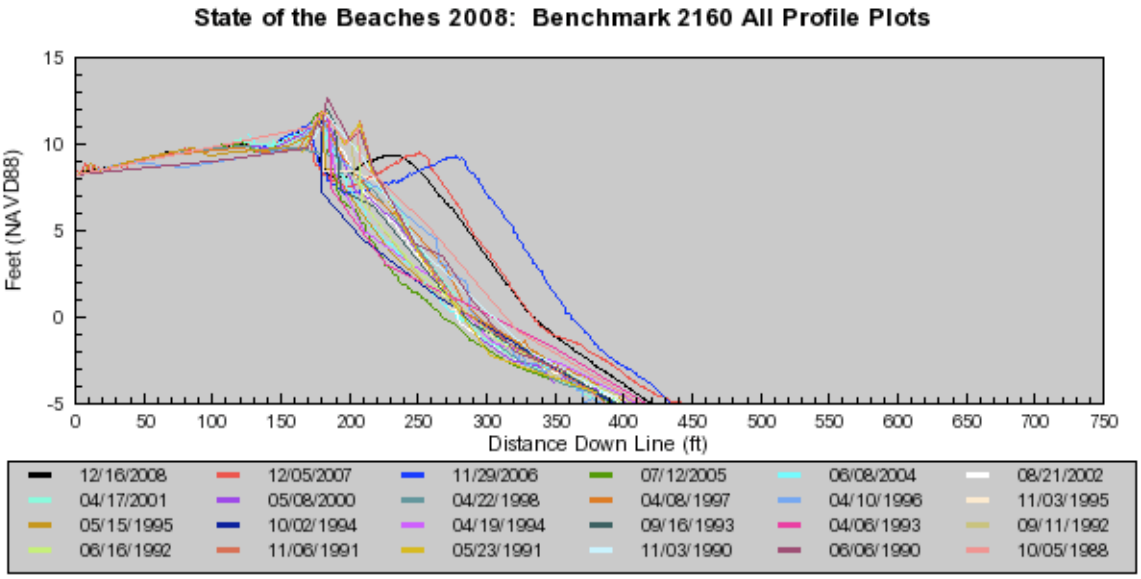

Figure 11. Beach profiles for Station 2160 on Edisto Beach.

The northern half of developed Edisto Beach, from station 2170 to station 2200 at the Pavilion, was one of the most critically eroded sections of beach anywhere in the state until the 2006 renourishment. All stations in this reach generally suffer from a considerable sand deficit and until the renourishment had virtually no beach at high tide and no protective dune between the ocean and the development. Prior to renourishment, many houses in this area were located on the active beach, with ocean water surging up under the house pilings during extreme high tides. This area did not experience much erosion through July 2005, but was hit hard by Tropical Storm Tammy in early October 2005.

From the renourishment a substantial beach was created with 100+ ft of berm in most places. From station 2155 through 2173, 15 to 20 ft of erosion occurred between the 2006 and 2007 study, and from 10 to 20 ft between the 2007 and 2008 survey. Slight accretion between station 2178 and 2180 occurred within the current study year, with erosion of 10 to 20 ft between stations 2190 and 2230. Stations 2200 to 2230 in Edisto Beach State Park are comparable to the northern half of Edisto Beach. Beach width is minimal, the dune is maintained by periodic sand scraping, and the campsites and access roads in the park still remain very vulnerable to erosion.

Seabrook Island

Seabrook Island is a barrier island approximately 4 miles long, situated between North Edisto Inlet and Captain Sams Inlet. Development on the island is a mix of single-family and multi-family structures. A continuous 5,000-ft section of shoreline is armored with rock revetments and a few seawalls. The entire island is classified as an inlet zone—the armored portion is a stabilized inlet zone, while the remainder is unstabilized. Shoreline change patterns have been quite dynamic over the past 50 years but in the long-term are categorized as stable. There are 11 beach monitoring stations on Seabrook Island. Three of them, stations 2545, 2565, and 2570, were surveyed during June 2004, September 2005, March 2007, and March 2008.

Figure 12. Station numbers for Seabrook Island.

Table 7. Beach profile data for Seabrook Island.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
2570	03/02	03/21	None	1998	6
2565	03/02	03/21	None	1998	6
2545	03/02	03/21	None	1998	6

Station 2515, at Beach Club Villas along the North Edisto River, is a typical inlet profile—very steep and fairly stable. Stations 2520 through 2540 are located along the revetment, from the Beach Club to Renken Point. This section of Seabrook Island lacked a dry-sand beach for many years, but the artificial movement of sand to this area from the intertidal portion of the beach to the north has corrected this situation and a minimal dry-sand beach now exists. In addition, changes to the northern marginal flood channel of the North Edisto River are benefiting the beach. The channel has historically been fairly deep and pinched in very close to the shoreline, creating a steep profile and making it difficult to retain a dry-sand beach, but within the past few years the channel has filled in, decreasing in depth from -20 ft to -5 ft. As this trend continues it will be easier to maintain a dry-sand beach seaward of the revetment here.

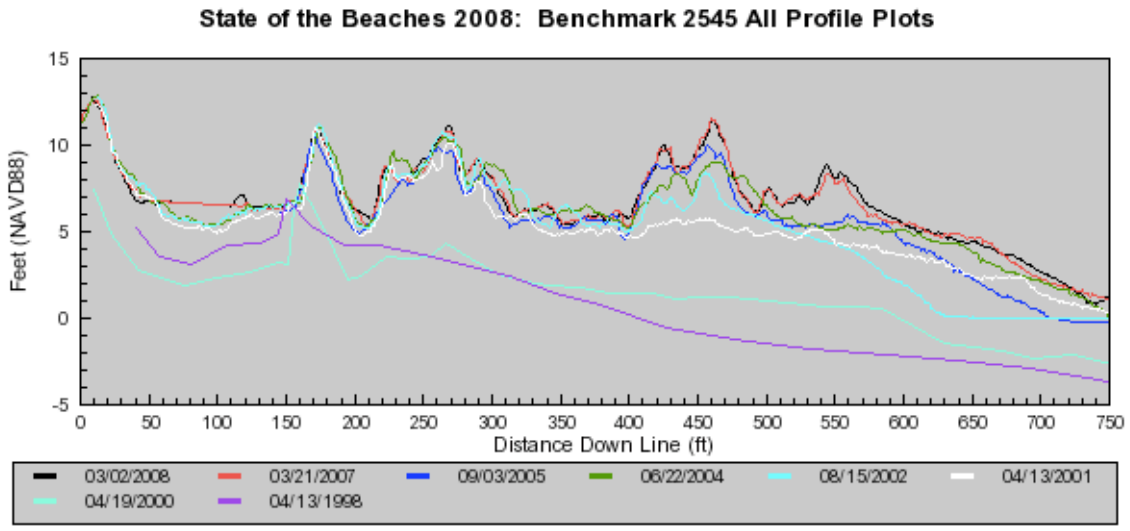

Figure 13. Beach profiles for station 2545 on Seabrook Island.

In the North Beach area, from station 2545 to 2575, the high-tide beach averages over 500 ft in width. This area is closer to Captain Sam's Inlet and its nearness to the

inlet causes the shoreline to be more dynamic, experiencing episodes of moderate erosion or accretion from one year to the next. However, the substantial width of the dry-sand beach makes these changes of less concern than they might be elsewhere. In 2005 station 2545, near Cobia Court, showed a stable dune field and moderate changes on the intertidal beach. This trend continued into 2007, with the formation of an additional small dune 100 ft seaward of the 2005 dune. At station 2565 near Seascape Court the dune was stable but the beach seaward of the dune eroded back about 100 ft. Station 2570 off Oyster Catcher Court experienced some dune erosion and also lost about 75 ft of beach seaward of the dune from 2004 to 2005, while the region between 0 and 5 ft in elevation eroded on average 30 ft. Between 2007 and 2008, the upper beach has eroded approximately 50 ft at station 2570.

Kiawah Island

Kiawah Island is a ten-mile long barrier island, located between Seabrook Island and Captain Sams Inlet to the west, and Stono Inlet and Folly Beach to the east. Kiawah is one of the most stable barrier islands in the state, although the eastern and western ends of the island are more dynamic due to their proximity to inlets. Most oceanfront development here is single-family residential, although there are some multi-family residential buildings, commercial structures, a golf course, and a public park. The long-term erosion rates are stable to slightly erosional for most of the island.

Figure 14. Station numbers for Kiawah Island.

Table 8. Beach profile data for Kiawah Island.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
2775	03/03	03/19	None	2001	2
2765	03/03	03/19	None	1999	5
2760	03/03	03/19	None	1999	5
2755	03/03	03/19	None	2001	1
2750	03/03	03/19	None	1998	6
2735	03/03	03/19	None	1998	5
2730	03/03	03/19	None	1998	7
2725	03/03	03/19	None	1998	7
2720	03/03	03/19	None	1998	7
2715	03/03	03/19	None	1998	7
2705	03/03	03/19	None	1998	7
2700	03/03	03/19	None	1998	6
2695	03/03	03/19	None	1998	7
2690	03/03	03/19	None	1998	7
2685	03/03	03/19	None	1998	7
2680	03/03	03/19	None	1998	6
2675	03/03	03/19	None	1998	7
2665	03/03	03/20	None	1998	5
2660	03/03	03/20	None	1998	7
2645	03/03	03/20	None	1998	7
2640	03/03	03/20	None	1998	7
2635	03/03	03/20	None	1998	6
2630	03/03	03/20	None	1998	6
2625	03/03	03/20	None	1998	6

Eighteen beach monitoring stations on Kiawah Island were most recently surveyed in June 2004, May and June 2005, March 2007, and March 2008. Stations 2615 through 2645 are located at the western end of Kiawah, where land use consists of undeveloped property, a beach park, single-family homes, and some multi-family structures. This is usually one of the most stable sections of Kiawah Island. For all stations here the primary dune was stable and the beach profile seaward of the dune showed either no change or minor accretion. Some of the 2007 profiles document the formation of a small dune twenty ft seaward of the 2005 shoreline and the 2008 data continue to indicate an increase of sand in the shoreface.

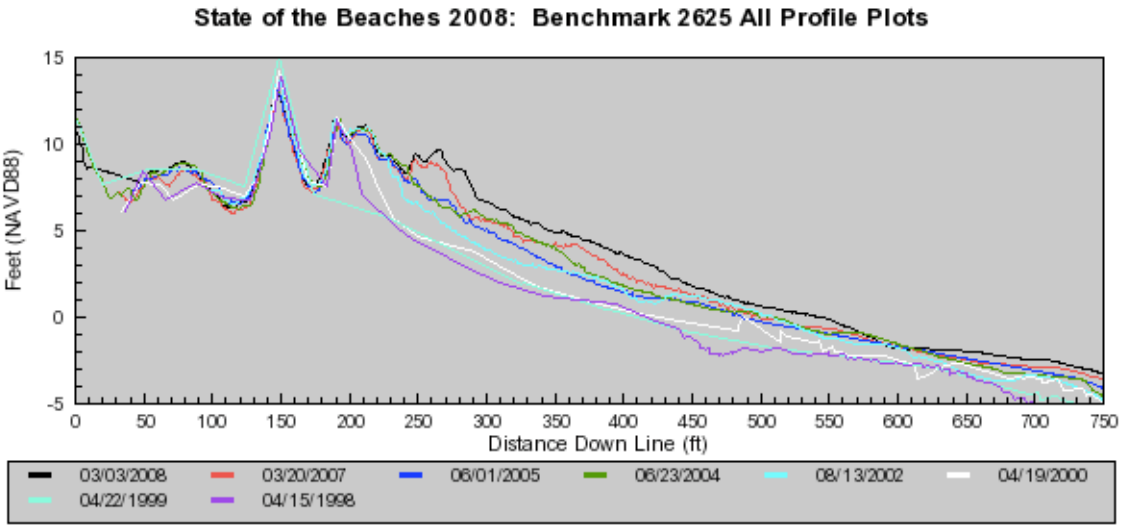

Figure 15. Beach profiles for station 2625 on Kiawah Island.

