# 2019 Beach Monitoring Survey

## TOWN OF SULLIVAN'S ISLAND, SC

Elko Coastal Consulting, Inc. | July 2019

Technical Report

# 2019 Beach Monitoring Survey: Town of Sullivan's Island, SC

Prepared for:

Town of Sullivan's Island

P.O. Box 427, Sullivan's Island, SC 29482

Prepared by:

Elko Coastal Consulting, Inc.

P.O. Box 1451, Folly Beach, SC 29439

(843) 371-7082

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Cover Photo: July 2019 Ground photo of Monument 3065 near Station 26, looking south

# Contents

# 1. Executive Summary

Annual beach monitoring began on Sullivan's Island in 2016 to better understand the beach performance on the island. In addition to data collected in this study effort, beach profile data collected by the state in 2014 and 2015 were also used. Over the last six years (since 2014), the beach at most (8 out of 11) of the monitoring stations has eroded. The east end of the island from Station 29 to Breach Inlet has eroded considerably despite the stabilization structures (groins). Most severe was the beach at Station 29, which retreated 300 feet between 2014 and 2019.

Sand bar attachment events, which are common on Sullivan's Island, occurred in 2014 and 2018. Sediment from the most recent attachment is supplying sand to the center of the island where volume calculations indicate very healthy beaches. Unfortunately, this sediment has not yet been transported to the eroding east end. Continued monitoring of the beach, and in particular, the erosional conditions on the east end is important.

# 2. Introduction

The purpose of this work is to provide an annual condition survey to monitor the Sullivan's Island beach. The intention is to survey the beach annually at the beginning of hurricane season in order to monitor changes to the beach from normal and/or storm conditions. Annual monitoring will not only provide baseline conditions for each storm season, but also a comparison of past year's monitoring data that will yield change rates important for understanding beach performance over time.

The beach on Sullivan's Island has generally been accretional due to its location on the updrift side of the Charleston Harbor jetties (Figure 1). As a result, little data have been collected to quantify and understand the physical coastal processes as is common on barrier islands with erosion problems. The Town's Local Comprehensive Beach Management Plan[1] provides an overview of the studies to date.

This effort continues an annual data collection and analysis plan for the Town of Sullivan's Island that started in 2016. In early 2018, a beach nourishment project placed about 1.7 million cubic yards of sand on the neighboring Isle of Palms. This influx of sediment to the barrier island system updrift of Charleston Harbor will likely have an impact on Sullivan's Island.

[1] ATM, 1992. Local Comprehensive Beach Management Plan, Town of Sullivan's Island, May 1992, 233 p.

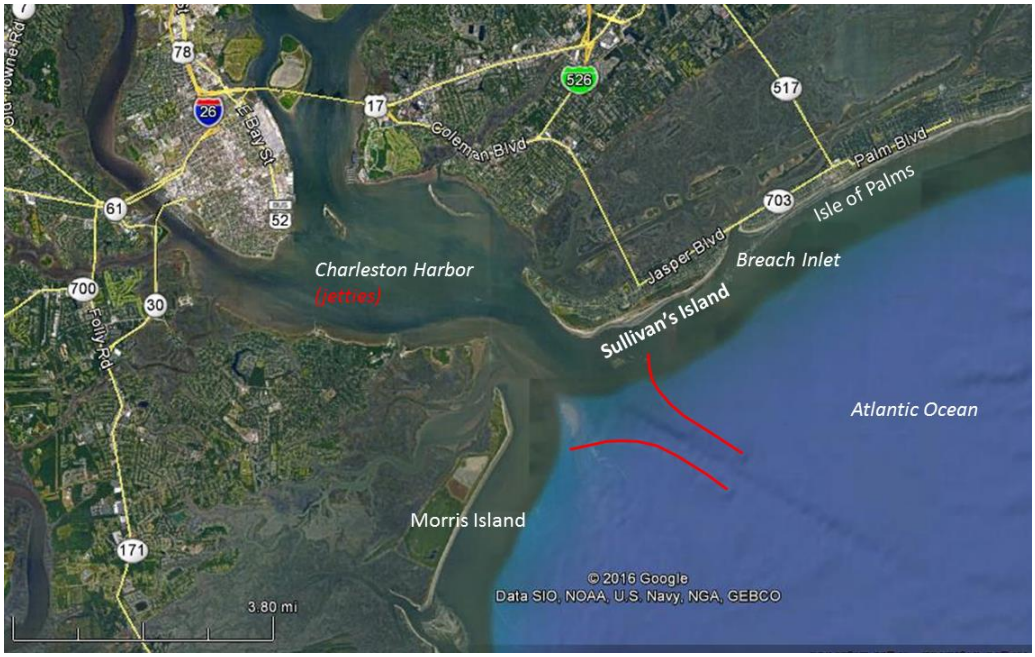


*Figure 1. Location map of Sullivan's Island (image modified from Google Earth).*

## 3. Survey Methodology

Topographic and hydrographic data collection (beach profile surveys) occurred on May 31 and June 3, 2019. A total of 11 profile surveys were measured at existing Coastal Council/OCRM Monuments (Figure 2). On Sullivan's Island, the OCRM Monument spacing ranges from approximately 500 to 2,000 ft.

The monuments are survey benchmarks, which are permanent metal disks in the ground with information stamped on the face that mark a specific point that can be consistently reoccupied. On Sullivan's Island, these survey benchmarks begin with Monument 3010 at the southwest end of the island adjacent to the Entrance to Charleston Harbor and end at Monument 3095 at Breach Inlet. The lines illustrated in Figure 2 extending offshore from the monuments are the profile lines along which surveyors collect elevation measurements. These measured beach profiles describe a cross-section of the topography and bathymetry of the sand surface along the dry beach and nearshore/sand bar regions (e.g., Figure 7). By surveying the same line routinely, scientists can measure the change in sand volume or shoreline position, for example.


*Figure 2. 2015 aerial photo illustrating the eleven (11) beach profile lines and corresponding SCDHEC-OCRM Monuments on Sullivan's Island. The solid black line running parallel to the shoreline through the dunes is the OCRM Baseline.*

Surveys out to the "depth of closure" were collected in order to appropriately calculate volume changes along the beach. The depth of closure represents the offshore location where measurable sediment transport ceases. Here, closure depth is roughly -12 ft NAVD88.

Each profile extended from the OCRM Monument to either -14 NAVD88 or 1,400 feet from the toe of the dune, whichever was more landward. In some cases, this meant extending the profile lines up to 4,000 ft offshore to capture the nearshore sand bar feature and reach the depth of closure (e.g., Figure 3 and Figure 4).

