

The Coastal Research Center

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NEW JERSEY'S DISTINCTIVE PUBLIC UNIVERSITY

Mr. Robert Smith, Administrator
Borough of Stone Harbor
9508 Second Avenue
Stone Harbor, New Jersey 08247

May 10, 2021

Dear Mr. Smith,

The Stockton University Coastal Research Center (CRC) completed the first of two scheduled seasonal surveys for 2021. The spring 2021 municipal oceanfront beach survey was completed on April 14th and 15th at the eight established sites in Stone Harbor. Semi-annual shoreline and sand volume changes were calculated between survey #57 (conducted in October 2020) and survey #58 to determine changes over the 2020 to 2021 winter season and review changes to the Borough beaches. This spring has presented significant beach berm losses seen between the Avalon boundary and the 95th Street profile site. From 95th Street south to the last profile at 123rd Street change has been considerably less with gains on the beach appearing at 112th to 123rd Streets. Storm activity commenced with two northeasters in mid- to late-December, followed by two minor events in January and the worst event February 1st and 2nd that produced berm erosion to the seaward toe of the dunes. Since the February 2021 event, storm activity declined with low pressure systems moving west of the Jersey shore to the northeast not setting up in the Atlantic Ocean off the coast between North Carolina and Delaware to build serious northeast wave events.

As of the fall of 2020 the Coastal Barrier Resource System (CBRS) issue remains unsettled for the US Army Corps of Engineers (USACE) resuming taking sand from the Hereford Inlet borrow zone. However, there is a potential that a compromise option is being discussed where the established borrow area in the ebb-tidal shoals could be literally carved OUT of the CBRS and returned to open area not subject to CBRS rules and restrictions. Also, as to whether the new US Department of Interior Secretary will honor the previous Secretary's letter, Mr. Bernhardt, that provided relief from the USACE restriction from moving sand from Hereford Inlet to Stone Harbor beaches is a question as well?

The following is a list of the eight monitoring sites surveyed in the spring 2021 study, their corresponding locations and defined beach cell:

Profile Number	Street Location	Beach Cell
SH-82	82 nd Street	North Boundary – 84 th St. Groin
SH-90	90 th Street	84 th & 92 nd Street Groins
SH-95	95 th Street	92 nd & 98 th Street Groins
SH-103	103 rd Street	98 th & 106 th Street Groins
SH-108	108 th Street	106 th & 111 th Street Groins
SH-112	112 th Street (paper)	111 th & 114 th Street Groins
SH-116	116 th Street	114 th & 122 nd Street Groins
SH-123	123 rd Street (paper)	122 nd & the Terminal Groins

Stone Harbor Beach Performance

The 2017 maintenance effort was conducted by the NJ State Div. of Coastal Engineering and the USACE. The combined effort with State and federal sand supplies resulted in 320,000 CY (from Townsends) plus 394,000 CY (from Hereford), totaling 714,000 CY in new sand added to the municipal shoreline. No new sand was added during the 2019 maintenance cycle due to the restriction on federal funds to access the Hereford Inlet material. The Borough determined that mining the dune material found to be in excess of the USACE design beach cross section template mostly within the zone between 112th and 116th Streets was not entirely consistent with overall shore protection management goals. Thus far, no additional sand placement is anticipated until the Hereford Inlet CBRS issue is resolved other than sand moving from Avalon into Stone Harbor transported by littoral currents along the beachfront. Efforts continue to extract the authorized sand source

Table 1 displays the semi-annual changes in shoreline positions and sand volumes from the recent survey #57 conducted in October 2020 to survey #58 from April 2021. Shoreline changes are calculated by comparing the zero datum positions in the recent survey to the previous survey. Sand volume changes are expressed in cubic yards of sand per linear foot of beachfront (yds³/ft.); the total beach volume change is calculated using this value. The distance (cell width) between groins along the beachfront of Stone Harbor was measured between the centerlines of adjacent groins. Each cell's net sand volume change is computed by multiplying each cross-section volume change by its corresponding groin cell width.

Table 1
Stone Harbor Semi-Annual Comparison (Surveys 57 & 58)
Shoreline and Sand Volume Changes
October 2020 to April 2021

Profile Number	Shoreline Change (feet)	Volume Change (yds³ / ft)	Cell Distance (feet)	Cell Volume Change (yds³)
SH-82	-57	-37.99	1,381	-52,468
SH-90	-42	-0.71	2,240	-1,588
SH-95	21	-5.16	1,680	-8,662
SH-103	-30	-24.81	2,208	-54,785
SH-108	-28	-21.22	1,433	-30,408
SH-112	-12	-12.55	804	-10,089
SH-116	-30	-16.95	2,273	-38,518
SH-123	-8	-1.29	1,058	-1,367
Total Volume Change =				-197,886
Offshore losses				-129,207

The winter of 2020 – 2021 saw extensive sand volume loss along the northern Stone Harbor shoreline particularly at the 82nd Street location. The 90th Street site had substantial shoreline retreat, but without the

large amount of sand volume removed offshore. No site gained sand across the entire distance profiled (dune, beach and offshore), but 2 of 8 sites saw modest sand volume gains on the beach and dune. The loss on the beach at 116th and 123rd Streets were quite minimal. Northeast storm damage could be attributed to the February 1, and 2, 2021 event that was the most severe for the winter. The 108th Street site was the only location with dune damage. Other events were relatively minor but added to the loss numbers. Last year the oceanfront loss was under 400 cubic yards, but this year losses amounted to 197,886 cubic yards with three quarters occurring offshore.