The area from station 2660, near the middle of Eugenia Ave., through station 2680, at the eastern end of Windswept Villas, experienced significant erosion in 1995 and 1996, stabilized from 1997 through 1999, became erosional again in 2000 and 2001, and was accretional between 2002 and 2004. Through March 2007 continuing into March 2008 the dune field was stable but the beach seaward of the dune showed minor erosion. Station 2665 showed the development of a more pronounced berm, with minor erosion of the shoreface. Other stations to the northeast, from 2685 on Turtle Beach Lane to 2735 at the Kiawah Beach Club, also showed a stable dune and minor changes seaward of the dune and accretion in the shoreface.

The condition of the beach changes along the Ocean Course golf course, from station 2745 to 2780, which historically has been the most unstable section of Kiawah Island. Station 2750 experienced dune scarping and about 50 ft of erosion seaward of the dune from 2004 through 2007, with accretion in the upper beach and lower beach through March 2008. Station 2755 exhibited a loss of the 2001 dune, with a substantial longer-term accretion of the beach and accretion of the berm. Erosion at 2760 near the 18th fairway and 2765 near the Clubhouse stabilized in the upper beach, and the lower beach continues to build up significantly between 5 and -5 ft. The erosion at stations 2775 and 2780, where emergency sand scraping was repeatedly performed during the fall of 2005,

was alleviated with the large volume of sand on the beach in the 2007 survey. The last two Kiawah Island monitoring stations, 2785 and 2790, are located along the Stono Inlet shoreline far from any development and were not surveyed during 2008.

Folly Beach

Folly Beach is located between Stono Inlet and Kiawah Island to the southwest, and Lighthouse Inlet and Morris Island to the northeast. Nearly all of Folly's shoreline is armored and contains groin fields. Oceanfront development is mostly single-family residential, with one large condominium and one large hotel in the center of the island behind a seawall, a public park at the southwest end, and a large tract of undeveloped property at the northeast end near the old Coast Guard Station. Long-term erosion rates are -2 to -4 ft per year, although in recent years the northeast end of the beach has been highly erosional. The 33 monitoring stations at Folly Beach were surveyed in December 2007 and 2008. A major beach renourishment project placed over 2 million cubic of sand from an offshore borrow source on the beach at Folly during the summer and fall of 2005. A small renourishment project was conducted in 2007 to fortify the northeastern end of the island, from the Washout to the old Coast Guard base.

Figure 16. Station numbers for Folly Beach.

Table 9. Beach profile data for Folly Beach.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
2963	None	None	None	1990	17
2960	None	None	None	1988	20
2890	12/14	12/06	01/24	1988	22
2885	12/14	12/06	01/24	1988	26
2883	12/14	12/06	01/24	1988	29
2880	12/14	12/06	01/24	1988	31
2878	12/14	12/06	01/24	1988	29
2873	12/14	12/06	01/24	1988	30
2867	12/14	12/06	01/24	1990	17
2865	12/14	12/06	01/24	1988	28
2863	12/14	12/06	01/24	1990	27
2860	12/14	12/06	01/24	1998	10
2855	12/14	12/06	01/24	1988	28
2850	12/14	12/06	01/24	1988	32
2843	12/14	12/06	01/24	1988	28
2840	12/14	12/06	01/24	1988	23
2838	12/14	12/06	01/25	1988	28
2835	12/14	12/06	01/25	1988	29
2833	12/14	12/06	01/25	1988	28
2832	None	None	None	1988	18
2830	12/14	12/06	01/25	1988	29
2828	12/14	12/06	01/25	1988	31
2825	12/14	12/06	01/25	1998	10
2823	12/14	12/06	01/25	1998	10
2820	12/14	12/06	01/25	1999	8
2818	12/14	12/06	01/25	1999	9
2815	12/14	12/06	01/25	1999	9
2813	12/14	12/06	01/25	2000	7
2810	12/14	12/06	01/25	1999	7
2805	12/14	12/06	01/25	1999	8
2803	12/14	12/06	01/25	1999	6

At the western end of the island in the county park, station 2803 showed significant erosion on the upper and lower beach, while stations 2805 in the middle of the park and 2810 at the gatehouse eroded 100 and 25 ft respectively. Most other stations on the western section of Folly Beach, from station 2813 just outside the park to station 2825 at 3rd St. West, exhibited 20 to 50 ft of erosion between 2006 and 2007, with a similar erosional trend into this survey period. Station 2828 in front of the Holiday Inn seawall was very stable but has virtually no dry-sand beach at high tide. Station 2830, immediately northeast of the seawall, was also fairly stable to slightly accretional in the middle beach.

The next section of beach is the first eight blocks east of the Holiday Inn, from station 2833 up to 2843 at 8th St. East. This area has a moderate dune over or seaward of the line of rock revetments. Almost all profiles in this area were slightly erosional to slightly accretional during the current survey period, with a loss in the upper beach of over 75 ft in places between January 2006 and December 2007, and an increase in the dune height between 2007 and December 2008.

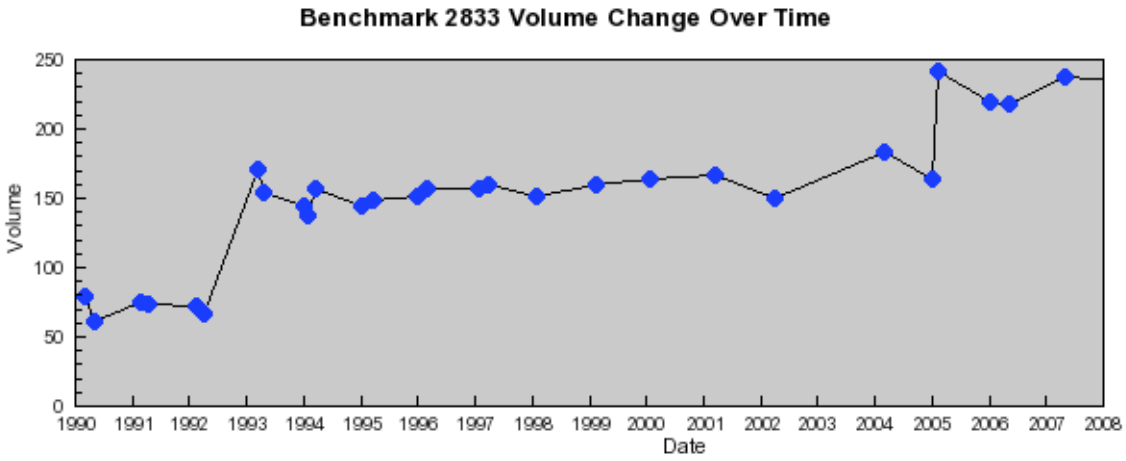

Figure 17. Change in volume of profile 2833 over time on Folly Beach. Notice the 1993 and 2005 renourishment. Volume in cubic yards of sand per foot of beach between +10 and -5 ft.

The section of beach closer to the area commonly referred to as the Washout was more erosional. The dune at station 2850 at 10th St. East was relatively stable from 2006 to 2007, but the upper beach in front of the dune deflated a foot and the shoreline moved landward 20 ft. In the current survey period, the beach has accreted about one ft. At station 2855 at 12th St. East, where the dune and beach profile down to the –5 ft contour accreted twenty to fifty ft between 2006 and 2007, the beach has migrated landward over fifty ft throughout most of the profile, while the dune grew two to three ft. Stations 2860 at 13th St. East and 2863 near the last house before the Washout showed similar erosion on the beach profile.

Stations 2865 and 2867 are located squarely in the middle of the Washout, where the ocean is closest to the road and there are no residential lots on the seaward side of

Ashley Ave. Both of these stations were quite stable through January 2005, perhaps because the beach width here was already minimal in 2004 with little additional sand to be lost. Between 2006 and 2007, this section of coast gained significantly throughout the beach profile, except for movement of the dune at station 2865. From 2007 to 2008 and similar to the profiles to the south, the profiles eroded 30 to 40 ft, with a growth of the dune.

In the region from station 2873, just east of the Washout, to 2885, near the Sumter Drive beach access parking area, all stations experienced a general trend of accretion on the upper beach and intertidal beach from 2006 to 2007, and erosion from then to the present. In most cases the dune was cut back by 20 to 25 ft prior to this survey year, but the dune has accreted. The last monitoring station, 2890 on the former Coast Guard base property, also showed considerable dune scarping and erosion on the upper and intertidal beach in the prior survey year, with slight accretion in the upper beach and dune. The volume of sand present in the profile steadily declined from the mid 1990's with a general increase since 2005.

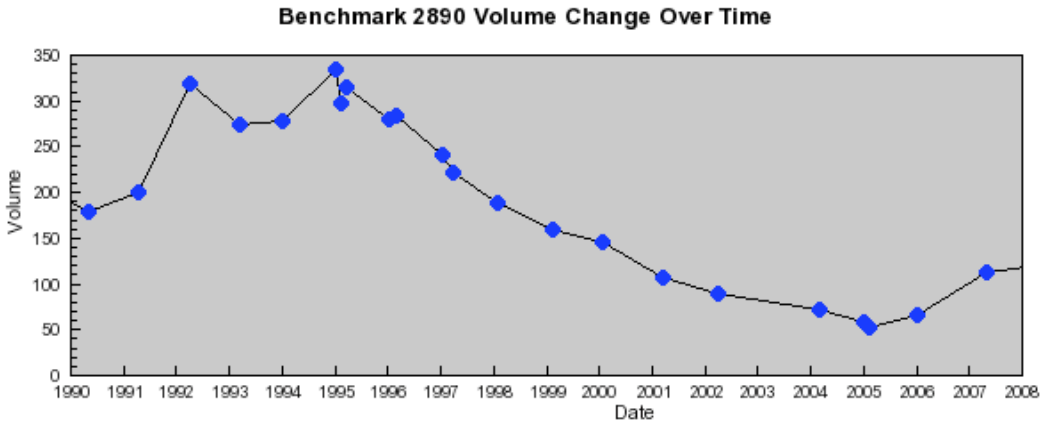

Figure 18. Change in beach profile volume through time at station 2890 on Folly Beach north of the Washout.

Based on qualitative observations of the beach from the start of the renourishment project in June 2005 through project completion in November 2005 and then in the two months following project completion, it appears the beach at the Washout and at the northeast end of Folly experienced the most rapid loss of renourishment sand, primarily due to the effects of Tropical Storm Ophelia in September 2005 and Tropical Storm

Tammy in October 2005. The Army Corps of Engineers conducted a follow-up renourishment at the northeast end of Folly Beach in 2007 to replace the renourishment sand lost during these two storms.