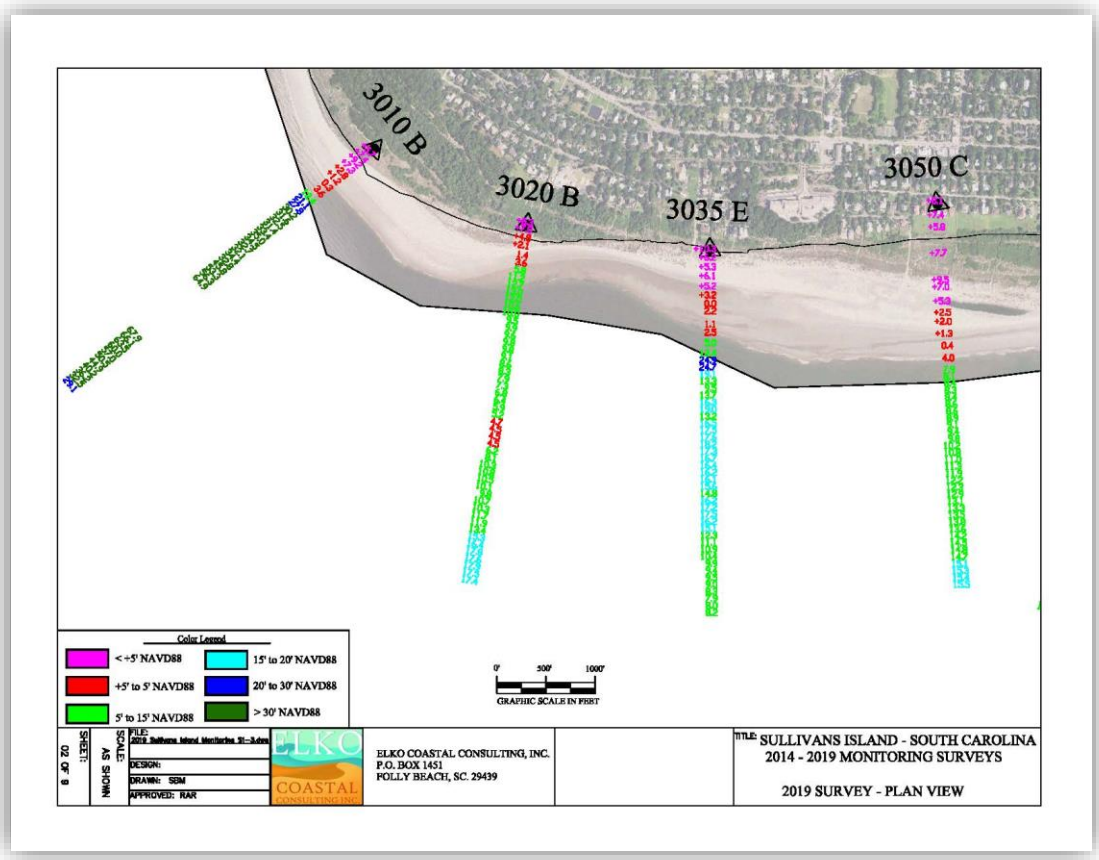


*Figure 3. Topographic and bathymetric 2019 survey data illustrating the measured elevation along each line for the southwest end of Sullivan's Island.*

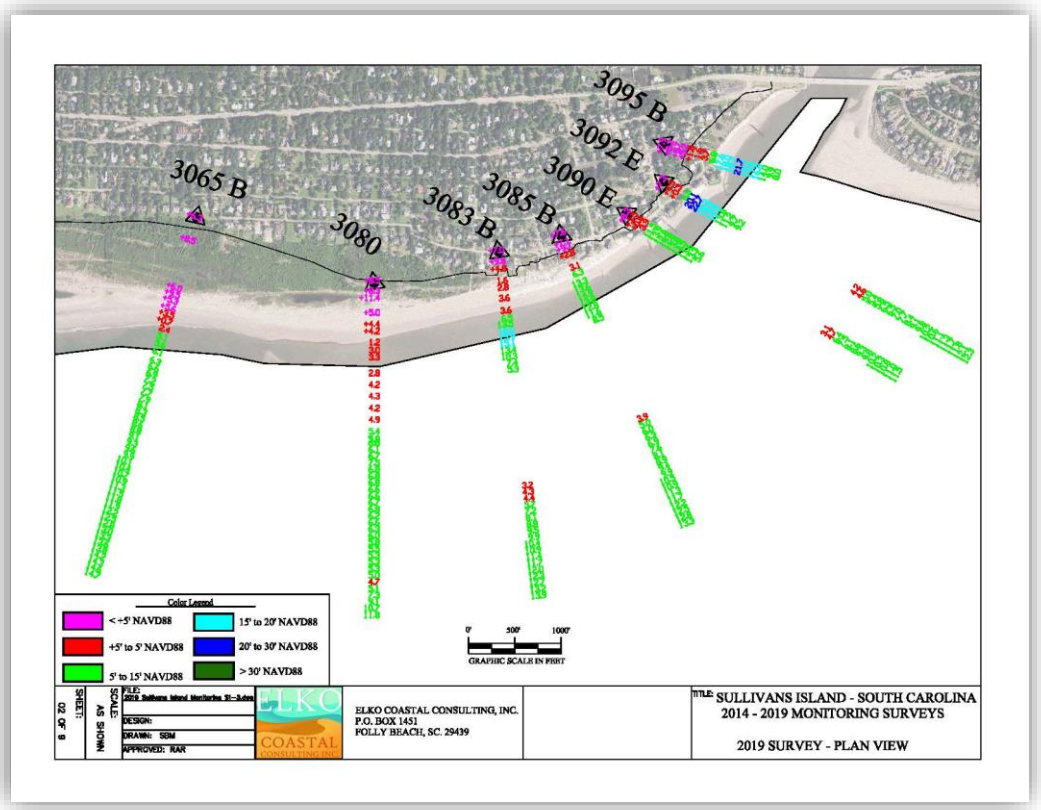


*Figure 4. Topographic and bathymetric 2019 survey data illustrating the measured elevation along each line for the northeast end of Sullivan's Island.*

The upland portion of the profiles was conducted by RTK GPS standard land surveying techniques and extended seaward to a wading depth deep enough to overlap with the offshore portion of the profile survey. Profile data points were collected at a maximum interval of 25 feet and at all significant elevation changes such as dunes, berms, scarp lines, seawalls, or sand bars.

The offshore portion of the survey was conducted by hydrographic techniques using a vessel mounted fathometer along with kinematic GPS. The survey equipment and methodology complied with USACE standards for hydrographic surveying.

## OTHER DATA UTILIZED IN THIS STUDY

Beach profile data was also collected during the summer of 2014 and 2015 by SCDHEC OCRM and served to the general public through the S.C. Beach Erosion and Monitoring (BERM Explorer) application. The combination of these data and the survey data collected for this work provides six years of data over a study period of 2014 to 2019.

# 4. Shoreline and Volume Change Analysis

The shoreline change analysis was conducted by measuring the position of the Mean High Water (MHW) contour (2.03 ft NAVD88) relative to the OCRM baseline. The volume change analysis was conducted by measuring the volume of sand on the profile from the seawardmost dune crest to the depth of closure (-12ft NAVD88) when possible.

## 3.1 MHW POSITION RELATIVE TO THE OCRM BASELINE: 2014-2019

The position of MHW relative to the baseline is a useful measurement (Figure 5) because it illustrates both the change in shoreline position from year to year, as well as the distance between the shoreline and baseline – an indicator of the level of storm damage protection provided by the beach/dune system at each monument.

During the study period, the Sullivan's Island shoreline changed dramatically between 2014 and 2015, and between 2015 and 2019 the shoreline has gradually recovered back to near the 2014 position in most cases (Figure 5). Several areas were flagged in previous monitoring reports and are discussed below.

The northeast end of the island, between Monuments 3090 and 3095 and adjacent to Breach Inlet, was flagged in the 2016 report. It is under continual erosional pressure due to the southwesterly migration of Breach Inlet, but has been stabilized by erosion control structures. Minor shoreline change has occurred along this northeastern end over the last four years (i.e., stability); however, the small distance between the shoreline and the OCRM baseline suggests erosional pressure and the need for continued monitoring. There is little storm damage protection at this location.

Along the central portion of the island, the shoreline between Station 31 and 22 (between OCRM Monuments 3050 and 3085) was also flagged in the 2016 report because the shoreline position moved landward an average of 180 ft between 2014 and 2016 (Figure 5). This dramatic shoreline retreat has stopped and the shoreline is advancing at all of the monuments in this section. As noted above, the shoreline has nearly recovered to its 2014 position. The shoreline along this portion of the island tends to fluctuate in response to Breach Inlet shoal attachment events[2].

Downdrift of this region, in the vicinity of the Charleston Harbor jetty, the shoreline has been stable to accretional over the last five years.

[2] ATM, 1992. LCBMP (see Footnote 1).