Table two repeats last year’s assessment of the sand volume changes offshore versus those on the beach or dune system. The dunes and beaches gained 22,734 cubic yards last year, while this spring they lost 68,678 cubic yards of material. The coming summer season always provides some cross-shore accumulation on the beaches, so the annual difference may not be so great.

Table 2
Stone Harbor Study Area – Beach & Dunes Above the Zero Datum (Surveys 57 v 58)
Shoreline and Sand Volume Changes
October 2020 to April 2021

Profile Number	Shoreline Change (feet)	Volume Change (yds³ / ft)	Cell Distance (feet)	Cell Volume Change (yds³)
SH-82	-57	-12.88	1,381	-17,780
SH-90	-42	-9.63	2,240	-21,560
SH-95	21	0.14	1,680	242
SH-103	-30	-6.88	2,208	-15,187
SH-108	-28	-5.95	1,433	-8,531
SH-112	-12	1.58	804	1,273
SH-116	-30	-2.78	2,273	-6,326
SH-123	-8	-0.77	1,058	-809
Total Volume Change =				-68,678

The northern two beach cells lost significantly, largely offshore. The two northern sites accounted for over 39,000 cubic yards of the total loss seen. Two locations saw modest beach and dune sand gains. If one subtracts the beach losses from the total loss number from Table 1, the offshore region shed 129,207 cubic yards of material. This sand moves parallel to the shoreline, occasionally migrating to the beach as offshore sand bars move landward and eventually attach to the beach. However, the majority of the offshore material winds up in the ebb tidal shoals of Hereford Inlet where it has been successfully recovered and pumped back to the municipal beaches by the efforts of the federal, state and local funding streams since the initial work in 1997.

Individual Site Descriptions

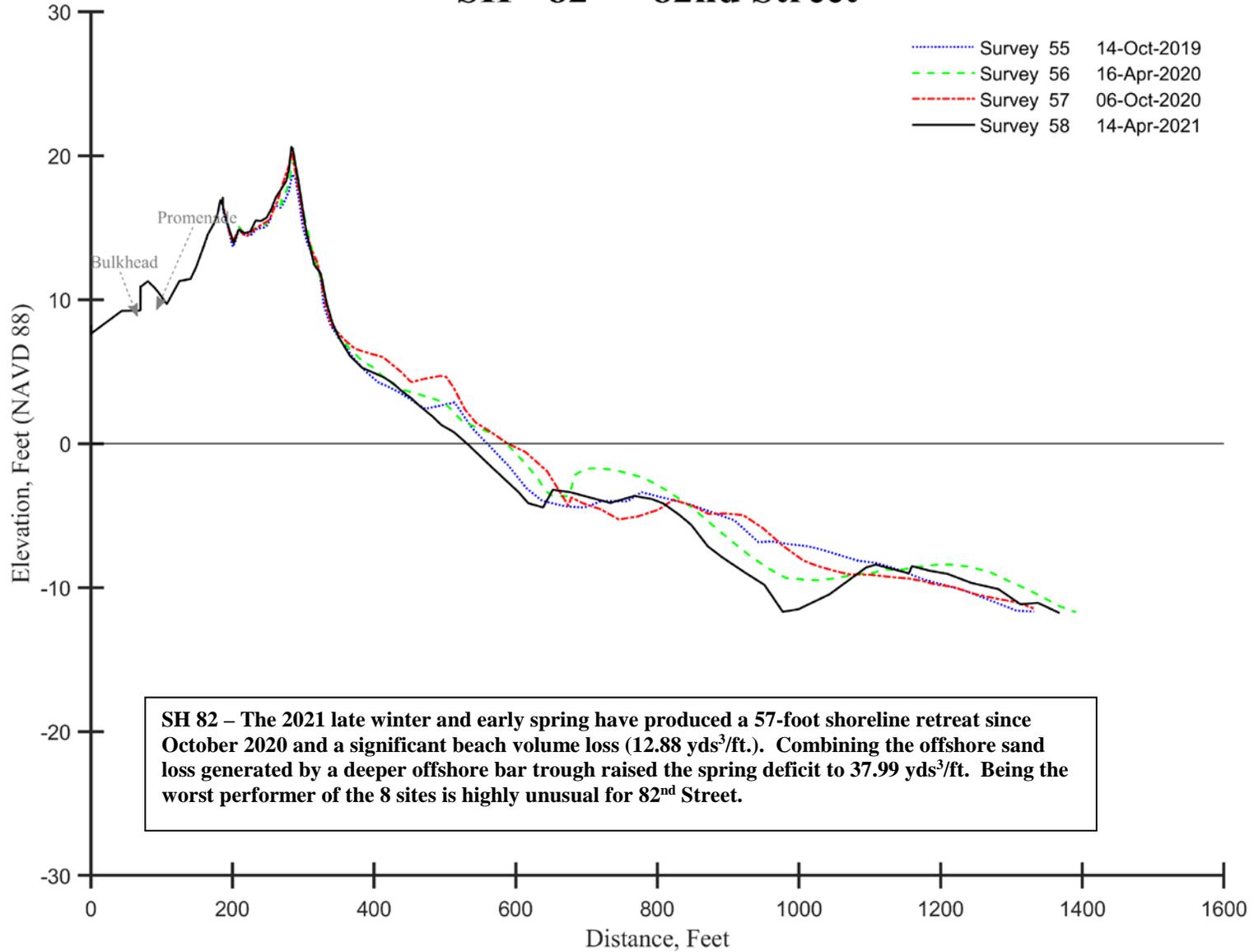
Below is a review of data collected at each of the eight individual sites. A photo is included for each location to show conditions as of April 2021. Comparison plots are provided to show beach and nearshore profile changes from the fall of 2020 to spring 2021.