Sullivans Island

Sullivans Island is located between Charleston Harbor and Breach Inlet. The Charleston Harbor north jetty, which comes ashore on Sullivans Island, has caused the long-term shoreline trend to be stable or accretional for much of the island. Periodic shoal attachment and movement of the channel at Breach Inlet can cause the shoreline in this region to be quite dynamic, and the long-term erosion rate here is -2 ft per year. Beach surveys were conducted at 3 of 11 monuments in the center of the island in July 2002 August 2004, and October 2006. 10 of 11 monuments were surveyed in 2007 and in the recent survey period.

Figure 19. Station numbers for Sullivans Island.

Table 10. Beach profile data for Sullivans Island.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
3095	None	None	None	1988	19
3092	10/21	11/13	10/25	1990	18
3090	10/21	11/13	None	1990	20
3085	10/21	11/13	10/25	1990	21
3083	10/21	11/13	10/25	1990	21
3080	10/21	11/13	10/25	1988	26
3065	10/21	11/13	10/25	1988	25
3050	10/21	11/13	10/25	1988	24
3035	10/21	11/13	10/25	1988	20
3020	10/21	11/13	10/25	1988	17
3010	10/21	11/13	10/25	1988	22

Survey monuments 3010-3035, between Station 16 and Station 19, are located within the Charleston Harbor north jetty. This area is extremely accretional in the long-term but has been stable to slightly erosional for the past several years. However, the tremendous beach buildup over the past century still leaves this as one of the widest beaches in South Carolina, as measured from the row of oceanfront houses out to the high-tide swash line. From 2006 to 2007, the beach generally accreted here from +5 down to 0 ft, except for station 3020 where erosion of 50 ft occurred. A similar trend is seen in the current survey year.

Survey monuments 3050-3080 are located along the center section of Sullivans Island. The area is outside the north jetty and sand shoals from Breach Inlet periodically attach to the beach here, so that long-term trends are accretional but the shoreline is quite dynamic. The three monuments here that were surveyed in 2004, 3050 at Station 22½, 3065 at Station 26, and 3080 at Station 28, all show dune and upper-beach accretion. A sand bar 200 ft wide and 3 ft tall migrated onshore between 2006 and 2007. Between 2007 and 2008, the bar continues to move onshore. The long period of data collection in this region suggests an approximately ten year cycle between maximum beach widths, particularly adjacent to 3080 and 3085 and are associated with bar-welding to the beach from Breach Inlet.

Monument 3083 at Station 29 marks the transition point between the accretional center section of the island and the erosional northeastern end of the island along Breach Inlet, where the long-term erosion rate is -2 ft per year. The wide bar from 3080 can also

be seen on 3083, and the dune at 3085 grew over 5 ft between surveys. The beach at 3083 has been fairly stable in recent years but the beach at 3085 near Station 30, 3090 near Station 31, and 3092 near Station 32 has been seriously eroded for several years. These survey monuments are all located close to Breach Inlet and continue to show steep and narrow inlet profiles with a sand deficit, no dune, and no high-tide beach. This 3-block section of Sullivans Island, about 2,000 ft long, is one of the most critically eroded beaches in Charleston County.

Isle of Palms

The Isle of Palms is located between Breach Inlet and Sullivans Island to the southwest, and Dewees Inlet and Dewees Island to the northeast. The island is generally accretional, primarily because the downdrift Charleston Harbor jetties interrupt the longshore flow of sand from north to south. The official long-term shoreline change rate is stable to accretional for all but two stations. The northeastern end of the island, near Dewees Inlet, is extremely dynamic and can experience hundreds of ft of beach erosion or accretion over a few years. This area was renourished with 885,000 cubic yards of sand in the spring of 2008. There are 22 monitoring stations on the Isle of Palms, which were surveyed in August 2004, May 2005, October 2007, and October 2008.

Figure 20. Station numbers for the Isle of Palms.

.

Table 11. Beach profile data for Isle of Palms.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
3290	10/15	10/25	10/19	1992	19
3280	10/15	10/25	10/19	1992	19
3270	10/15	10/25	10/19	1992	18
3263	None	None	None	1992	1
3260	10/15	10/25	10/19	1992	19
3257	None	None	None	1992	5
3255	10/15	10/25	10/19	1992	18
3250	10/15	10/25	10/19	1991	22
3240	10/15	10/25	10/19	1991	22
3230	10/15	10/25	10/19	1991	22
3220	10/15	10/25	10/19	1991	21
3210	10/15	None	None	1991	2
3190	10/16	11/12	None	1987	21
3185	10/16	11/12	None	1987	25
3183	10/16	11/12	None	1990	22
3180	10/16	11/12	None	1987	30
3178	10/16	11/12	10/26	1990	28
3175	10/16	11/12	10/26	1987	35
3173	10/16	11/12	10/26	1990	30
3170	10/16	11/12	10/26	1987	33
3167	10/16	11/12	10/26	1990	31
3165	10/16	11/12	10/26	1987	23
3160	None	None	None	1987	21
3159	10/16	11/12	10/26	1990	28
3157	10/16	11/12	10/26	1990	28
3155	10/16	11/12	10/26	1996	15
3150	10/16	11/12	10/26	1987	30
3145	10/16	11/12	10/26	1987	22
3140	10/16	11/12	10/26	1996	15
3135	10/16	11/12	10/26	1987	30
3130	10/16	11/12	10/26	1987	24
3125	10/16	11/12	10/26	1987	28
3120	10/16	11/12	10/25	1987	32
3115	10/16	11/12	10/25	1987	28
3110	10/16	11/12	10/25	1987	30
3105	10/16	11/12	10/25	1990	20
3100	10/16	11/12	10/25	1987	24

Stations 3100-3110, from Breach Inlet to 3rd Ave., are influenced by the inlet's channels and shoals and are usually more dynamic than the central portion of the island. This area is strongly accretional in the long term but exhibited strong dune scarping and erosion the previous year.

Stations 3115-3155, from 6th Ave. to the Citadel Beach Club, are located along the more stable portion of shoreline in the center of the island. Beach profiles here typically show a well-defined primary sand dune and only minor to moderate seasonal

variations from year to year. This area was slightly accretional during the past year, with stations 3155 at the Citadel Beach Club and 3157 near 50th Ave. continuing to experience the most dune and upper beach accretion.

Beginning at station 3159 near 53rd Ave. and continuing on into Wild Dunes, beach profiles are close enough to Dewees Inlet to be effected by periodic bar bypassing from the inlet shoal complex, and as a result profiles here are more dynamic than the rest of the island. These shoal attachment episodes cause extreme accretion in the area of shoal attachment and severe but localized erosion immediately adjacent to the attachment site. These shoal attachment episodes generally occur about every 6-8 years and last about 18 months, with an event terminating in the fall of 1996 and another ongoing at the end of 2007.

Station 3159 near 53rd Ave. and 3165 near 57th Ave. were fairly stable through May 2005, but the dynamics of the inlet-dominated shoreline became apparent beginning at station 3167, at the southwest end of Beachwood East, which was erosional through May 2005. Similar to last year, these areas experienced a mix of erosion in the upper beach and accretion lower in the profile below 0 ft. The large addition to stations 3165, 3167, and 3170 can be seen in the profile data (see figure for 3165).

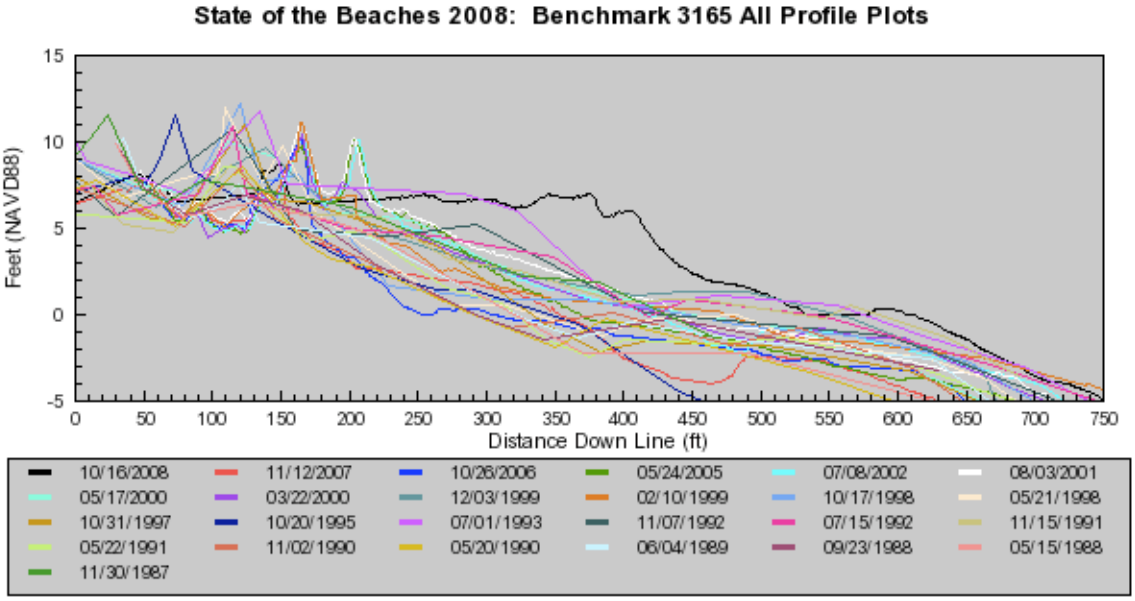

Figure 21. Station 3165 and the wedge of sediment added to the beach between 2007 and 2008.

Station 3170 and 3173 experienced accretion in the 5-ft berm, with bar accumulation between the 0 and -5 ft contour. In the previous study year, station 3170 at the northeast end of Beachwood East and 3173 near the Property Owners Clubhouse, both gained sand on the entire beach profile from the +4 ft contour down to the -8 ft contour. Accretion continues to occur at station 3175 near Mariners Walk from May 2005 through December 2007, while severe erosion across the upper beach occurred at station 3178 and 3180. The erosion worsened at the last two stations on the Isle of Palms. Both station 3178 near SummerHouse condominiums and station 3180 at Port O'Call condominiums lost about 100 ft of beach between August 2004 and May 2005, another 50 ft through December 2007, and 10 to 20 ft through October 2008.

Dewees Island

Dewees Island is located between Dewees Inlet to the southwest, and Capers Inlet to the northeast. The island is approximately two miles long, and is classified as an unstabilized inlet zone. The shoreline is very dynamic, with long-term erosion rates as high as -24 ft per year for portions of the island, although in recent years most of the island has been stable to accretional. There is limited single-family development here. The 9 monitoring stations on Dewees Island were most recently surveyed in October 2006, October 2007, and October 2008.

Station 3220 is located on top of a bluff along Dewees Inlet. The beach here can be very dynamic but was fairly stable and showed only minor accretion at the seaward end of the profile.

Along the developed southern half of Dewees stations 3230, 3240, 3250 and 3255 all experienced some erosion at the seaward end of the profile for the current survey period. The erosion appears to be most extreme at station 3250, where the primary sand dune was lost and the beach retreated by about 50 feet.

Along the undeveloped northern half of Dewees Island, stations 3260 and 3270 were fairly stable. Station 3280 is closer to Capers Inlet and has a very wide profile that extends several hundred ft offshore. This station was also fairly stable through 2008. The last monitoring station, 3290, is located on Capers Inlet. Seaward of the dune a large sand flat, most of it intertidal, extends offshore for hundreds of feet. During the past year the primary dune was again very stable and the large offshore sandbar that attached to the beach here several years ago has exhibited little change.