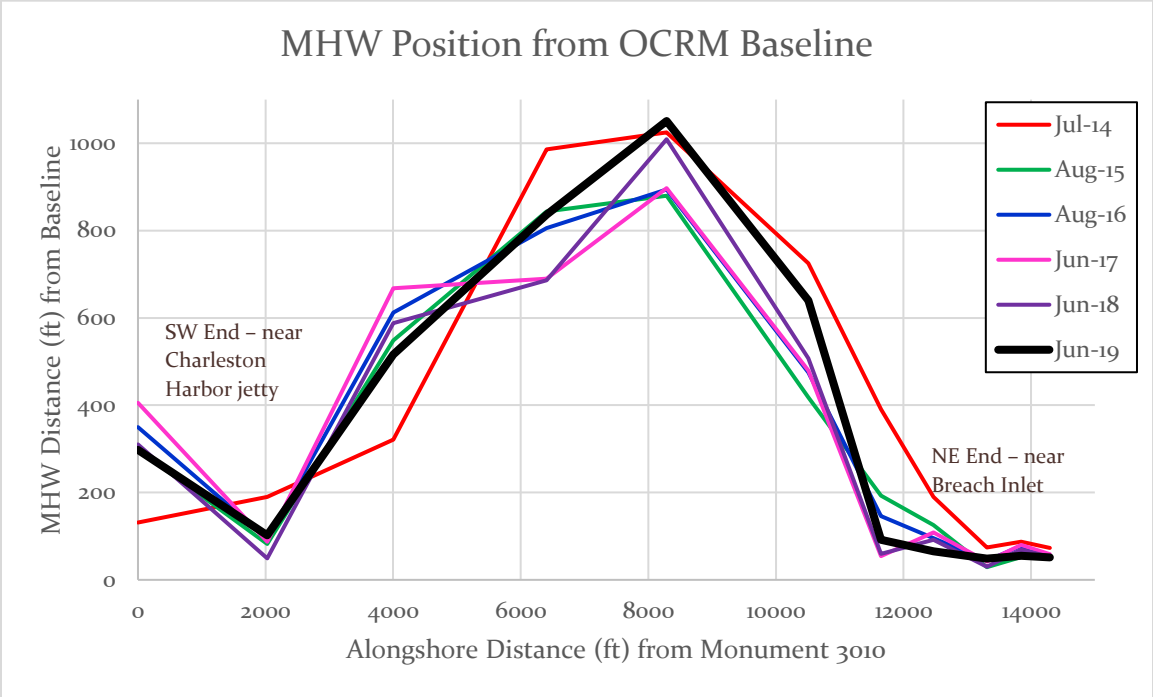


*Figure 5. Annotated MHW Position graph illustrating the change in shoreline position from 2014 to 2019, as well as the distance between the shoreline and baseline.*

At the sandbar attachment point, Station 26 (OCRM Monument 3065), the shoreline moved about 100 ft landward between 2017 and 2018. This location is represented by the peak of the black line near 8,000 ft alongshore (Figure 5). To the southwest at Station 28 (monument 3080), the shoreline advanced over 130 ft landward between 2018 and 2019. To the northeast at Station 22.5 (monument 3050), the shoreline advanced nearly 150 ft between 2018 and 2019. These large consecutive shoreline advancements illustrate the downdrift migration of the sand bar. The June 2019 MHW position line is approaching the July 2014 line (Figure 5) indicating that the sand bar attachment events may follow a general pattern represented by accretion and erosion along the central portion of the island. The only location on the island that has exhibited shoreline advancement since 2014 is at Station 19 (monument 3035)

## 3.2 VOLUMETRIC ANALYSIS

As noted above, the volume change analysis was conducted by measuring the volume of sand on the profile from the seawardmost dune crest to the depth of closure (-12ft NAVD88) when possible. These two locations were selected to approximate the limits of measurable sand movement across the beach portion of the profile. The nearshore sand bar was intentionally left out of the calculations when possible; however, the bar often complicates beach profile volume calculations. When the profile does not "close" at or before -12 ft, volume is calculated out to the location where the lines intersect (i.e., the visible depth of closure).

There is no doubt that the nearshore sand bar and the beach exchange sediment, but in order to understand the beach volume change, an effort was made to separate the beach profile from the nearshore sand bar when the bar was separated by a channel and not welding to the beach face. The volume of the nearshore bar can be approximated in the future if necessary.

### 3.2.1 Unit volume to DOC by Monument: 2014-2019

As suggested in the MHW analysis, northeastern Sullivan's Island has less storm protection in place than the rest of the island. Despite the narrow beach, the average unit volume to the depth of closure (DOC) has been stable at near 130 cubic yards per foot (cy/ft) from 2016 to 2019. The rest of the island has at least 200 cy/ft of volume along each measured profile (Figure 6).

The other end of the island, near Charleston Harbor, has exhibited remarkably stable unit volume measurements over the last four years. Between monuments 3020 and 3035 (Sta. 19 west to the Sand Dunes Club), very little volume change has been measured. As is expected adjacent to inlets, monument 3010, closest to the channel is more dynamic.

The 2016 monitoring report detailed a sandbar attachment event that occurred in 2014. Another sandbar attachment was documented in 2018. This sandbar began spreading in both directions alongshore during this monitoring period. The June 2018 and 2019 lines (purple and black) in Figure 6 illustrate a substantial increase in volume between about 7,000 (3065; Sta. 26) and 11,000 (3080; Sta. 28) feet along shore. The next section details this sandbar attachment using beach profile data from each monument.

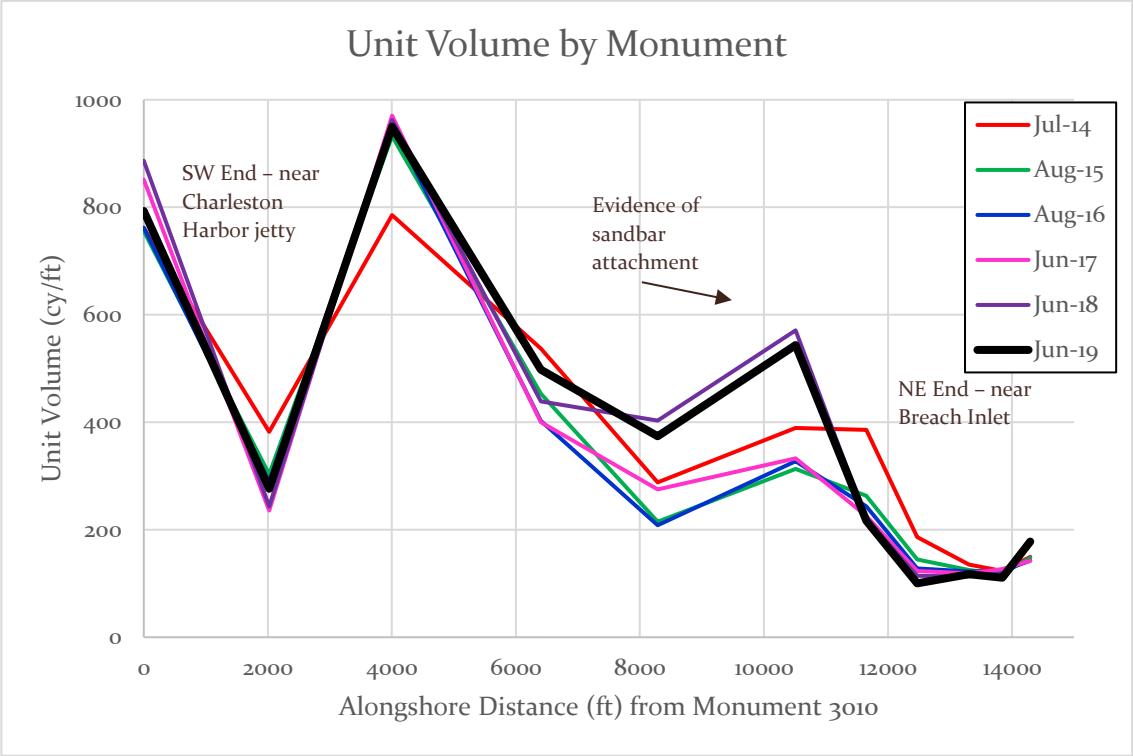


*Figure 6. Annotated Unit Volume graph illustrating the change in unit volume at each profile from 2014 to 2019.*

### 3.2.2 Island-wide Volume Change Estimates

Due to the large distance between OCRM Monuments on Sullivan's Island, it is difficult to calculate total volume statistics for the island using data from only 11 profiles. Small fluctuations in volume at a single beach profile translate to relatively large volume change statistics when applied over long distances. Thus, the volume change estimates provided in Table 1 should be treated as approximations.