SH-82, located at 82nd Street, this beach received sand later in 2017 derived from Townsend's Inlet. This April 16, 2020 view shows the sand accumulated at the dune fencing over the past 2 winters and a wide beach looking north towards Avalon.



Figure 1. View to the north at 82nd Street. The photo was taken on April 14, 2021. This view duplicates the perspective from last spring with a little more sand deposited on the seaward dune slope at the nearly buried fencing. The beach is narrower with storm debris almost to the seaward dune toe.

Borough of Stone Harbor - Semi-Annual Comparison SH - 82 82nd Street

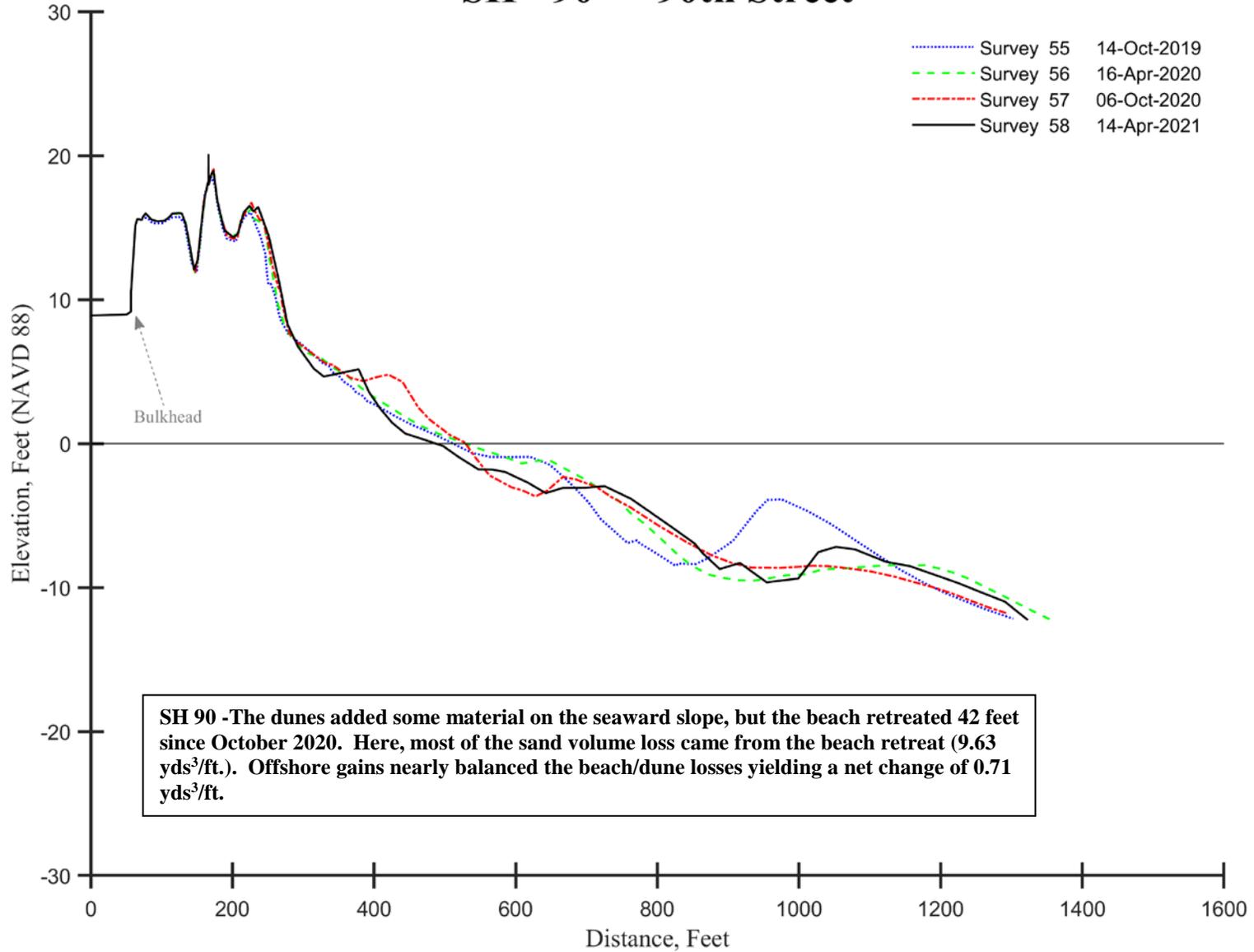


SH-90, located at 90th Street this beach also received sand during spring of 2017 adding 44.63 yds³/ft. The beach width sustained the dune's seaward slopes without any erosion. Storm debris does cover much of the dry beach indicating the winter storm activity.



Figure 2. View to the south taken from the foredune toe on April 14, 2021. The dune remains unscathed by storm damage with the debris line 20 or so feet seaward of the seaward dune toe. The beach width is less, but not substantially so.