Debidue Beach

Debidue Beach, located between North Inlet and Pawleys Inlet, is the southernmost of the Grand Strand beaches. The central portion of Debidue is armored with a continuous 4,500-ft long bulkhead. The area south of the bulkhead has experienced long-term erosion rates of -8 to -12 ft per year, while the area north of the bulkhead is stable to accretional. The southern half of Debidue Beach was renourished in the spring of 2006. The northerly most stations here were surveyed in June 2006 and May 2007, and May 2008.

Figure 22. Station numbers for Debidue Beach.

Table 12. Beach profile data for Debidue Beach.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
4180	05/28	05/31	06/28	1987	34
4170	05/28	05/31	06/28	1987	31
4160	05/28	05/31	06/28	1987	32
4150	05/28	05/31	06/28	1987	32
4140	05/28	05/31	06/28	1987	36
4130	05/28	05/31	06/28	1987	28

4125	05/28	05/31	06/28	1987	24
4120	05/28	05/31	None	1987	21
4115	05/28	None	06/28	1987	29
4110	None	None	None	1987	4
4105	None	None	None	1987	4
4100	09/30	None	None	1987	17

At station 4115, located near the southern end of the maritime forest closest to North Inlet, the upper beach has continued to erode and cut back by about 10 ft during the past year. At station 4125, about 1,000 ft south of the bulkhead, the long-term trend is erosional. The beach profile collected in June 2006 shows the wedge of renourishment material merging with the shoreface at -5 ft and extending the beach approximately 125 ft seaward. Since 2006, the renourishment wedge has eroded an additional 30 to 40 ft from the +7 to 0 ft contour. At the south end of the bulkhead, station 4130 reflects the creation of a larger dune and extension of the profile seaward almost 200 ft due to the renourishment in 2006, with a retreat of approximately 75 ft from 2006 through May 2007 and little change to this survey year. This south bulkhead section of beach has historically been the most critically sand-starved beach profile at Debidue.

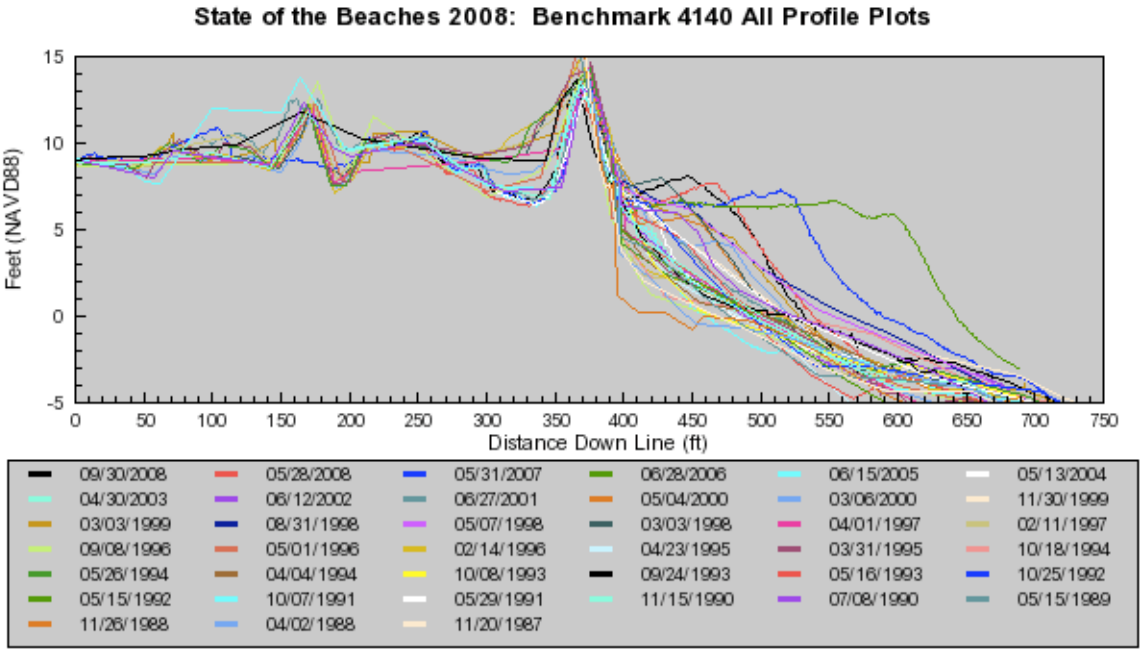

Figure 23. Beach profiles for station 4140 on Debidue Beach. Note the 2006 renourishment and landward migration through 2007.

Station 4140, near the northern end of the bulkhead, is the “pivot point” on Debidue—the beach typically erodes to the south and accretes to the north. During the previous year this station saw erosion between the +7 ft and –2 ft contours, as the beach cut back by up to 25 ft. The renourishment project added approximately 200 ft of beach to the profile with approximately 68 cubic yards of fill material per foot of beach. Between June 2006 and May 2007, 70 ft of beach have been lost and the profile steepened, while the recent survey period showed a slight gain in backbeach elevation and landward movement of the berm by about 10 ft. A similar loss is noted at station 4150.

Stations 4150-4180 are located north of the bulkhead. This is a mostly undeveloped area with an extensive dune field, and historically the beach is usually quite stable. From May 2004 through June 2005, and also May 2006 the dune field here once again remained unchanged. Station 4150 also received renourishment materials, extending the profile 150 ft seaward in the previous survey year. Station 4160 experienced some minor berm and upper beach accretion from the renourishment spillover, while 4170 experienced some accretion on the berm and lower beachface.

Figure 24. Aerial photograph of Debidue Beach near station 4130.

Pawleys Island

Pawleys Island is located between Pawleys Inlet and Midway Inlet. Groin fields on Pawleys have counteracted a slight erosional trend to produce a stable shoreline with an official long-term erosion rate of zero, although recent studies indicate a more accurate rate may be -2.8 ft/yr of erosion. The southern portion of Pawleys is low-lying, with little or no sand dunes. The central portion has some of the highest dunes in the state, while the northern, accretional end has a wide field of low dunes. A beach renourishment project using sand borrowed from the sand spit at the southern end of the island was completed in 1999. Sixteen monitoring stations at Pawleys were surveyed in May 2008, fifteen in July 2007, fourteen in July 2006 and twelve in June 2005.

Figure 25. Location of benchmarks and stations for Pawleys Island area.

Table 13. Benchmark data for Pawleys Island

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
4295	09/29	None	None	1987	22
4290	09/29	05/30	07/06	1987	32
4285	09/29	05/30	07/06	1990	31

4280	09/29	05/30	07/06	1987	19
4275	09/29	05/30	07/06	1989	31
4270	09/29	05/30	07/06	1987	28
4260	09/29	05/30	07/06	1987	34
4245	09/29	05/30	07/06	1987	37
4240	09/29	05/30	None	1989	25
4230	09/29	05/30	07/06	1987	28
4220	09/29	05/30	07/06	1989	33
4215	09/29	05/30	07/06	1987	34
4210	09/29	05/30	07/06	1989	30
4205	09/29	05/30	07/06	1987	37
4203	09/29	05/30	07/06	1989	29
4200	09/29	05/30	07/06	1987	31

While there are no monitoring stations at the southern end of the island, it is apparent from visual observations that the dune in the public parking area has been chronically eroded for the past few years, and the southernmost groin cell, where the last 13 houses on Pawleys are located, still has no sand dune. Stations 4200-4220 are the 6 monitoring sites located north of this groin cell, in the developed, low-lying southern end of Pawleys Island. In this region station 4200 experienced some minor dune erosion in the 2007 survey, the berm at stations 4203 and 4205 had negligible change, and the other stations saw some minimal erosional and accretional changes on the intertidal beach between the +3 ft and -5 ft contours. From May 2007 to May and September 2008, the trend was similar, with slight additional dune erosion at 4200.

The central portion of Pawleys Island, with a large primary dune, is represented by stations 4230-4280. All of the profile stations here were fairly stable, with some experiencing minor berm accretion and most gaining or losing a small amount of sand on the intertidal beach. Historically, this entire section of beach has always been the most stable portion of Pawleys Island. It shows little change from year to year, has an adequate sand volume, and, in most places, also has one of the largest sand dunes in the state. Between July 2005 and July 2006, the small runnel on the intertidal beach filled and the berm generally enlarged, increasing the total volume on the beach in this area. Similar to the previous survey year, erosion in the intertidal zone between 0 and +5 ft was compensated between the 0 and -5 ft contours on some profiles in the north of this segment of coast.

Stations 4285 to 4295 are located closest to Midway Inlet, where the beach is much wider and is generally more dynamic. The long-term trend here is accretional, and

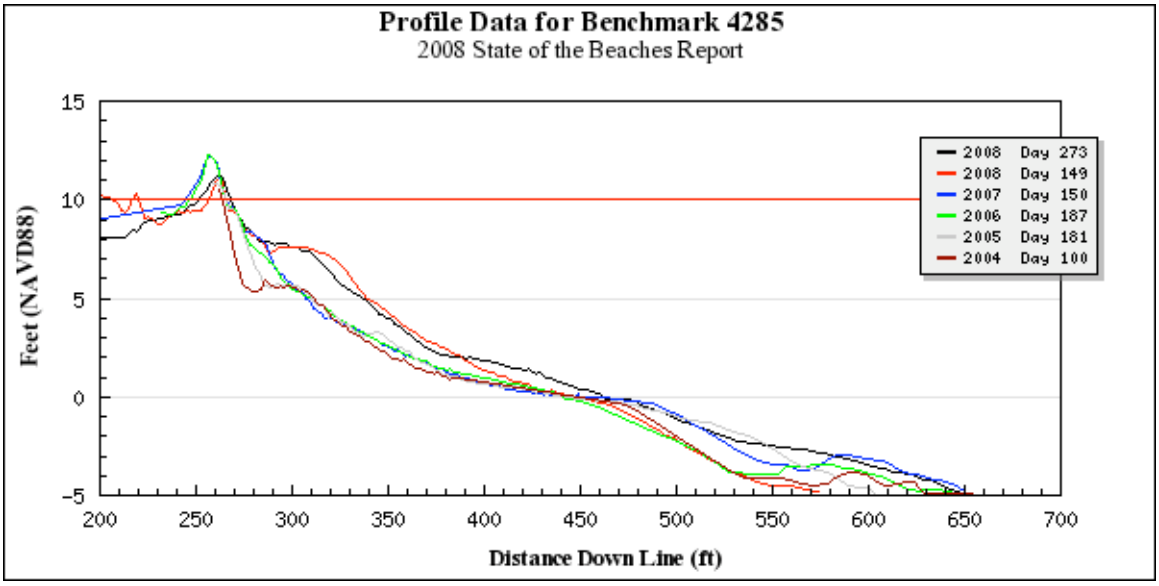

Figure 26. Beach profiles for station 4285 on Pawleys Island.

most houses are several hundred ft landward of the high-tide water line. The entire beach profile was fairly stable here in the past, with minor accretion along 4285 and 4290 and a shallowing of the profile above 0 ft at 4295 due to an inlet bar welding event (see Figure 27). Station 4285 did experience some erosion on the berm, with accretion in the lower beach between 0 and -5 ft. Station 4290 experienced minor accretion throughout the profile down to -5 ft again this year.

