

The Coastal Research Center

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NEW JERSEY'S DISTINCTIVE PUBLIC UNIVERSITY

Mayor Corson and Township Committee
Township of Upper
P.O. Box 205
Tuckahoe, New Jersey 08250

September 10, 2022

Dear Mayor Corson and Committee Members:

As the summer moved into September, the Stockton University Coastal Research Center (CRC) surveyed the Strathmere beaches on August 30, 2022, as the third quarter review for 2022. The data is concerning between Corson's Inlet and Tecumseh Avenues where dune erosion is now evident as contrasted to the June 2022 situation. Vertical cliffs surround Seaview Avenue having removed all the seaward dune slope up to and past the crest elevations. There remains about a third of the width of the dune crest, but loss rates will be rapid given the exceedingly narrow beach seaward of the dune scarp. The erosion continues south to the Williams Avenue location leaving a linear scarp on that beach as well. The Tecumseh Avenue profile shows limited erosion at the seaward toe of the dune that grew seaward over time on the dry beach. This fact contrasts with the sand accumulation at the site on both the dry beach and offshore at the largest magnitude of any of the 6 locations.

However, south of Tecumseh Avenue the beach widens out with extensive back beach areas between the berm and the dune toe. This report will focus on the problem areas.

The six quarterly monitoring sites are as follows:

UT-1	First Street at the border with Sea Isle City (NJBPN site #120)
UT-2	2400 Commonwealth Avenue
UT-3	Jasper Avenue
UT-4	Tecumseh Avenue
UT-5	Williams Avenue (NJBPN site #121)
UT-6	Seaview Avenue at Corson's Inlet

Table 1 shows the sand volume and shoreline change values calculated for each of the six monitoring sites. It displays the values for the period from June to late August 2022. Individual shoreline (feet) and sand volume ($\text{yds}^3/\text{ft.}$) changes are displayed along with an average volume change between sites. The average of two adjacent profile volume changes multiplied by the distance between sites determines a net cell volume change. Summation of the net cell volume changes produces a total net sand volume change for the Strathmere oceanfront beaches.