Borough of Stone Harbor - Semi-Annual Comparison SH - 90 90th Street

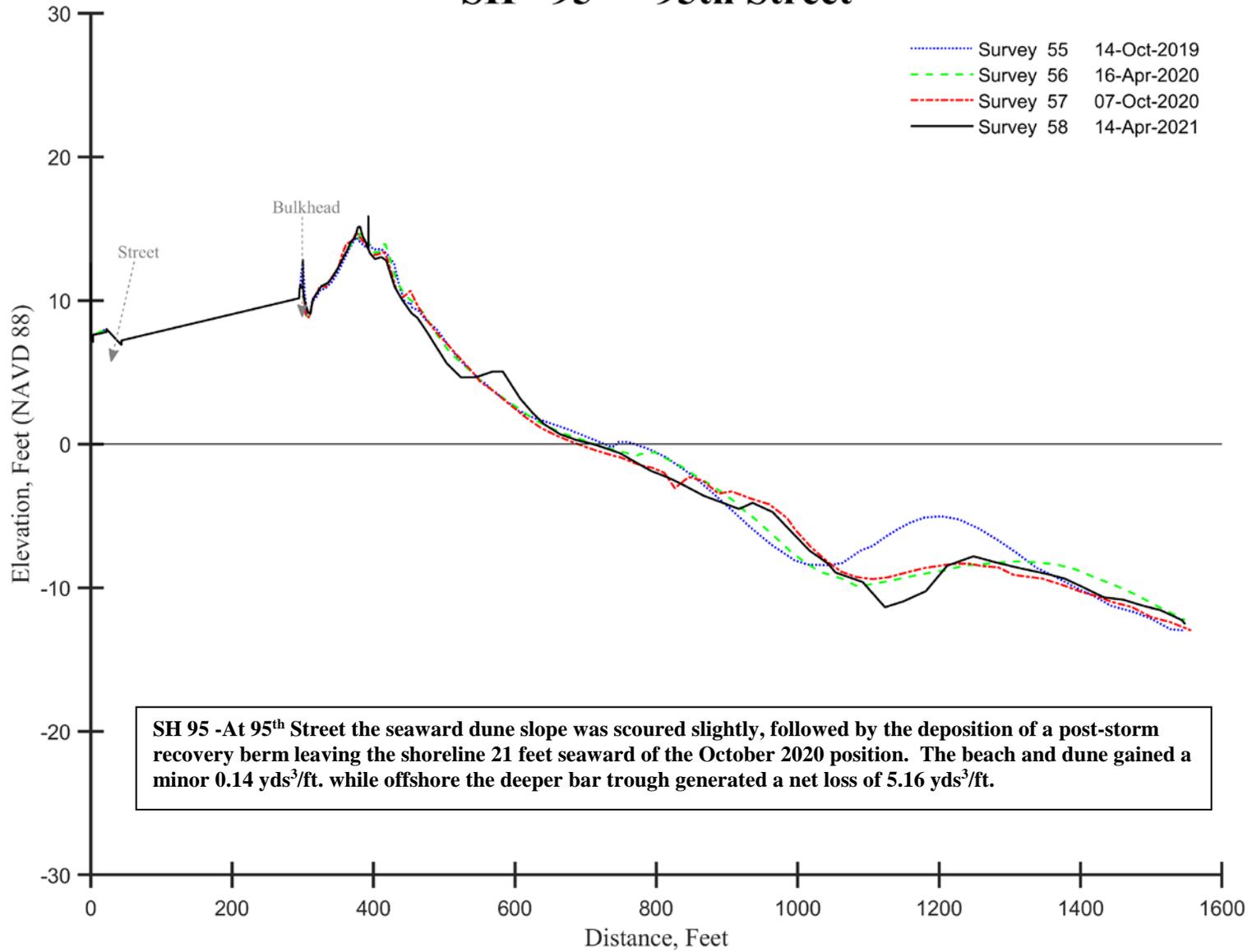


SH-95, located at 95th Street this site received sand by June 12, 2017, providing a 99-foot wider beach as 53.73 yds³/ft. were placed above the zero elevation. The beach remains in decent shape with sand deposited by the wind in the dunes in substantial quantities over the past 3 years. Wave run-up did remove the earlier sand deposited on the seaward dune toe slope to the fence line.



Figure 3. This view to the south along the recent wrack line taken April 14, 2021 shows the beach and dunes just south of the handicapped access ramp.