From 2016 to 2019, the total volume change was a gain of 294,795 cy (Table 1). Most of the volume increase occurred along the center of the island between 3050 and 3083 indicating that the alongshore and onshore sandbar migration is a significant contributing factor to the volumetric increase. In the last year, the island lost 81,837 cy (erosion) with the most volume loss occurring at the dynamic 3010 (Sta. 16) adjacent to Charleston Harbor.

*Table 1. Volume change estimate for Sullivan's Island from 2016 to 2019 and for 2018 to 2019.*

| | 2016-2019 | | 2018-2019 | |
|---|---|---|---|---|
| Monument | Avg. Change Between Profiles (cy/ft) | Total Between Profiles (cy) | Avg. Change Between Profiles (cy/ft) | Total Between Profiles (cy) |
| **3010 B** | | | | |
| | 8.7 | 23,360 | -30.6 | -82,620 |
| **3020 B** | | | | |
| | -9.7 | -19,922 | 10.0 | 20,454 |
| **3035 E** | | | | |
| | 44.8 | 109,008 | 23.2 | 56,350 |
| **3050 C** | | | | |
| | 66.2 | 115,863 | 15.0 | 26,302 |
| **3065 B** | | | | |
| | 54.7 | 126,673 | -28.2 | -65,317 |
| **3080** | | | | |
| | 6.0 | 8,788 | -15.0 | -21,872 |
| **3083 B** | | | | |
| | -44.1 | -44,595 | -8.2 | -8,298 |
| **3085 B** | | | | |
| | -16.3 | -15,565 | -4.9 | -4,681 |
| **3090 E** | | | | |
| | -8.9 | -4,846 | -1.2 | -650 |
| **3092 E** | | | | |
| | -8.3 | -3,968 | -3.1 | -1,504 |
| **3095 B** | | | | |
| **Total Volume Change (cy)** | | **294,795** | | **-81,837** |

## 3.3 BEACH CONDITIONS BY MONUMENT

In addition to survey data collection, this study also conducted a beach condition assessment by taking ground photographs at each OCRM Monument and noting the condition of the beach. This section includes the condition assessment information and a beach profile data plot for each OCRM Monument.

Beach profile data presented in this section suggest that between Station 19 and Station 28 a dune higher than 3 feet above the seaward toe to the crest of the dune exists seaward of the state's baseline.

### 3010

This is the southwesternmost OCRM Monument on Sullivan's Island, located along the long beach access path at Station 16 with the nature trail. In 2017, this access path was flooded with standing water but since then a boardwalk has been installed. The beach is located on the Charleston Harbor side ("inside") of the jetty. Consistent with the measured beach profile data (Figure 7), the beach displayed erosional conditions. There was little to no high tide beach and the channel was hugging the shoreline. Overtopping of the berm was evident.

Compared to the 2016 conditions, the dunes are higher and accreting seaward with incipient dune vegetation observed to the northeast (Figure 8). Minor dune scarping was observed to the southwest (Figure 9). According to the 2019 volume calculation, this profile has a unit volume of 793 cy/ft.

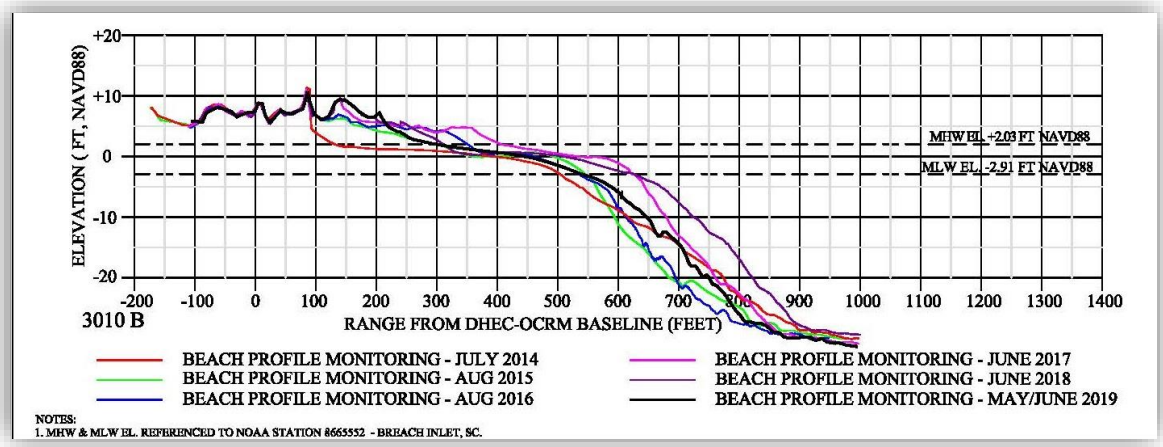


*Figure 7. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3010.*

*Figure 8. Ground photo taken at Monument 3010 looking east on August 4, 2016 (top) and June 6, 2019 (bottom). Note the narrower beach but higher elevation of the backbeach and dune in 2019.*

*Figure 9. Ground photo taken at Monument 3010 looking west on August 4, 2016 (top) and June 6, 2019 (bottom). Note the higher elevation of the backbeach and dune in 2019.*

3020

Monument 3020 is located along the long beach access path at the Sand Dunes Club. Significant erosion had taken place here since 2014 that included loss of a large dune and submerged nearshore sand body (Figure 10). Now, sediment in the offshore sandbar is accumulating and the bar is slowly migrating onshore.

As opposed to previous years, the beach at Monument 3020 appeared to be showing some minor signs of recovery. While the storm high tide rack line is reaching the (dead) vegetation, the beach appears to have benefited from recent bar attachment with a slightly wider berm. The high tide beach was about 40 ft wide.

A sand bar had attached to the updrift beach (Figure 11) in 2016. Considerable ongoing dune erosion was evident to the southwest in 2016, but the dunes have recently been recovering (Figure 12).

According to the 2019 volume calculation, this profile has a unit volume of only 276 cy/ft, which is in stark contrast to the surrounding accretional areas. This monument is influenced by its location downdrift of the Charleston Harbor jetty.

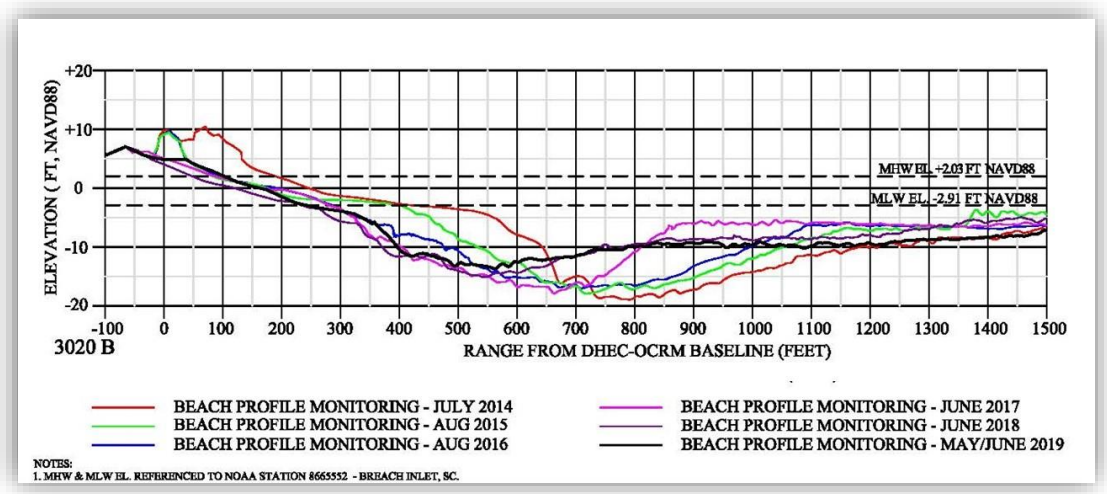


*Figure 10. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3020.*

*Figure 11. Ground photo taken at Monument 3020 looking northeast on August 4, 2016 (top) and June 6, 2019 (bottom). Notice the evolution of the sand bar attachment on the beach to the northeast.*