Figure 27. Northern end of Pawleys Island. A bar has migrated onto the island here (Photo Credit: Scott Harris, June 22, 2007).

Litchfield Beach/Huntington Beach State Park

Litchfield Beach, North Litchfield, and Huntington Beach State Park represent a continuous, uninterrupted sediment budget compartment. This area is bounded by Midway Inlet to the south, and Murrells Inlet to the north. The southern spit at Litchfield is a low-lying area with a small dune field, while the central portion of this reach contains a large, well-defined primary dune, one of the largest in the state. The official long-term shoreline trend is "stable" for this entire area, and in fact, Litchfield Beach and North Litchfield Beach are among the most stable beaches in South Carolina. All stations here have a significant primary dune that generally shows no sign of erosion from year to year, and changes to the beach profile are usually limited to minor sand gains or losses on the active beach seaward of the dunes. The northern reach, in the state park, is directly influenced by Murrells Inlet and the south inlet jetty.

Litchfield Beach

Litchfield Beach is covered by stations 4300 to 4495; seven profiles were collected in May 2008, April 2007, three profiles in July 2006 and seven in July 2005.

Figure 28. Benchmark locations for Litchfield Beach.

Table 14. Benchmark data for Litchfield Beach.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
4495	05/22	None	None	1987	20
4490	05/22	04/02	None	1987	35
4430	05/22	04/02	None	1987	31
4400	05/22	04/02	None	1987	31
4395	05/22	04/02	None	1987	32
4390	05/22	04/02	07/12	1987	31
4360	05/22	04/02	07/12	1987	30
4330	05/22	04/02	07/12	1987	33
4315	05/22	None	None	1988	21
4300	05/22	None	None	1992	12

During the past year stations 4300 to 4395 were collected and again indicate a stable dune field with slight accretion in the profile between the 0 and 5 ft contour and a small bar attachment above the +5 ft contour. Although accretion is evident above 0 ft, the profile is steepening due to loss of sediment below 0 ft down to approximately -6 ft. Seaward of the dune, a moderate-size berm about 35 ft in width that formed between 2003 and May 2004 was eroded away by June 2005, as the upper-beach profile returned to its 2003 shape. From 2005 to 2006, the beach between 0 ft and -5 ft eroded, while above and below these contours accretion occurred. Between 2007 and this survey period, the upper beach increased in elevation, although the width is similar, and the lower beach eroded heavily from 0 to -6 ft.

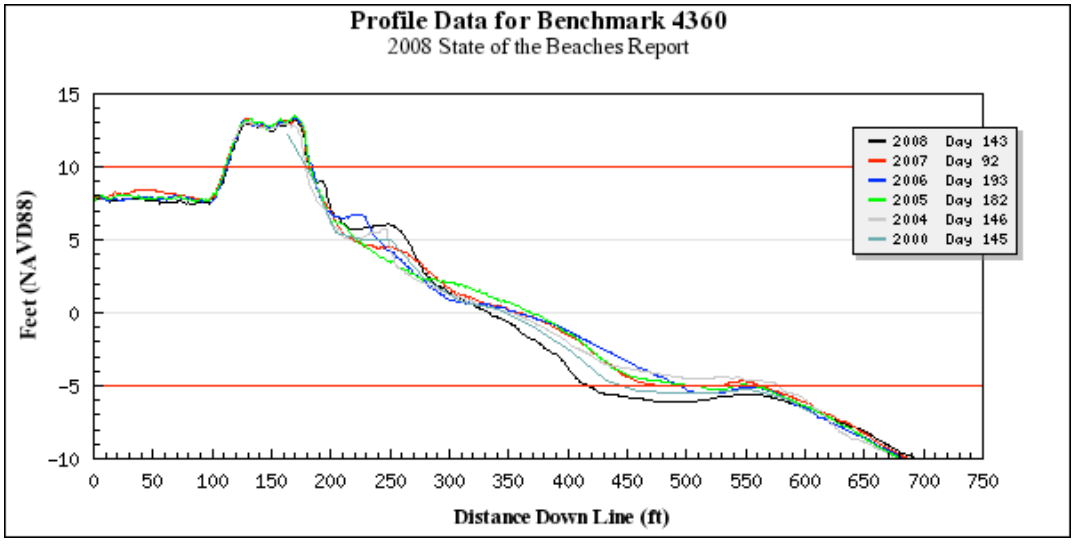

Figure 29. Recent data for station 4360 on Litchfield Beach. Accretion in the upper beach is offset by erosion in the lower beach and shoreface.

Huntington Beach

Stations 4500-4565 are located in Huntington Beach State Park. In the southern end of the park, stations 4500, 4515, and 4525 are morphologically similar to North Litchfield Beach. They have a stable, well-defined dune and experienced some moderate changes on the intertidal beach, with accretion on the upper beach and accretion of a large mass of sediment lower in the profile below -5 ft. Station 4515 and 4525 showed accretion in the upper profile adjacent to the dune at +5 to +10 ft, while farther north at 4545 and 4555 showed some erosion of the dune toe, accretion at +2 ft, and erosion down the profile.

Figure 30. Benchmark locations for Huntington Beach.

Table 15. Benchmark data for Huntington Beach.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
4575	05/21	None	None	1987	17
4565	05/21	04/02	07/20	1987	33
4555	05/21	04/02	07/20	1987	33
4550	None	None	None	1988	1
4545	05/21	04/02	07/20	1988	32
4535	05/21	04/02	07/20	1988	31
4525	05/21	04/02	None	1988	35
4515	05/21	04/02	None	1987	33
4500	05/21	04/02	None	1987	29

As proximity to Murrells Inlet increases the primary dune becomes somewhat smaller and the shoreline can become more dynamic, although the inlet itself is stabilized by jetties that were constructed in the early 1980's. At station 4535, a small dune formed 25 ft seaward of the 2005 position and increased in size between 2007 and 2008; however the profile exhibited slight erosion from +5 ft to 0 ft and eroded 5 ft in elevation below -5 ft, contributing to a steepening of the profile. Station 4545 experienced similar erosion of the upper shoreface with a slight increase in elevation of the primary dune and erosion at the dune toe. Stations 4555 and 4565 were more dynamic, experiencing erosion from the seaward dune face down to the –5 ft contour and movement of the dune approximately 10 ft landward. The 2007 dune has been removed, stepping the upper beach landward approximately 50 ft, and the wide beach below 0 ft has eroded downward two to three ft in elevation down to -7 ft.

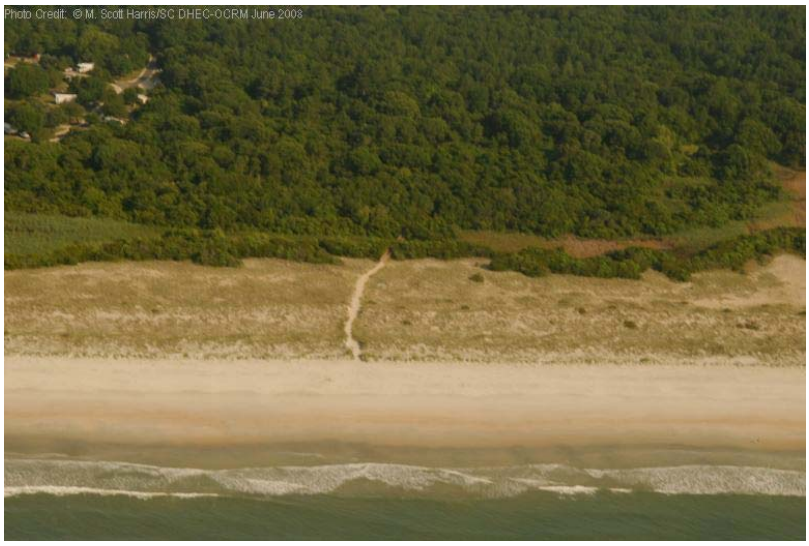

Figure 31. Aerial photograph of Huntington Beach State Park. (Photo Credit Scott Harris and DHEC, June 25, 2008)

Garden City Beach

This section of shoreline begins at Murrells Inlet and extends northward to the southern limit of the Town of Surfside Beach. The southern half of Garden City, from station 4900 to 4955, contains few shore-protection structures, while in the northern half, between stations 4960 and 5030, seawalls and bulkheads become predominant. Generally, sand volumes are adequate in the unarmored section of Georgetown County, begin to decrease in the armored section of Georgetown County, and reach a minimum in the armored section of Horry County. The long-term erosion rate is about -1.5 ft per year. Much of Garden City was renourished in 1998 as part of the Army Corps of Engineers Grand Strand Renourishment Project. The very southern end of Garden City, closest to Murrells Inlet, was renourished with 100,000 cubic yards of sand in 2003, and all of Garden City was renourished in 2008. There are 24 monitoring stations here, which have been surveyed since the late 1980s and most recently in January 2007 and March 2008.

Figure 32. Benchmark locations for Garden City.

Table 16. Benchmark data for Garden City.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
4980	03/11	01/06	03/30	1987	41
4975	03/11	01/06	03/30	1989	30
4970	03/11	01/06	03/30	1987	37
4965	03/11	01/06	03/30	1989	31
4960	03/11	01/06	03/30	1987	37
4955	03/11	01/06	03/30	1989	30
4950	03/11	01/06	03/30	1987	36
4940	03/11	01/06	03/30	1988	34
4935	09/04	01/06	03/30	1989	34
4930	03/11	01/06	03/30	1987	36
4925	03/11	01/06	03/30	1989	32
4920	03/11	01/06	03/30	1987	39
4910	09/06	None	None	1987	25
4905	09/06	None	None	1989	20
4900	09/06	None	None	1987	26
4800	None	None	None	1989	1

Most stations in the standard zone from 4900 through 4955 are unarmored, have a well-defined dune, and historically have been fairly stable. The only exception is found along a 2,000 ft section of beach south of Pompano Drive, between stations 4910 to 4920, where the shoreline is armored and curves seaward and the beach is narrower and more vulnerable. This area was renourished in 2003, although most of that sand has since been lost. At station 4915 the beach face on the seaward side of the bulkhead dropped 3 feet during the current survey period, increasing the exposure on the erosion control structure. While the profile at station 4920 was more stable there is no dry-sand beach in this area at high tide.

The other monitoring stations in this general area all experienced minor berm accretion but also lost sand on the lower beach between the 5 and 0 ft contours. Station 4935 showed major accumulation between +7 and 0 ft since 2004 and a moderate accretion between 2007 and 2008, while 4940 increased vertically approximately 2 ft between +7 and +5 ft through 2006, with 10 to 20 ft of loss above 5 ft. Between 2007 and the current survey period, the beach accreted above +2 ft, widening the upper beach by 50 ft.

North of station 4960 the shoreline is predominantly armored and the beach width decreases. Stations 4950 through 4975 lost the berm established between +5 and 0 ft prior to 2004. Stations 4960 through 4999, in Georgetown County, and station 5000, in Horry County just south of the pier, still show a minimal dry sand beach seaward of a small dune or bulkhead. The beach here has accreted between 0 ft and +5 ft, while eroding below -2 ft and -4 ft, steepening the beach.