Borough of Stone Harbor - Semi-Annual Comparison SH - 95 95th Street

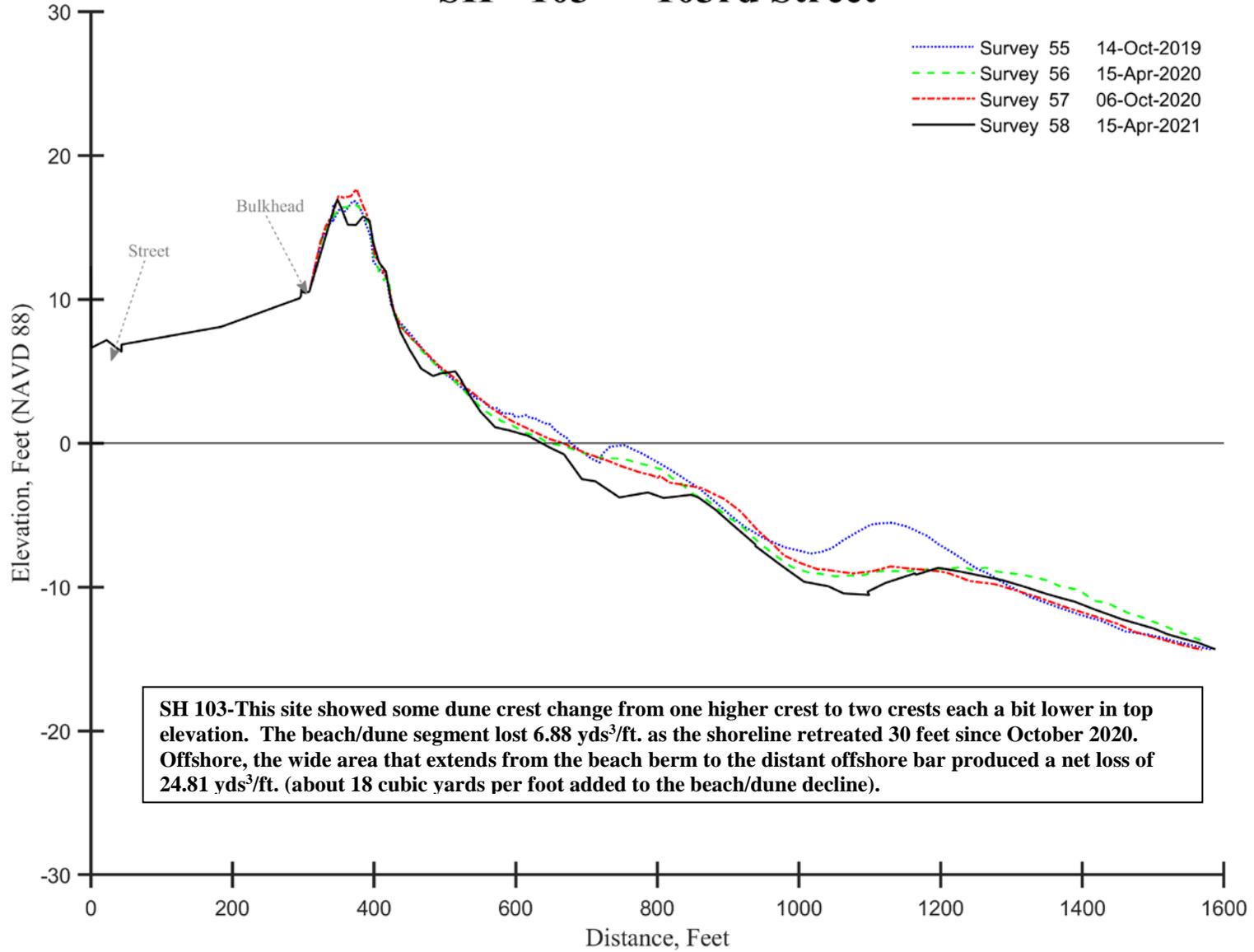


SH-103, the 103rd Street beach gained sand at the dune fencing burying the most recently placed row of fencing (2017). The beach width declined by 30 feet but remained sufficient to protect the dunes from erosion.



Figure 4. View to the south at 103rd Street taken April 15, 2021. There has been extensive sand deposition around the 2017 fence installation that has buried the fence. The site suffered a minor loss in beach width, but no dune damage this past winter.