*Figure 12. Ground photo taken at Monument 3020 looking southwest on August 4, 2016 (top) and June 6, 2019 (bottom). Note the recovery of dune vegetation to the southwest in 2019.*

3035

Monument 3035 is located along the long beach access path at Station 19. This area has been the beneficiary of the 2014 sandbar attachment event (Figure 13). The beach has been wide and accreting between August 2016 and June 2019 with more than 100 ft of dry beach between the vegetation line and the high tide line (Figure 14 and Figure 15). Over the past two years, a wide hummocky foredune field developed on the backbeach (Figure 15). In contrast to 2016 and 2017, no ponding was observed in the backbeach (Figure 14), suggesting the berm and backbeach elevation have increased.

According to the 2019 volume calculation, this profile has a unit volume of 950 cy/ft. The beach profile at this monument is influenced by the sediment trapping effect of the Charleston Harbor jetty.

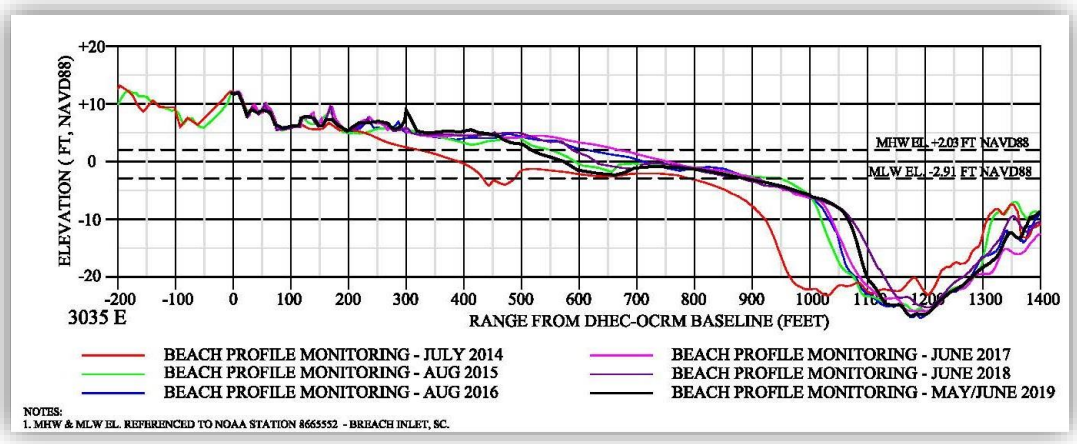


Figure 13. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3035.

*Figure 14. Ground photo taken at Monument 3035 looking northeast on August 4, 2016 (top) and June 6, 2019 (bottom). Note the abundance of incipient dunes, reduced ponding, and over change in slope.*

*Figure 15. Ground photo taken at Monument 3035 looking southwest on August 4, 2016 (top) and June 11, 2019 (bottom). Note the higher berm elevation.*

3050

Monument 3050 is located along the long beach access path at Station 22.5 in the center of the island. Beach profile data indicate the onshore transport of the recent sand bar attachment event that occurred here in 2014 (Figure 16). Over the last five years, sediment from this attachment bar has welded to the shoreface and resulted in the 2019 beach which includes a wide berm and tall primary dune.

In 2019, the beach was over 150 ft wide and accretional. Two ridge and runnel systems were attaching to the shoreface. The dunes were healthy with new growth. Very little backbeach ponding was observed.

The elevation at the seaward end of the dune access path is low relative to the adjacent dunes, leaving a discontinuity in the dune system. According to the 2019 volume calculation, this profile has a unit volume of 498 cy/ft. The beach profile at this monument benefits from its location updrift of the Charleston Harbor jetty and indications are that accretion will continue.

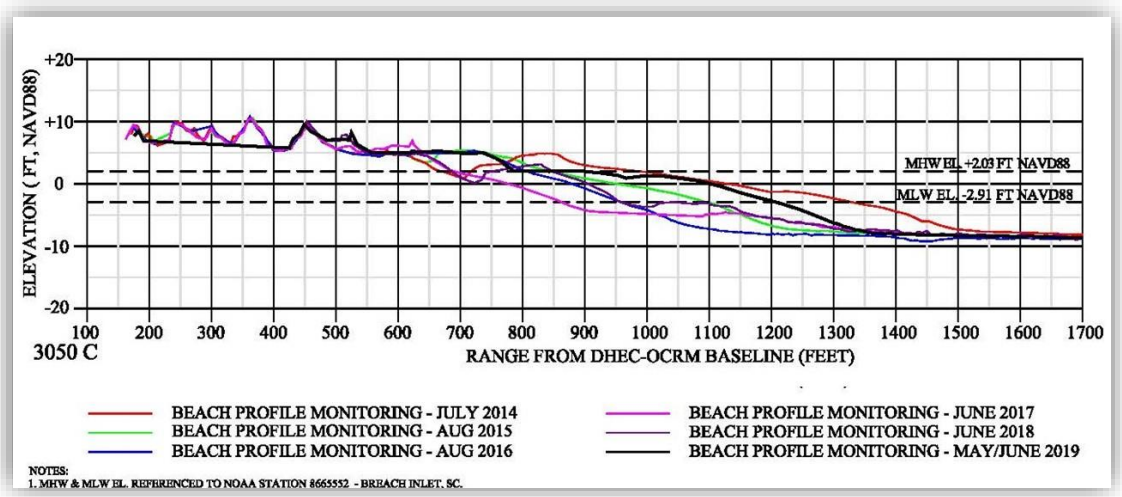


*Figure 16. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3050.*

*Figure 17. Ground photo taken at Monument 3050 looking northeast on August 4, 2016 (top) and June 6, 2019 (bottom). Note the sandbar attachment in 2019.*

*Figure 18. Ground photo taken at Monument 3050 looking southwest on August 4, 2016 (top) and June 6, 2019 (bottom). Note the sandbar attachment in 2019.*

3065

Monument 3065 is located along the long beach access path at Station 26, which traverses a beachfront marsh environment. Shoreline and beach profile data indicate that this is the widest maritime forest, beachfront marsh, dune and beach system on the island. Six inches of standing water was present along the beach access path in 2017, but the access path was dry in 2019.

This monument is near the sandbar attachment point, which fluctuates but in 2019 was located near Sta. 27.5. The bar comes onshore and then begins to spread in both directions alongshore.

The profile goes through cycles of erosion and accretion as new sand bars attach and the sand is dispersed alongshore. For example, past beach profile data indicated substantial beachface erosion following the 2014 attachment event (Figure 19) as the sediment spread along the beach. This year, beach width was reduced considerably as the sand spreads downdrift.

In 2019, a recent storm rack line reached the toe of vegetation. The dry beach was about 100 ft wide at high tide and exhibits a wide, gently sloping low tide terrace and a robust dune system (Figure 20 and Figure 21). According to the 2019 volume calculation, this profile has a unit volume of 374 cy/ft.