Stations 5005 to 5035, the northernmost section of Garden City in Horry County from the pier to Melody Lane, are mostly armored and lack a dune but have a minimal dry-sand beach. Prior to the 1998 renourishment project this area had a substantial sediment deficit, and the renourishment has not performed as well here. Between May 2004 and April 2006 stations 5005 through 5035 showed significant erosion on the upper beach between the 5 and 0 ft contours. Accretion from 2006 to 2007 has slowed, with erosion between 0 and -5 ft, and a slight accretion from 0 to +3 ft. Just north of here all

stations showed a continued loss of the renourishment berm, now only 40 ft wide in places, and also erosion along the entire profile out to a depth of –10 ft.

Figure 33. Aerial photograph of Garden City near Station 4970. (Photo Credit Scott Harris, June 22, 2007)

Figure 34. Aerial photograph of Garden City near Station 4970. (Photo Credit Scott Harris and DHEC, June 25, 2008)

Surfside Beach and Unincorporated Horry County—South

This section of the Grand Strand includes 6 monitoring stations in the Town of Surfside Beach, and 9 stations in the unincorporated region north of Surfside Beach—the campground region, Long Bay Estates, and Myrtle Beach State Park. Surveys here were completed in November 2004, December 2005, March/April 2006, January/February 2007 and March/July 2008. Where the beach rises against the older headland deposits, the long-term erosion rates here are around one foot per year, and in general the beach is stable in the short-term.

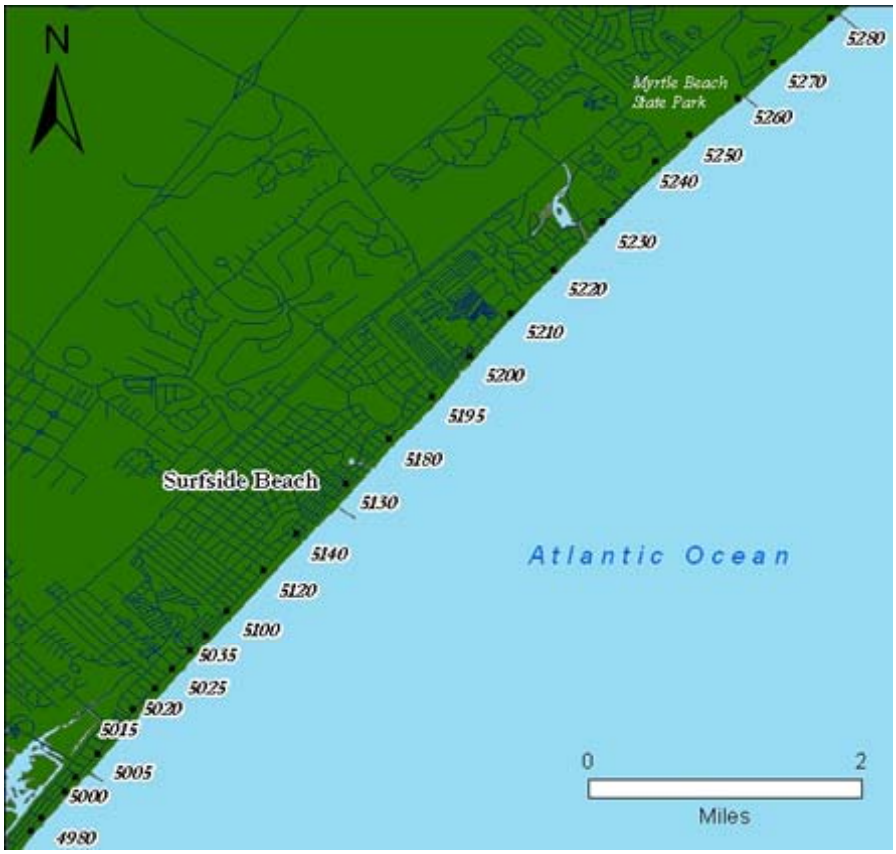

Figure 35. Benchmark locations for Surfside Beach.

Stations 5100 at 16th Ave. South through 5195 at 16th Ave. North fall within the Town of Surfside Beach, and almost all stations here have a well-established primary sand dune. Surfside Beach was renourished in 1998 as part of the Army Corps of Engineers Grand Strand Renourishment Project, and that project reached equilibrium within a few years. It was more recently renourished in 2008. In the southern portion of

Surfside Beach, from station 5100 to 5130, the beach profile experienced erosion from the +7 to the –10 ft contour during the 2004 through April 2006 period while the dune remained stable. Between 2007 and March 2008 the large wedge of renourishment sediment increased the beach width over 50 ft, redistributing to a more gentle slope between March and September of 2008. North of here, through station 5195, the profiles all showed some minor accretion on the upper beach (+7 to +5 ft), as the berm decreased in width by 20 to 30 ft in the current survey period.

Table 17. Benchmark data for Surfside Beach.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
5280	07/17	02/26	None	1988	30
5270	07/17	02/26	None	1988	34
5260	07/17	02/26	None	1987	32
5250	07/17	02/26	None	1987	35
5242	None	None	04/06	2006	2
5241	None	None	04/06	2006	1
5240	03/11	02/26	04/06	1988	31
5230	03/11	02/26	04/06	1988	34
5220	03/11	02/26	04/06	1988	34
5211	03/11	None	04/06	2006	1
5210	03/11	01/06	04/06	1988	34
5200	03/11	01/06	04/06	1988	25
5196	03/11	None	04/06	2006	1
5195	03/11	01/06	04/06	1987	33
5181	03/11	None	04/06	2006	1
5180	03/11	01/06	04/06	1987	38
5140	03/11	01/06	04/05	1988	36
5130	03/11	01/06	04/05	1987	36
5120	03/11	01/06	04/05	1988	37
5100	03/11	01/06	04/05	1988	34
5035	03/11	01/06	04/05	1989	32
5030	03/11	01/06	04/05	1988	26
5025	03/11	01/06	04/05	1989	29
5020	03/11	01/06	04/05	1988	34
5015	03/11	01/06	04/05	1989	29
5010	03/11	01/06	04/05	1988	28
5005	03/11	01/06	04/06	1989	30
5000	03/11	01/06	03/30	1987	32
4999	03/11	01/06	None	1989	31

Stations 5200 to 5240 are located in the campground section. Every station here has a well-established dune except for 5220, which is armored with a rock revetment. Through April 2006 the beach profiles for 5200 and 5210 show erosion from the +5 ft

across the entire shoreface, while the northern section of the campground exhibited erosion from 0 ft down and across the profile. From 2006 to the current survey period, a loss above +2 ft was countered by a gain below 0 ft.

Stations 5250 through 5270 are located in Myrtle Beach State Park. These profiles all have a well-established dune, and the beach is usually very stable. This area was not directly renourished in 1998, although it probably received an indirect benefit from renourishment to the north and south. Surveys in January and November of 2007 through the current survey period show accretion on the intertidal beach around the +5 ft contour in this section and erosion from 0 ft to -5 ft. The beach widened substantially at +4 ft with a gain of approximately 50 ft, probably due to the 2008 renourishment project.

Figure 36. Aerial photograph of northern Surfside Beach. (Photo Credit Scott Harris, June 22, 2007)

Figure 37. Aerial photograph of northern Surfside Beach. Notice the change in width of the upper beach due to renourishment (photo credit Scott Harris and DHEC, June 25, 2008).

Myrtle Beach

The next area is the eight-mile section of shoreline within the Myrtle Beach city limits. The long-term erosion rate here is about one-half ft per year due to its natural geologic setting against the headland. Myrtle Beach was renourished between May and December 1997 as part of the US Army Corps of Engineers Grand Strand Renourishment Project. That fill stabilized and reached equilibrium within a few years, and the entire area was renourished again in late 2008. The most recent beach surveys were conducted in February 2007, and February/May/ July/November in 2008.

Figure 38. Benchmark locations for Myrtle Beach.

Table 18. Benchmark data for Myrtle Beach.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
5505	02/19	02/22	03/23	1988	28
5500	02/19	02/22	03/23	1988	32
5480	02/19	02/22	06/09	1988	37
5478	02/19	02/22	06/09	1999	9
5475	02/19	02/22	06/09	1988	36
5473	02/19	02/22	06/09	2002	6
5470	02/19	02/22	06/09	1988	32
5468	02/19	02/21	03/23	1998	6
5465	02/19	02/21	03/23	1988	35
5463	02/19	02/21	03/23	1998	8
5460	02/19	02/21	03/23	1988	30
5458	02/19	02/21	06/09	1998	9
5455	02/19	02/21	None	1988	34
5453	02/19	02/21	None	1998	9
5450	02/19	02/21	None	1988	27
5448	02/19	02/21	None	2000	6
5445	02/19	02/21	None	1988	32
5443	02/19	02/21	None	1998	9
5440	02/19	02/21	None	1988	31
5438	02/19	02/21	None	1998	8
5435	07/17	02/21	None	1988	37
5433	07/17	02/21	10/12	1998	9
5430	07/17	02/21	10/12	1988	34
5428	07/17	02/21	None	1998	9
5425	07/17	02/21	None	1988	33
5423	07/17	02/21	None	1998	7
5420	07/17	02/21	None	1988	37
5418	07/17	02/21	None	1998	6
5415	07/17	02/21	None	1988	36
5413	07/17	02/21	None	1998	8
5410	07/17	11/27	None	1988	30
5408	07/17	02/21	None	1998	7
5405	07/17	02/26	None	1988	37
5403	07/17	02/26	None	1998	8
5401	07/17	02/26	None	1998	6
5400	None	None	None	1988	23
5350	07/17	02/26	None	1988	38
5345	07/17	11/27	None	1998	7
5340	07/17	02/26	None	1988	34
5335	07/17	02/26	None	1998	9
5330	07/17	02/26	None	1988	34
5325	07/17	02/26	None	1998	7
5320	07/17	02/26	None	1988	37
5315	07/17	02/26	None	1998	9
5310	07/17	02/26	None	1988	33
5305	07/17	02/26	None	1998	9
5300	07/17	02/26	None	1988	32

Stations 5300-5430, from 29th Ave. South to 31st Ave. North, are located in the southern commercial district. There are many seawalls and bulkheads in this region, and before renourishment sand volumes were relatively low. The 1997 renourishment project stabilized by 2000 and the upper beach berm has lost only a minor amount of sand since then. During the 2007 survey period almost all stations showed erosion from February to November from 0 to +5 ft countered by accretion farther up the profile from +5 to +10 ft in the upper beach and almost all stations showed accretion on the upper beach as the berm increased in width and also grew vertically by 1 to 2 ft. Between 2007 and the current survey period, the renourishment project added to the berm by 25 to 50 ft at +5 ft. Lower in the beach profiles, loss was seen from 0 to -5 ft in response to the increased beach slope. Below the stations in the southern section of Myrtle Beach, from 5300 at 29th Ave. South to 5330 at 15th Ave. South also lost sand from the 0 to –5 ft contour, but north of here the remaining stations were fairly stable on the lower beach. In general the dry-sand berm width here is still adequate and continues to provide storm damage protection and a recreational benefit. Station 5430 showed accretion in the profile from -5 to +5 ft from fall 2005 through 2007 and slight accretion in the upper beach and loss below 0 ft through 2008.

Figure 39. Withers Swash in Myrtle Beach near station 5350.