Borough of Stone Harbor - Semi-Annual Comparison SH - 103 103rd Street

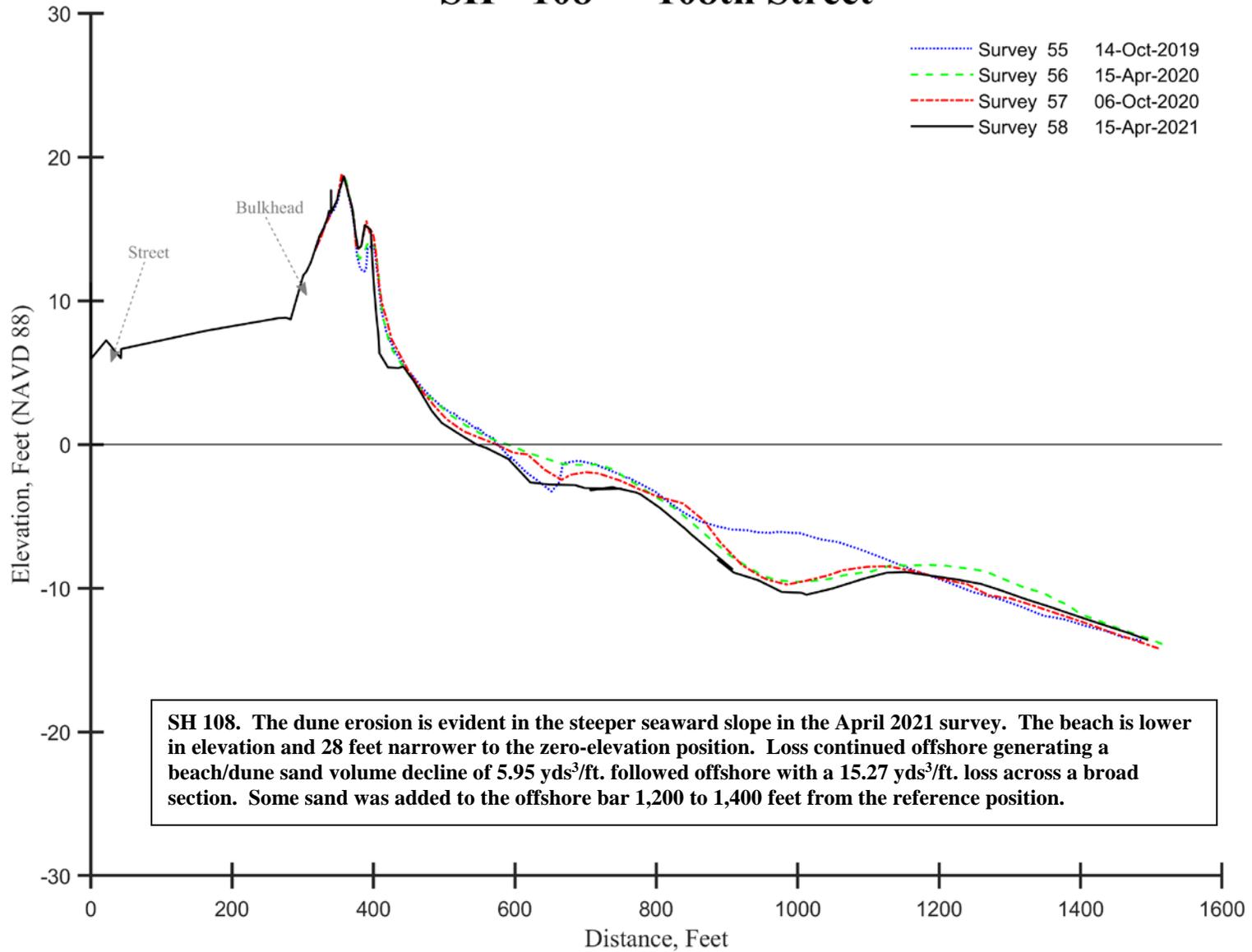


SH-108, the project beach at 108th Street was restored by March 27, 2017. Since the project, the dunes have been brushed by wave erosion, with this winter's activity the most damaging. The cut scarp in the photograph is hard evidence of modest dune erosion.



Figure 5. View to the south taken on April 15, 2021. At this site, most likely the February 1, 2nd northeast storm cut into the seaward dune slope generating the scarp in this picture and destroyed the 2017-installed fencing in the immediate vicinity of the profile transect. The shoreline retreated 28 feet leaving a narrow beach that waves continue to run up to the dune toe.

Borough of Stone Harbor - Semi-Annual Comparison SH - 108 108th Street

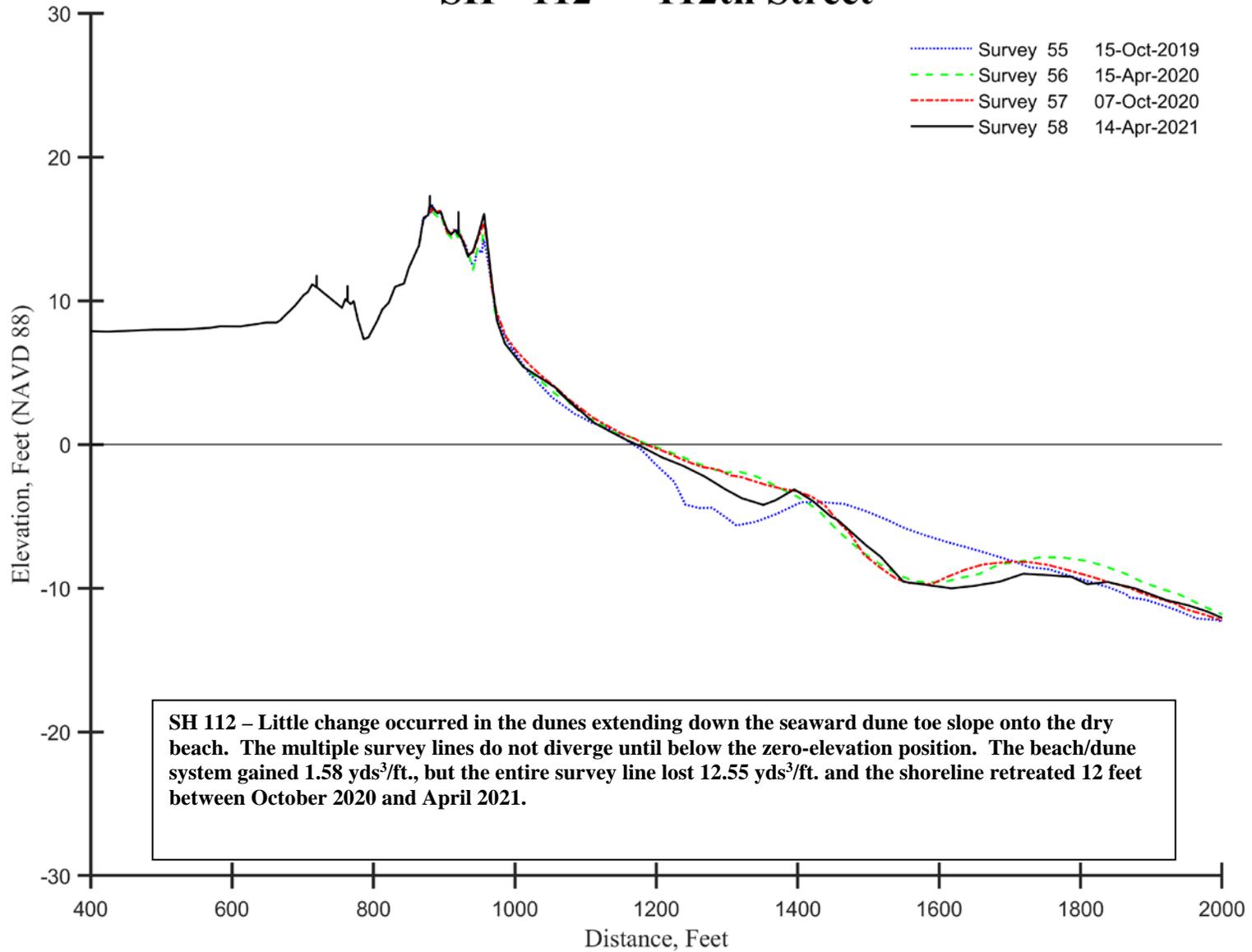


SH-112. The 112th Street beach re-nourishment was completed by March 27, 2017. The new fencing is all but buried by April 2021 and the beach width remains excellent.