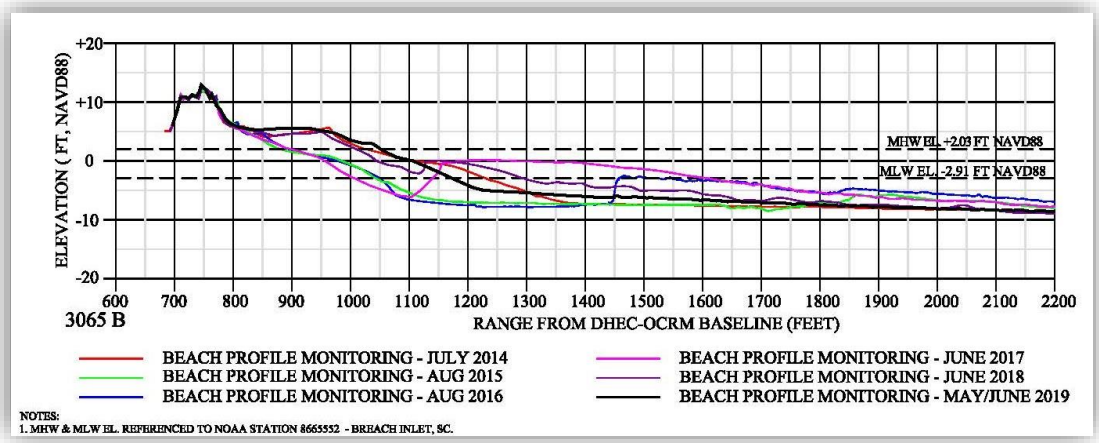


*Figure 19. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3065.*

*Figure 20. Ground photo taken at Monument 3065 looking northeast on August 4, 2016 (top) and June 6, 2019 (bottom).*

*Figure 21. Ground photo taken at Monument 3065 looking southwest on August 4, 2016 (top) and June 6, 2019 (bottom).*

3080

Monument 3080 is located along the long beach access path at Station 28.

The sand bar attachment point was located just to the west of this monument in 2019. The sand bar was in the process of migrating east and onshore toward monument 3080 (Figure 22). Profile data indicate that the berm configuration is similar to 2014 when a similar sand bar attachment event occurred. The beach to the east was in an erosional state (having not been the recipient of sand from a bar attachment event in several years) while the beach to the west was accreting thanks to the recent sand bar attachment.

The beach at this location displayed classic signs of accretion with a large ridge and runnel (attaching sand bar) and wide healthy dunes (Figure 23 and Figure 24). Dune vegetation is healthy and flourishing with a high foredune. Spring high tide is about 30 ft from the toe of vegetation.

According to the 2019 volume calculation, this profile has a unit volume of 543 cy/ft.

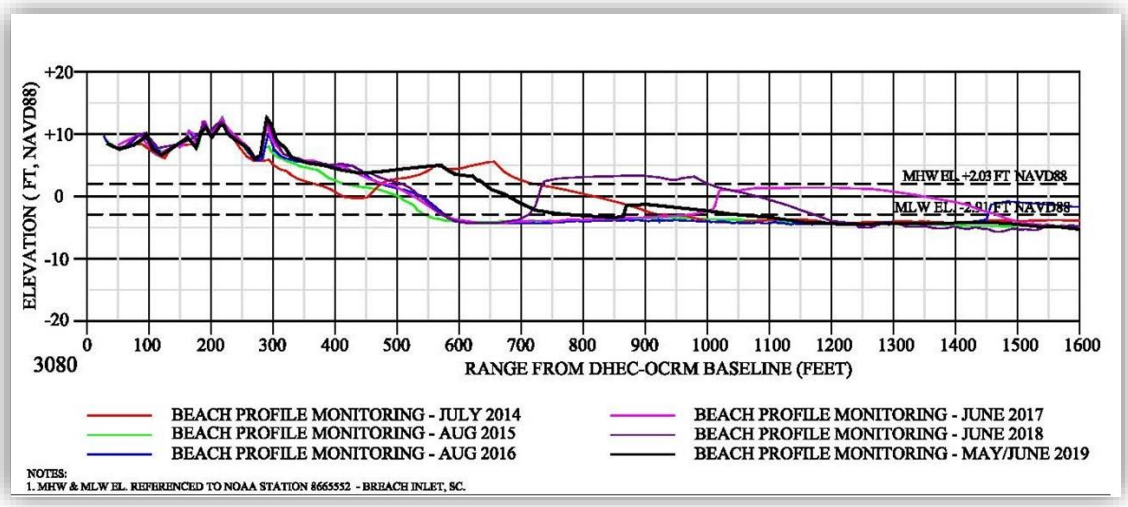


*Figure 22. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3080.*

*Figure 23. Ground photo taken at Monument 3080 looking northeast on August 4, 2016 (top) and June 11, 2019 (bottom). Note the sand bar attachment in 2019.*

*Figure 24. Ground photo taken at Monument 3080 looking southwest on August 4, 2016 (top) and June 6, 2019 (bottom).*

3083

Monument 3083 is located near Station 29 and is in an area of critical erosion. This profile represents the southwest end of the groin field along northeastern Sullivan's Island. The shoreline here has retreated nearly 300 ft since the last sand bar attachment event in 2014 (Figure 25), including the loss of three rows of low sand dunes. In 2019, conditions were no better. There is no recreational beach at high tide. Sand bags have been placed and/or exposed at the toe of the dune scarp. Groins and seawalls dominate this portion of the island.

Unfortunately, sand from the ongoing sand bar attachment event has not yet been transported to this area. This profile continues to be monitored closely.

This location marks the transition between the northeast end of the island, which has been stabilized with erosion control structures (Figure 26) and the wide, fluctuating beach of the central portion of the island to the southwest (Figure 27).

According to the 2019 volume calculation, this profile has a unit volume of 216 cy/ft.

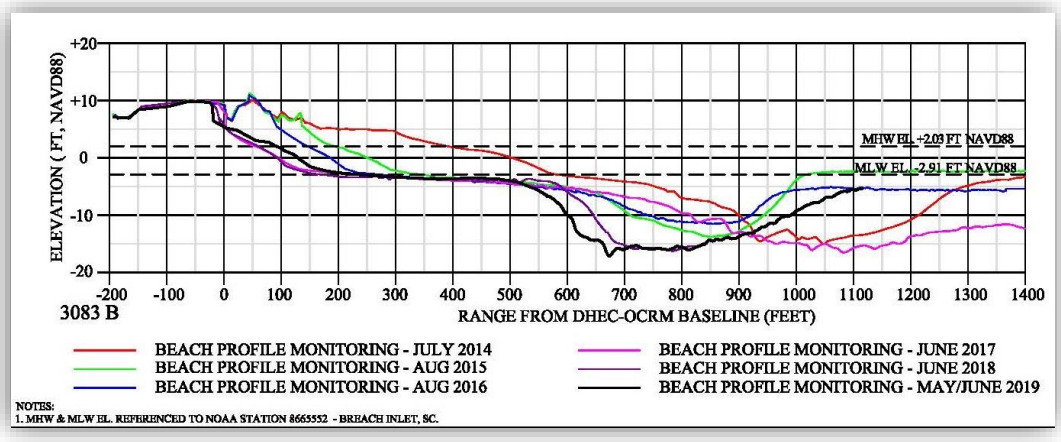


*Figure 25. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3083.*

*Figure 26. Ground photo taken at Monument 3083 looking seaward on June 11, 2018 (top) and looking northwest on June 6, 2019 (bottom).*

*Figure 27. Ground photo taken at Monument 3083 looking southwest on August 4, 2016 (top) and on June 6, 2019 (bottom). The entire dry beach in the 2016 photo had eroded by 2019.*

3085

Monument 3085 is located near Station 30. This area has not received sediment from a sand bar attachment event since 2014. Beach profile data indicates evidence of the 2014 sand bar attachment and the subsequent beachface erosion (Figure 28) but nothing similar since then. Although a sandbar is attaching to the island in 2019, there is no evidence of sediment delivery to this part of the island. No recreational beach exists at high tide.