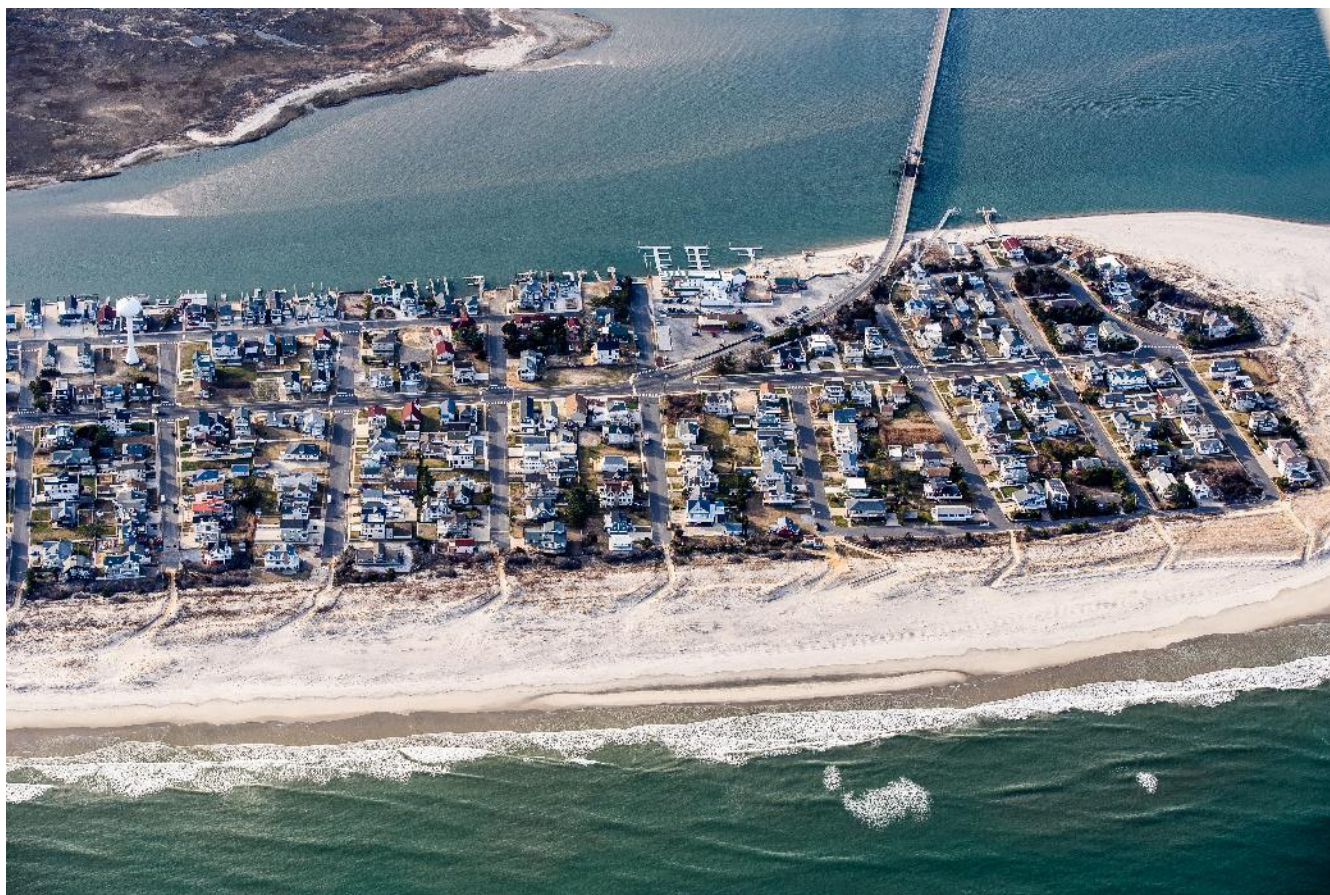


Figure 1. March 16, 2022, aerial view of the middle and northern Strathmere shoreline showing the beach including Seaview Avenue. Beach width by mid-March remained as it had been in December 2021, so the losses seen in the June survey occurred from the April and May northeast storms. (Photo by Ted Kingston).

Table 1.
Sand Volume and Shoreline Position Changes at Six Strathmere Survey Sites
June to August 2022

Profile	Shoreline Change (feet)	Volume Change (yds ³ /ft)	Avg. Volume Change (yds ³ /ft)	Distance Between (feet)	Net Volume Change (yds ³)
<i>Southern Township Boundary</i>					
UT-1	20	-2.26			
			0.23	1,410	320
UT-2	-4	2.71			
			-0.71	2,938	-2,073
UT-3	-27	-4.12			
			10.30	2,297	23,668
UT-4	25	24.73			
			1.44	1,323	1,902
UT-5	-45	-21.85			
			-53.39	911	-48,634
UT-6	-157	-84.92			
<i>Northern Township Boundary</i>					
				Total Volume Change =	-24,817

The spring loss in sand volume for the Strathmere oceanfront amounted to 266,664 cubic yards with the loss concentrated at the mid-section of Strathmere (Tecumseh to Williams Avenues). The summer erosion was focused on Seaview Avenue with the most sand added to the Tecumseh Avenue site. Sand volume changes at the southern three locations was minimal in either direction along with minor shoreline position shifts. Strathmere actually accumulated 25,570 cubic yards of sand between Sea Isle City and Williams Avenue only

to shed 48,634 cubic yards between Williams and Seaview Avenues. While far less than the loss seen winter and spring, the visual impact on the Seaview Avenue beach is profound.

Table 2 shows the changes seen just in the dunes and across the dry beach to the zero-elevation point on each profile transect.

Table 2
February to June Sand Volume Changes on the Dunes & Beach Only

Profile	Shoreline Change (feet)	Volume Change (yds³/ft)	Avg. Volume Change (yds³/ft)	Distance Between (feet)	Net Volume Change (yds³)
<i>Southern Township Boundary</i>					
UT-1	20	3.52			
			5.43	1,410	7,659
UT-2	-4	7.34			
			3.12	2,938	9,153
UT-3	-27	-1.11			
			1.00	2,297	2,291
UT-4	25	3.10			
			-4.21	1,323	-5,568
UT-5	-45	-11.52			
			-33.48	911	-30,499
UT-6	-157	-55.44			
<i>Northern Township Boundary</i>					
			Total Volume Change =		-16,963

The three of four southern locations gained sand on the beach with UT-3 only losing 1.11 yds³/ft. The beach lost material at both Williams and Seaview with 55.44 yds³/ft. being removed above zero elevation at UT-6.