Figure 6. View to the south taken April 15, 2021 along the foredune crest. Wind deposition is universally present where the 2017 fence installation is almost buried and lobes of sand deposited by the wind extend from almost every plant cluster. The 112th Street beach is wider at this location.

Borough of Stone Harbor - Semi-Annual Comparison SH - 112 112th Street

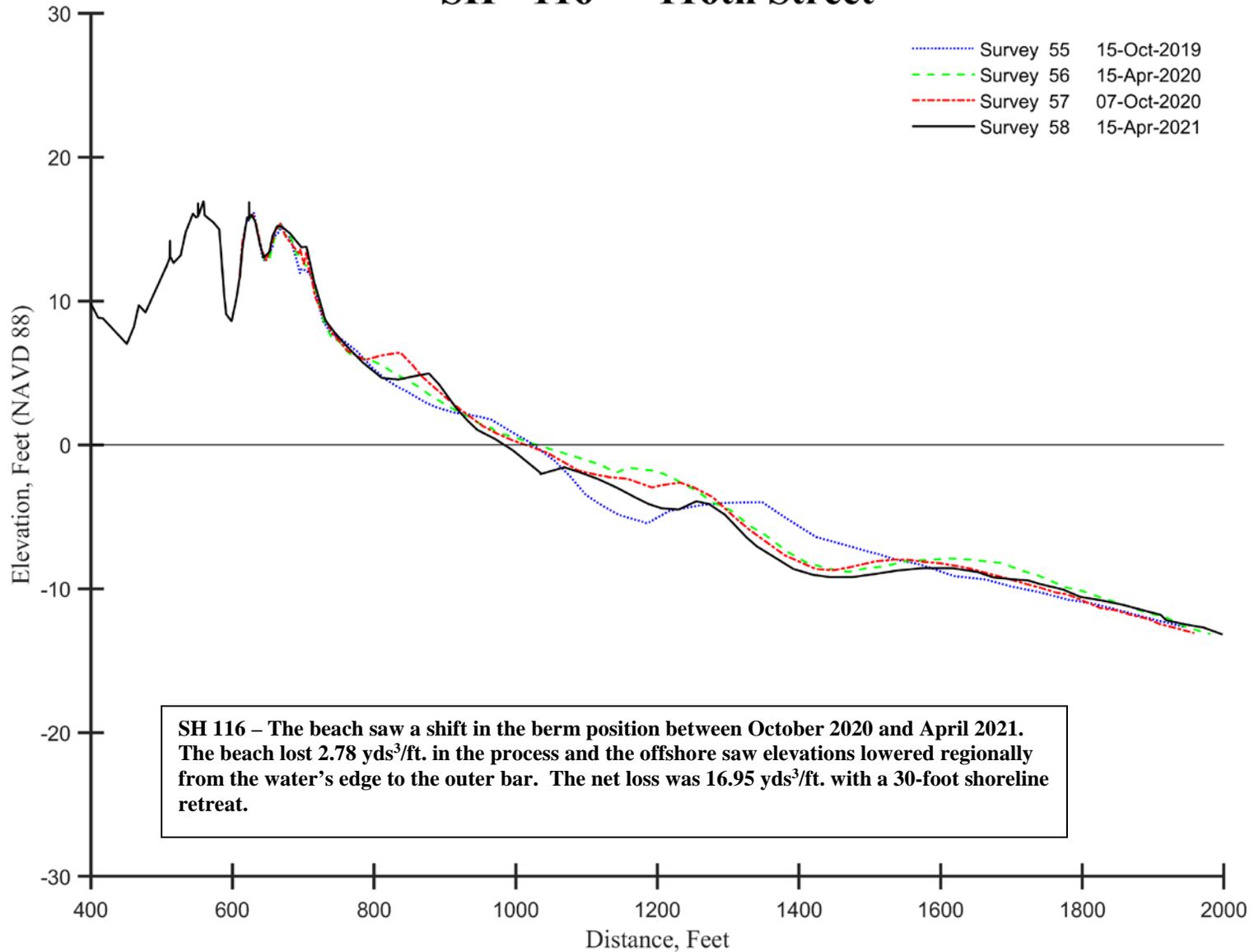


SH-116, This location has the widest dunes with foredunes advancing onto the USACE beach template. The 2017 fencing is buried, and the beach width is extensive.



Figure 7. View to the south at 116th Street taken on April 15, 2021, showing extensive dune accretion at the newest fence line with dune plants advancing onto the beach beyond the fence. The beach is the widest in Stone Harbor and allows the wind to scour the dry sand and move it into the dune field.