This pocket beach between groins is highly erosional. No dunes are present in front of the houses. Despite the structures, erosion continues to dominate this portion of the island between sandbar attachment events (Figure 29). Erosion has become so severe in this area that a historic cannon structure which has been buried under the beach became exposed on the beachface this year (Figure 30). This profile will be monitored closely.

According to the 2019 volume calculation, this profile has a unit volume of 100 cy/ft.

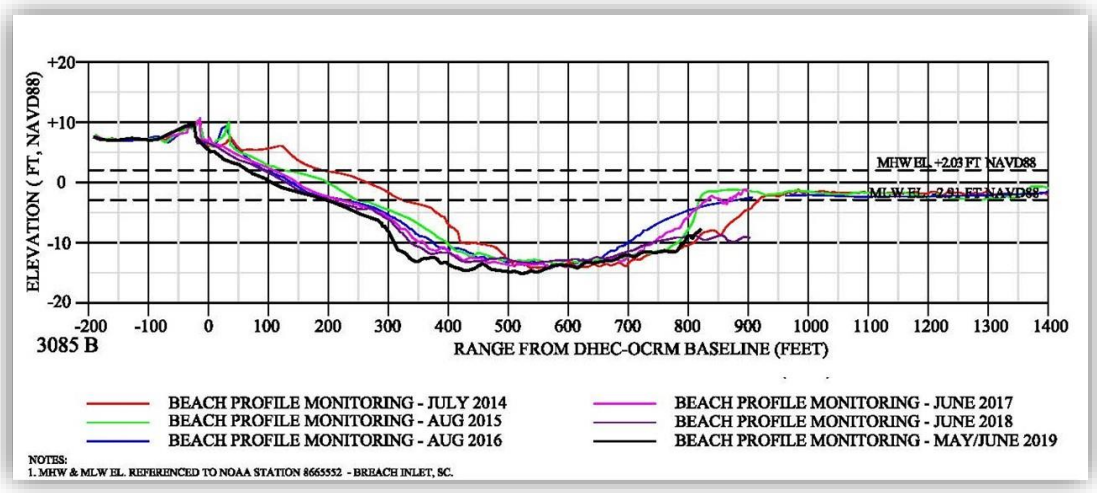


*Figure 28. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3085.*

*Figure 29. Ground photo taken at Monument 3085 looking northwest on August 4, 2016 (top) and June 6, 2019 (bottom). Notice the profile deflation under the deck in 2019.*

*Figure 30. Ground photo taken at Monument 3085 looking southwest on August 4, 2016 (top) and June 11, 2019 (bottom). Note the exposed cannon structure and loss of dunes in the background in 2019.*

3090

Monument 3090 is located just south of Station 31 on northeastern Sullivan's Island near Breach Inlet. It represents a small (<250 ft long) pocket beach between two groins. The beach is nearly completely armored. The beach profile has exhibited erosion despite the stabilization structures (Figure 31). No dry beach is exposed at high tide and no dunes are present. Upland erosion continued in 2019 with the high tide reaching nearly up to the road between the seawalls (Figure 32 and Figure 33).

According to the 2019 volume calculation, this profile has a unit volume of 117 cy/ft.

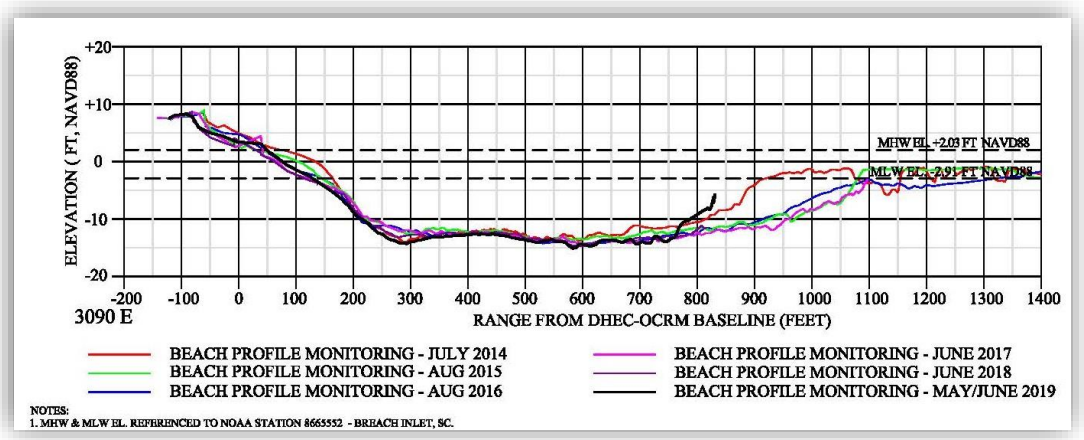


*Figure 31. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3090.*

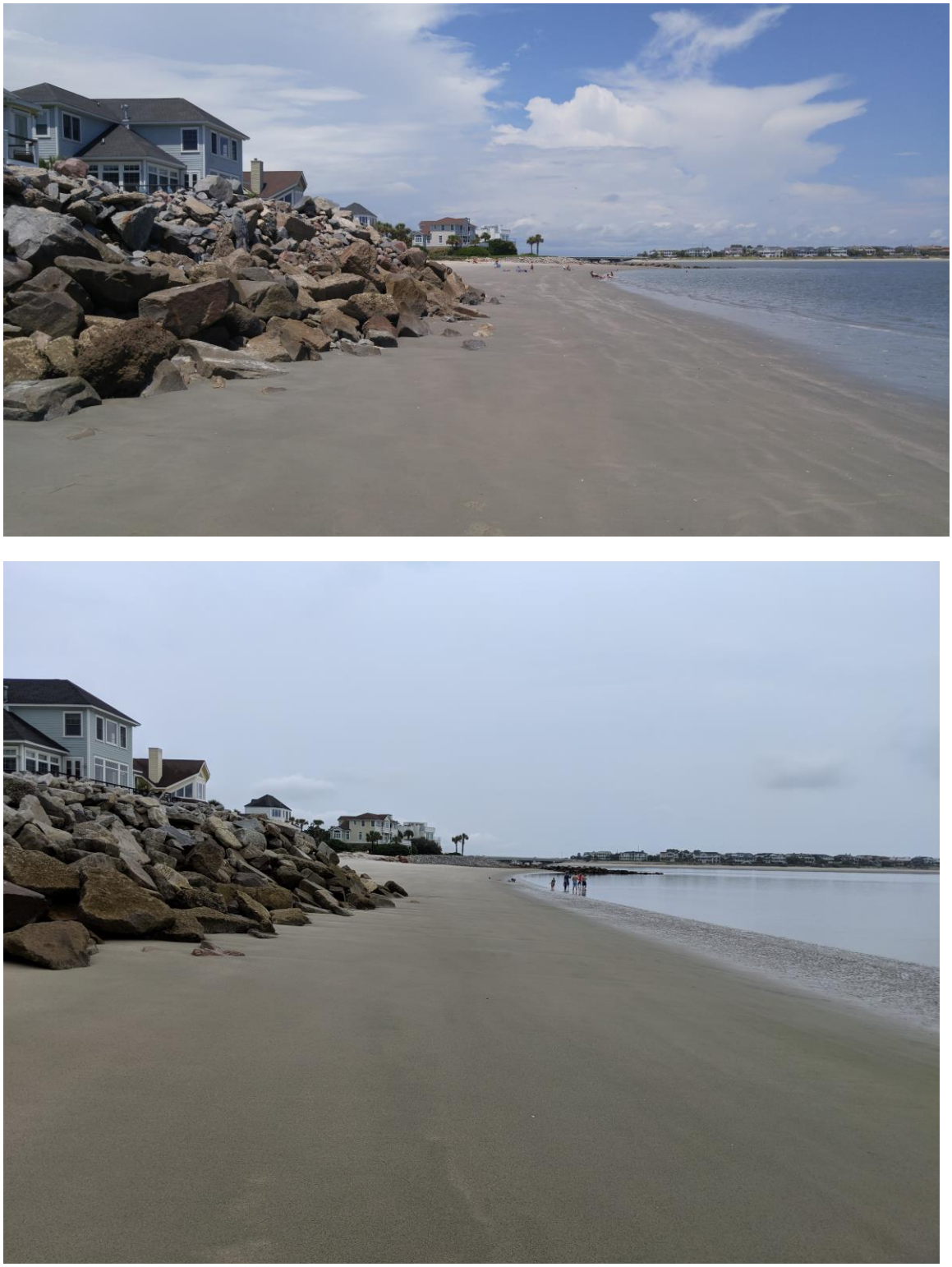

*Figure 32. Ground photo taken at Monument 3090 looking north on August 4, 2016 (top) and June 6, 2019 (bottom).*