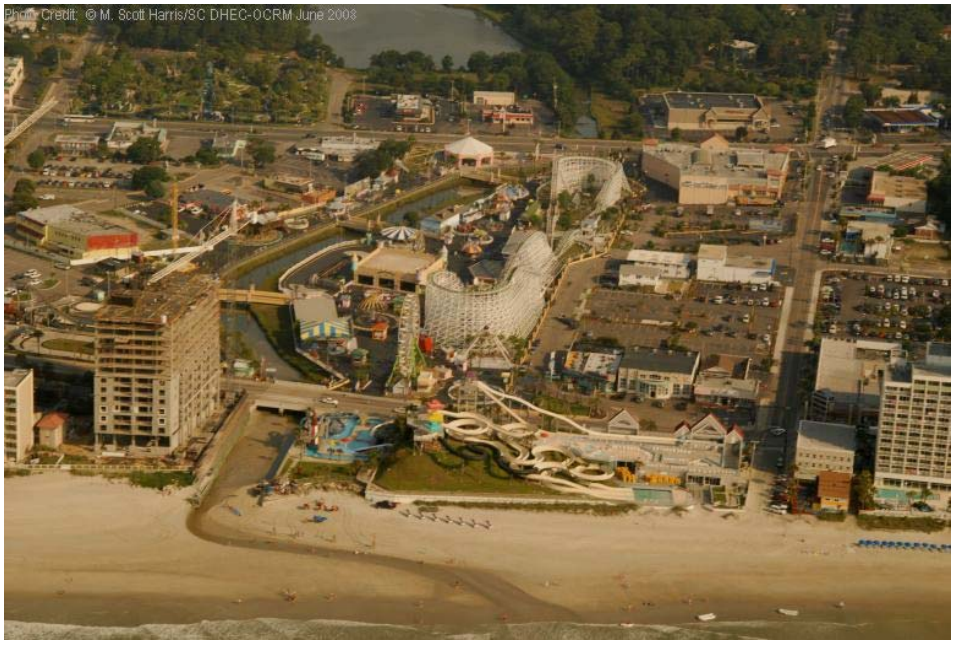

Figure 40. Withers swash in Myrtle Beach near station 5350 (photo credit Scott Harris and DHEC, June 25, 2008)

Station 5430 showed erosion between the +7 ft and -5 ft levels from January 2005 through October 2006, losing the berm on the upper beach created from 2003 to 2005, but gained during 2007 throughout the profile with a small dune of 1 to 2 ft in height. This trend increased through the current survey period.

The area between stations 5435 and 5465, from 31st Ave. North to 67th Ave. North, is primarily a residential section with some commercial sites. There are few bulkheads or seawalls, and although a primary dune exists in many areas there are also unarmored sections where the highland, usually a residential lawn, simply slopes down to the berm. From February 2005 to February 2007, the stretch of coast between Station 5458 and 5468 exhibited a loss of the berm at approximately +7 ft, migrating landward between 20 and 40 ft and losing 2 to 3 ft elevation. From 2007 to 2008, this same section shows an increase in the beach width of 50 ft in the upper beach, and a consistent loss of sand below 0 ft.

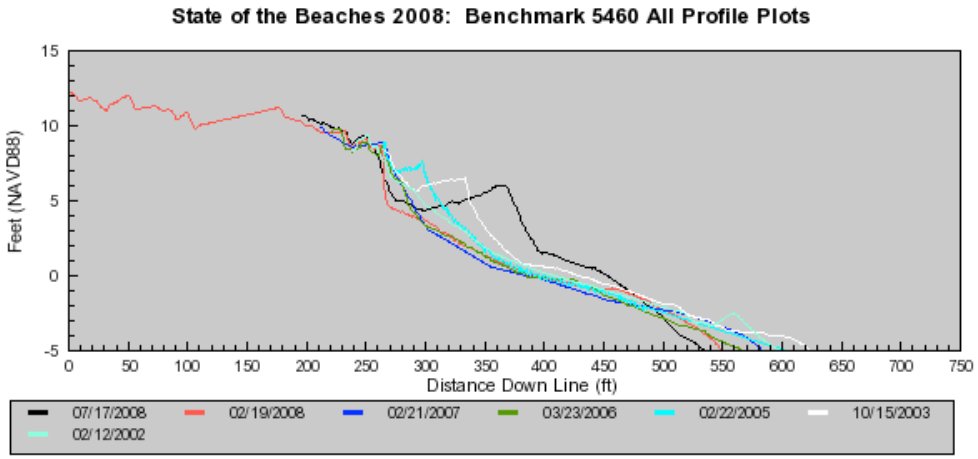

Figure 41. Beach profiles for station 5460.

Stations 5470 - 5480 are located in the northern commercial district, although there are several residential structures here as well. A small but well-defined primary dune exists along most of the beach. Surveys show the beach profile here to be eroding through 2006 similarly to the section to the south, with accumulation of materials above 10 ft. Between 2007 and 2008, this section has an upper beach which gained approximately 100 ft width from the base of the dune due to renourishment, with a significant loss below 0 ft. It is expected that this profile will adjust through time, narrowing the beach and filling the toe of the beach.

Stations 5500 and 5505 are located on Club Road, just north of the City of Myrtle Beach and south of Singleton Swash, where there is little oceanfront development. The beach here has a well-developed primary dune and the shoreline is usually quite stable from year to year. During the previous survey period, the upper beach lost approximately 1 to 2 ft of berm. From 2007 to 2008, Station 5505 lost 50 ft in the mid-beach and approximately 5 ft elevation, with a slight gain at the toe of the dune and dune face.

Unincorporated Horry County—North

This area of unincorporated Horry County is located between the City of Myrtle Beach and White Point Swash, and includes the Shore Drive section, Arcadian Shores, the campground section, and Briarcliffe Acres. The long-term erosion rate is about one-half ft per year. There are 14 beach survey monuments located here which were most recently surveyed in November 2003, March 2005, and June 2006.

Figure 42. Benchmark locations for the unincorporated sections of Horry County - North.

Table 19. Benchmark data for the unincorporated sections of Horry County – North.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
5590	07/15	None	None	1988	19
5585	05/15	02/22	None	2003	2
5580	05/15	02/22	06/15	1988	32
5575	05/15	02/22	None	2007	1
5570	05/15	02/22	06/15	1988	32
5565	05/15	02/22	None	2007	1
5560	05/15	02/22	06/15	1988	34
5555	05/15	02/22	None	2003	2

5550	05/15	02/22	06/15	1989	30
5540	05/15	02/22	06/15	1988	35
5535	05/15	02/22	06/15	1989	31
5530	05/15	02/22	None	1988	26
5528	05/15	02/22	06/15	2000	6
5523	05/15	02/22	06/15	2000	7
5520	05/15	02/22	06/15	1988	31
5519	05/15	02/22	None	2000	5
5518	05/15	02/22	06/15	1989	16
5515	05/15	02/22	06/15	1988	33
5514	05/15	02/22	06/15	2000	8
5513	05/15	02/22	06/15	1989	30
5510	05/15	02/22	06/15	1988	32

Stations 5510 to 5518 are located north of Singleton Swash along Shore Drive, where shoreline armoring is extensive and a dry-sand beach has generally been absent. This area was renourished by Horry County in 1999, when a 150-ft wide dry sand berm was created. The beach profile here has experienced post-project adjustment ever since, as the renourishment berm has cut back by 20 to 50 ft per year. During the period between March 2005 and June/October 2007, the upper beach in this area consistently eroded between 10 and 20 ft, with a small accumulation of sand from +1 to -1 ft and erosion of the lower beach between -3 and -7 ft. A recent renourishment project has extended the berm over 100 ft around the +5 ft contour, with a readjustment over 2008 leading to a stepped profile with an approximate 50 ft wide berm.

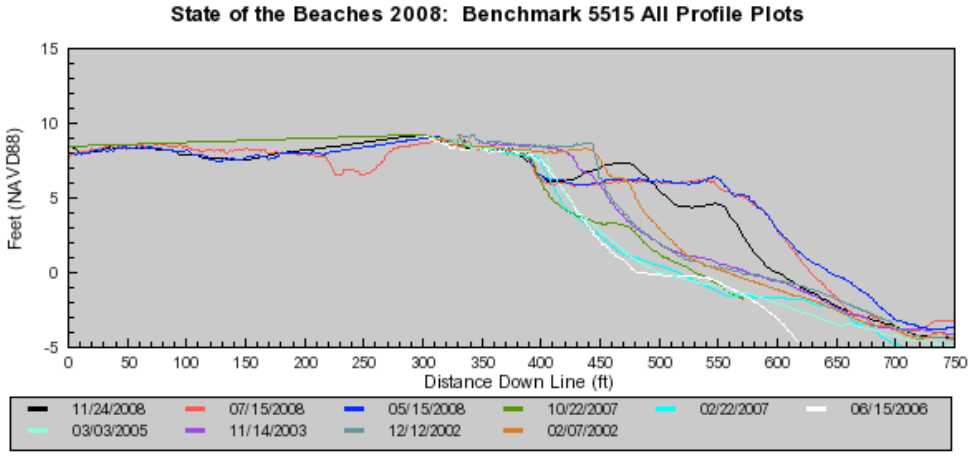

Figure 43. Beach profile data for station 5515 in unincorporated Horry County.

Stations 5520-5550 are located in the campground section, where oceanfront development is a mixture of campsites and resort hotels. Although this section was not renourished in 1999 it did receive some indirect benefits from the nearby Shore Drive renourishment project. Between the November 2003 and March 2005 surveys, most stations here experienced 40 to 50 ft of berm erosion, and a general loss of sand along the entire profile from the berm down to the –3 or –4 ft contour. The beach has recovered in this section through the June 2006 survey, with 30 to 50 ft accretion of the beach between +7 and 0 ft. A trough formed in the -3 to -6 ft elevations along this portion of the coast. This section of beach has also benefited from an increase in the berm of 50 ft or more in some places in the current survey period.

Stations 5560-5590 are located in Briarcliffe Acres, where the oceanfront is undeveloped and a well-defined primary dune exists with virtually no shoreline armoring. In the previous survey period, this area showed dramatic berm erosion, as the upper beach cut back by 60 ft at station 5570 and 80 ft at station 5580. During the current survey period, the beach recovered slightly, adding approximately 15 ft of berm to Station 5560, 25 ft of berm to 5570, and a negligible amount to Station 5580. The swale in the lower beach between -5 and -7 ft deepened from 2006 to 2007, with an addition of 50 ft to the berm width at each station.

Figure 44. Aerial photograph of campground, condominiums, and natural area near stations 5550 and 5560. (photo credit Scott Harris, June 2007)

Figure 45. Aerial photograph near stations 5550 and 5560. (photo credit Scott Harris and DHEC, June 25, 2008)

North Myrtle Beach

This section includes the City of North Myrtle Beach and Atlantic Beach, from White Point Swash to Hog Inlet. The shoreline is heavily developed and much of it is armored, with alternating zones of commercial and residential structures. The beach at North Myrtle Beach is typically wider and flatter than other Grand Strand beaches. The typical long-term erosion rate is about a half-foot per year, although a little higher in Cherry Grove. North Myrtle Beach was renourished by the US Army Corps of Engineers between September 1996 and April 1997, increasing the dry-sand beach width by over 100 ft and unit-width sand volumes by over 70 cubic yards per ft. The area was again renourished between July and September 2008. There are 43 beach survey monuments here, which were surveyed in May 2006, January/ February 2007, and May 2008.

Figure 46. Location of benchmarks in the southern section of the North Myrtle Beach area.