Borough of Stone Harbor - Semi-Annual Comparison SH - 116 116th Street

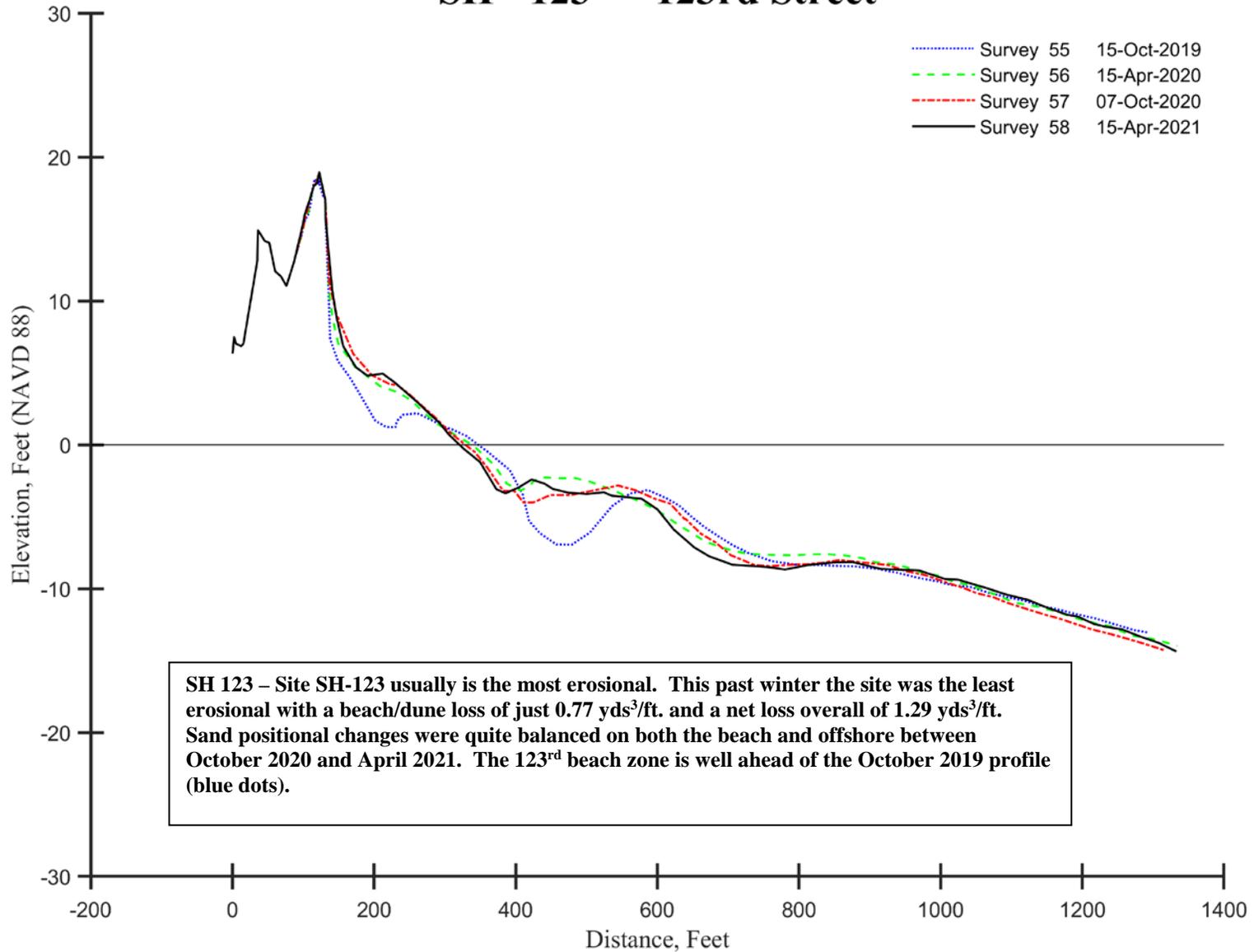


SH-123, site 123 is located just north of the terminal groin and the start of South Point. A new fence was installed since October 2020. The beach is narrow, but the winter storms do not appear to have eroded into the dune's seaward toe. The outer row of posts are for sea kayak moorings.



Figure 8. View to the south taken on April 15, 2021, looking toward the terminal rock groin. A new row of sand fence is in place with the winter damage to this dune less extensive than seen most winters. The wave run-up reaches just past the fence line.

Borough of Stone Harbor - Semi-Annual Comparison SH - 123 123rd Street



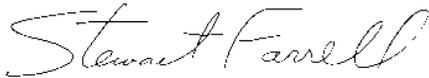
Summary

The February 2021 northeast storm seems to have differentially affected the two northern profile locations with the largest sand volume losses and shoreline retreats. The middle two sites (103 and 108) saw over 20 cubic yard sand volume losses and 20 plus-foot shoreline retreats. However, the southern beaches performed somewhat better with the 123rd Street site continuing last year's erosion free conditions. The 714,000 cubic yards of new sand placed on Stone Harbor beaches during 2017 continues to provide extensive storm protection and adequate recreational conditions.

This winter season, the 123rd Street locality did see the smallest overall sand volume loss of any site in the Borough. This has been a fairly unusual situation due to the ease with which sand passes around or over the terminal rock groin to South Point. The narrowest beach which did see minor dune erosion was 108th Street where the dry beach width is about 140 feet from the dune toe to the mean high-water line.

The CRC's next semi-annual survey is scheduled for early in the fall 2021 to assess the Borough beaches following the summer time period.

Sincerely,

A handwritten signature in cursive script that reads "Stewart Farrell".

Dr. Stewart Farrell
Executive Director
Coastal Research Center