*Figure 33. Ground photo taken at Monument 3090 looking southwest on August 4, 2016 (top) and June 6, 2019 (bottom).*

3092

Monument 3092 is located south of Station 32 on northeastern Sullivan's Island near Breach Inlet. This profile line represents a section of the island that has been armored with erosion control structures; however, erosion continues (Figure 34). In 2019, no high tide beach existed despite a recent small-scale beach and dune restoration project installed by one of the homeowners here. The structures have somewhat stabilized this portion of the beach, but erosion continues (Figure 35 and Figure 36).

According to the 2019 volume calculation, this profile has a unit volume of 111 cy/ft.

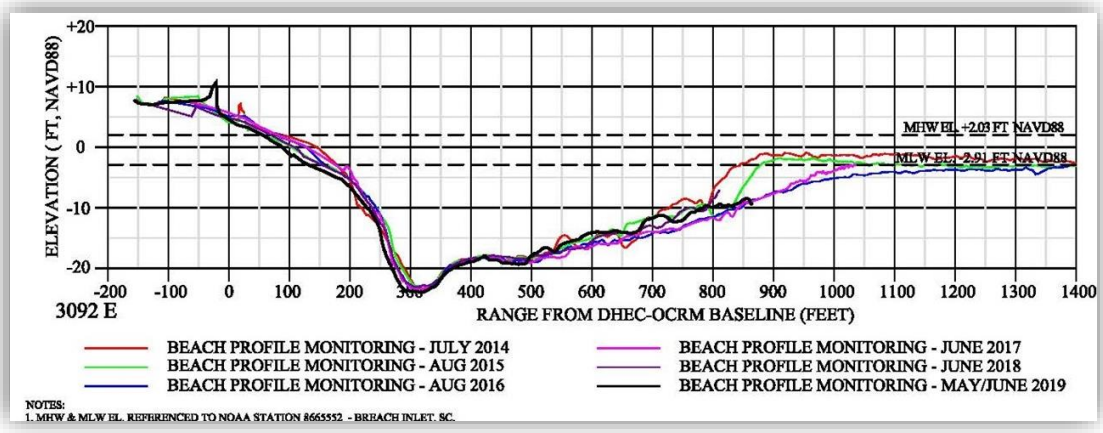


*Figure 34. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3092.*

*Figure 35. Ground photo taken at Monument 3092 looking north on August 4, 2016 (top) and June 6, 2019 (bottom).*

*Figure 36. Ground photo taken at Monument 3092 looking south on August 4, 2016 (top) and June 6, 2019 (bottom). The yellow house in the foreground of the 2016 photo was removed in 2017. Note the beach deflation in the background, exposing the riprap wall.*

3095

Monument 3095 is located on Station 32 at the northeastern tip of Sullivan's Island on Breach Inlet. It represents a cuspate beach anchored by erosion control structures (groins). The beach profile has exhibited little change over time due to the stabilization structures (Figure 37) with the exception of continuous upland erosion and beach face deflation. In June 2019, the upland "bluff" on the southwest side of the pocket beach had retreated significantly. The spring high tides are reaching the toe of vegetation and no high tide beach exists (Figure 38 and Figure 39).

According to the 2019 volume calculation, this profile has a unit volume of 178 cy/ft.

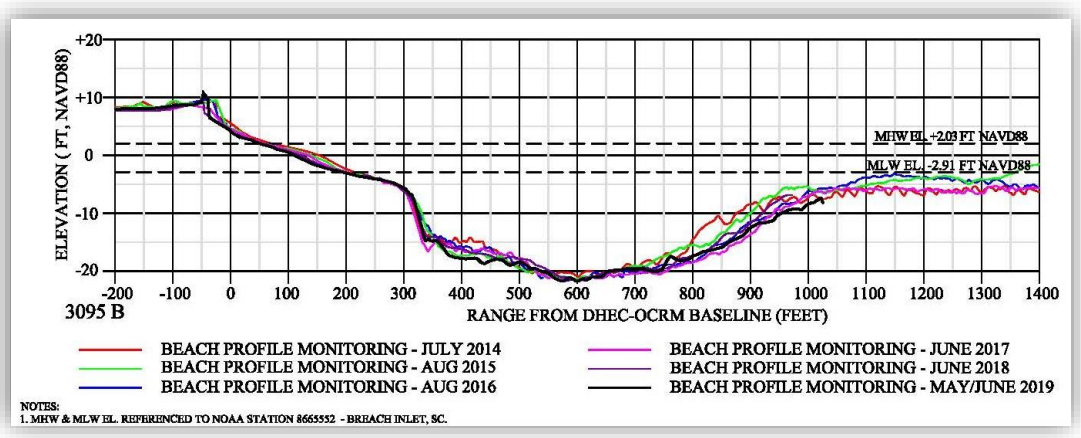


*Figure 37. Beach profile monitoring data from 2014-2019 in cross-section view at Monument 3095.*

*Figure 38. Ground photo taken at Monument 3095 looking north on August 4, 2016 (top) and June 6, 2019 (bottom).*

*Figure 39. Ground photo taken at Monument 3095 looking south on August 4, 2016 (top) and June 6, 2019 (bottom).*

# 5. Summary of 2019 Beach Monitoring Survey

This report provides an annual condition survey to monitor the Sullivan's Island beach. Beach profile data collected during August 2016, June 2017, June 2018, and June 2019 were compared to beach profile data collected by SCDHEC-OCRM in the summers of 2014 and 2015.

Analyses of the mean high water (MHW) position relative to the SCDHEC-OCRM Baseline and unit volume by monument were conducted. These analyses documented that the northeast end of the island, between Monuments 3083 and 3095, has little protective beach and dune system in place. Despite armoring with erosion control structures, erosion continues along this stretch of Sullivan's Island. Here, beachfront homes are located either on or seaward of the primary dune in vulnerable positions. Despite sand bar attachment events, sediment has not been delivered to this section in recent years.

The data documented a sandbar attachment event in 2014 and another that began in 2018. Most of the sediment from the 2014 attachment event has been transported downdrift, toward southwestern Sullivan's Island and the Charleston Harbor jetty. Data from 2019 indicate that sand bar attachment events result in a pattern of accretion and erosion along the central portion of the island. To date, there is no indication that the shoreline has advanced seaward since 2014 except at Station 19.

The beach at Station 19 is extraordinarily wide with a unit volume of 950 cy/ft due to the Charleston Harbor jetty. Between 2018 and 2019, the shoreline here retreated about 70 ft landward. As the recent sand bar attachment event provides sand to this region; however, it is expected to continue to advance as in previous years.

If the present management strategy is maintained, additional dune, beachfront marsh, and maritime forest progradation (seaward movement) may continue in the central portion of the island. It seems that the more frequent occurrence of king tides (specifically the higher than predicted high tides) may be controlling additional dune progradation somewhat. Continued annual monitoring is recommended. By better understanding the beach performance following sandbar attachment events, improved management strategies may become obvious.

In addition to the wide, accreting beaches in the central portion of the island, Sullivan's Island also has beach management challenges on the northeast end related to narrow beach widths and minimal storm protection. Several hot spots are being closely scrutinized.