Table 20. Benchmark data for the North Myrtle Beach area.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
5895	05/15	01/30	05/04	1989	36
5890	05/15	01/30	05/04	1988	42
5885	05/15	01/30	05/04	1989	36
5880	05/15	01/30	05/04	1988	37
5875	05/15	01/30	05/04	1989	35
5870	05/15	01/30	05/04	1988	40
5865	05/15	01/30	05/04	1989	34
5860	05/15	01/30	05/04	1988	41
5855	05/15	01/30	05/04	1989	34
5850	05/15	01/30	05/04	1988	42
5845	05/15	01/30	05/04	1989	28
5840	05/15	01/30	05/08	1988	34
5835	05/15	01/30	05/08	1989	31
5830	05/15	01/30	05/08	1988	39
5825	05/15	02/02	05/08	1989	33
5820	05/15	02/02	05/08	1988	39
5818	05/15	02/02	05/08	1989	35
5815	05/15	02/02	05/08	1988	38
5810	05/15	02/02	05/17	1989	34
5805	05/15	02/02	05/17	1988	38
5803	05/15	02/02	05/17	1989	32
5800	05/15	02/02	05/17	1988	37
5798	05/15	02/02	05/17	1989	34
5795	05/15	02/02	05/17	1988	37
5790	05/15	02/02	05/17	1988	36
5785	05/15	02/02	05/17	1989	38
5780	05/15	02/02	05/17	1988	34
5775	05/15	02/02	05/17	1989	32
5770	05/15	02/02	05/17	1988	37
5760	05/15	02/02	05/17	1988	40
5755	05/15	02/02	05/17	1989	36
5750	05/15	02/02	05/17	1988	36
5745	05/15	02/02	05/17	1989	36
5740	05/15	02/02	05/17	1988	39
5735	05/15	02/02	05/17	1989	34
5730	05/15	02/02	05/17	1988	39
5725	05/15	02/02	05/19	1989	30
5720	05/15	02/02	05/19	1988	30
5715	05/15	02/02	05/19	1988	39
5705	05/15	02/02	05/19	1988	34
5700	05/15	02/02	05/19	1988	38
5650	05/15	02/02	06/09	1989	26

In the Windy Hill section, the southernmost portion of North Myrtle Beach from 48th Ave. South to 34th Ave. South where stations 5650-5720 are located, the upper beach profile increased significantly due to renourishment in this area, and erosion on the lower beach occurred at most stations below -2 ft. In the Crescent Beach section, from 28th Ave. South to 2nd Ave. North where monitoring stations 5730 through 5798 are located,

most stations experienced similar changes of the profile. In the Ocean Drive section, from 2nd Ave. North to Sea Mountain Highway where stations 5800 to 5830 are located, most stations showed similar renourishment of sand between 0 and 10 ft, with less loss from 0 to -5 ft. At many stations, the primary dune increased in height a few ft.

Figure 47. Benchmark locations for the northern section of North Myrtle Beach.

In the Cherry Grove section between station 5835 at Sea Mountain Highway and 5850 at 32nd Ave. North the character of the beach changes. Much of this area is armored and experienced chronic sand deficits prior to renourishment. This same 7-block area south of the Cherry Grove pier has also experienced higher erosion rates following the renourishment project, and the beach here is currently not as wide as the beach north of the pier or south of 28th Ave. North. During the survey period from 2005 to 2006, the profile from the berm down to the 0 ft contour cut back an additional 20 to 30 ft from the previous survey period where the loss was about 20 ft. North of the pier, from station 5855 at 37th Ave. North to 5890 at 58th Ave. North, stations showed the same trend in pattern, with slightly more erosion in the lower part of the profile.

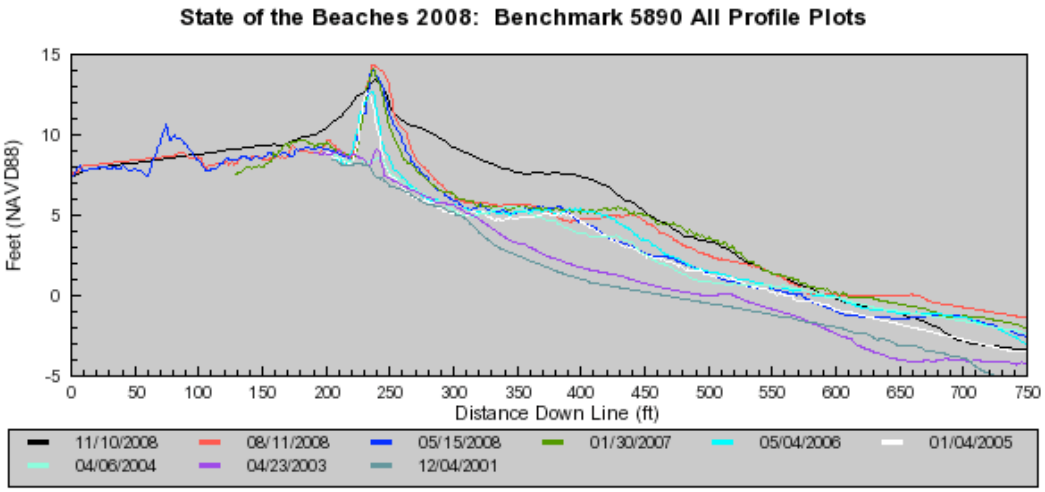

Figure 48. Beach profile data for Station 5890 in North Myrtle Beach.

Figure 49. The north end of Cherry Grove, where inlet processes make this region very dynamic. A new sand bar welds on to the shoreface here. (photo credit Scott Harris, June 2007)

Figure 50. The north end of Cherry Grove, showing the accumulation of bars in the nearshore where the channel cuts and fills. (photo credit Scott Harris and DHEC, June 2008)

Waties Island

Waties Island (listed here with a spelling change from the previously used "Waites" for historical and geographical name accuracy) is an undeveloped three-mile long barrier island located between Hog Inlet to the southwest and Little River Inlet to the northeast. Little River Inlet was stabilized by the construction of a jetty system between 1981 and 1983. The southwest end of Waties Island is an unstabilized inlet zone, the central portion is a standard zone, and the northeastern section is a stabilized inlet zone. Most of the island has a long-term erosion rate ranging from -4 to -10 ft per year, although jetty construction has helped to stabilize the shoreline and lessen the erosion. During most of the 1990's the Hog Inlet shoreline was extremely erosional, losing several hundred ft, but has changed to an accretional mode in recent years. There are 6 monitoring stations on Waties Island, which were most recently surveyed in May 2004, January 2005, December 2005, May 2007, and June 2008.

Figure 51. Benchmark locations for Waties Island.

Table 21. Data for benchmarks on Waties Island.

Benchmark	2008	2007	2006	First Survey Year	Total Profiles
5995	06/25	05/11	None	1989	20
5975	06/25	05/11	None	1989	28
5960	06/25	05/11	None	1988	33
5945	06/25	05/11	None	1989	32
5930	06/25	05/11	None	1990	30
5915	06/25	05/11	None	1988	28
5905	06/25	05/11	None	1989	33

During the current survey periods almost all profiles at Waties Island were stable or showed signs of moderate accretion on the upper beach and dune, with loss from 0 to -3 ft. Station 5905, closest to Hog Inlet at the south end of the island, had showed some signs of erosion and was slightly erosional between 2002 and 2003, but continues to be slightly accretional. During the previous survey period the primary dune here with a crest elevation of +14 ft was stable, while an emerging dune seaward of the primary dune continued to develop. Station 5915 showed the same characteristics—a stable primary dune at +15 ft and a smaller dune developing on the seaward side of it.

The remaining stations on Waties Island, 5930, 5945, 5960 and 5975, were all quite stable through the current survey period, with a gain of sand on the seaward side of the primary dune. The primary dune at Station 5930 grew approximately four ft from 2005 to 2007, with prominent accretion in the upper beach. An additional 40 ft of dune has accreted in the upper beach from -7 to +10 ft. In general, it appears the accretional phase that began on much of the island several years ago is continuing. This may be due to the long-term stabilizing influence of the Little River jetties, which may eventually decrease the officially adopted long-term erosion rates on Waties Island.

State-Wide Summary

The year 2008 had few named tropical systems with any great influence on the coast of South Carolina. In mid-July Bertha brought some larger than normal swell, and then in August and September two tropical storms crossed into South Carolina and a low-pressure cell that developed off the coast. Wind speed information was obtained from the SC Climatology Office, and additional information can be obtained from their website at:

http://www.dnr.sc.gov/climate/sco/ClimateData/yearly/cli_sc2008review.php

On August 20th, Tropical Storm Fay affected the southern and central coasts with 39 mph gusts that caused breaking wave heights of 6-8 ft and moderate erosion at Hunting Island and Edisto Beach. On September 5th and 6th, Tropical Storm Hanna crossed into the Little River area, producing wind speeds of 53 mph and some erosion along the Grand Strand's beaches. On September 25th, a low-pressure cell moved onshore with gusts of 46 mph measured at the Myrtle Beach Airport.

Two renourishment projects were conducted in South Carolina in 2008. The Isle of Palms project placed 885,000 cubic yards of sand dredged from an offshore sand source along 2.6 miles of beach, while the Grand Strand project, constructed in three phases, placed 2.9 million cubic yards of sand dredged from an offshore source along 26 miles of shoreline in North Myrtle Beach, Myrtle Beach, Surfside Beach, and Garden City.

In general the inlet zones, those beaches closest to unstabilized tidal inlets, are the most dynamic beaches and may experience the greatest shoreline erosion or accretion. Other sections of beach away from tidal inlets can still experience chronic beach erosion. Regardless of its designation as an inlet zone or standard zone, any section of beach with a sand deficit and a minimal beach width should be considered vulnerable to storm damage, since the dunes and dry-sand beach provide a buffer between the ocean and high-ground development. At present, the beaches most vulnerable to erosion, with sand deficits and a minimal dry-sand beach width at high tide, are listed from south to north as follows:

- **Hunting Island** – Several cabins on the southwestern end of the island were lost to erosion during 2007 and 2008, and others cabins remain threatened.
- **Harbor Island** – Chronic erosion in portions of the northeastern end of the island has resulted in ocean water coming up under several houses at high tide.
- **Sullivans Island** – Similar to Harbor Island, chronic erosion at the northeastern end of the island, near Breach Inlet, has also resulted in ocean water coming up under several houses at high tide.
- **Pawleys Island** – Many houses on the southern end of the island, near Pawleys Inlet, have minimal protection. The parking area, which provides most of the public beach access in Georgetown County, is in jeopardy.

South Carolina Department of Health and Environmental Control
Office of Ocean and Coastal Resource Management
1362 McMillan Ave., Suite 400
Charleston, SC 29405
(843) 953-0200

This report was prepared by Scott Harris, Department of Geology and Environmental Geosciences, College of Charleston and Bill Eiser, staff oceanographer for the South Carolina Department of Health and Environmental Control, Office of Ocean and Coastal Resource Management. For 2008, beach profile data were collected by Coastal Carolina University working under contract to DHEC. Historical profile data were collected by DHEC staff, Coastal Carolina University, College of Charleston, USC Beaufort, and private surveying companies all working under contract to DHEC. This report is available on the internet at www.scdhec.gov/ocrm. Beach profile data are available at http://gis.coastal.edu/pmas and oblique aerial photographs used in this report are available at http://maps.cofc.edu/website/flightdata/.