Table 3
June to August Sand Volume Changes Offshore Only

Profile	Shoreline Change (feet)	Volume Change (yds³/ft)	Avg. Volume Change (yds³/ft)	Distance Between (feet)	Net Volume Change (yds³)
<i>Southern Township Boundary</i>					
UT-1	20	-5.78			
			-5.21	1,410	-7,339
UT-2	-4	-4.63			
			-3.82	2,938	-11,226
UT-3	-27	-3.01			
			9.31	2,297	21,377
UT-4	25	21.62			
			5.65	1,323	7,470
UT-5	-45	-10.33			
			-19.91	911	-18,135
UT-6	-157	-29.48			
<i>Northern Township Boundary</i>					
			Total Volume Change =		-7,853

The sand loss offshore was mitigated by a large increase at Tecumseh Avenue with modest losses north or south of that location. The offshore loss at UT-6 was half that lost on the beach leaving the Strathmere deficit

offshore at -7,853 cubic yards. Clearly the beach took the worst of the erosion and the summer decline in sand volume was far more modest than the 200,000 plus cubic yards lost last winter. Its impact was simply focused on the Seaview Avenue site for all to see very clearly.

Individual Survey Sites on the Strathmere Oceanfront:

These locations are listed from south to north, starting at the Sea Isle City/Strathmere boundary and ending at the north curb line for Seaview Avenue south of the boundary with the NJ State Corson's Inlet Park.

UT-1, First Avenue (NJBPN #120).

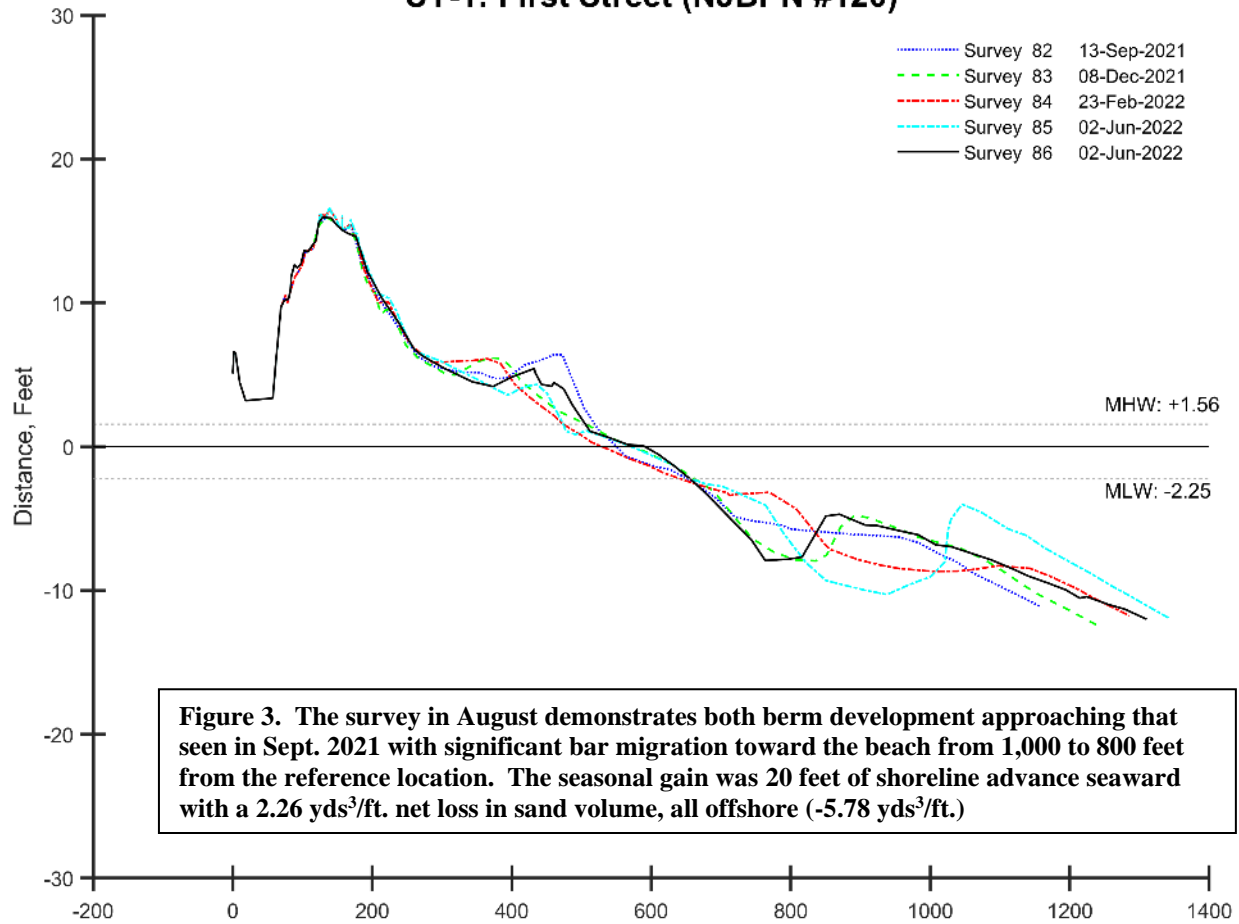
This site positioned near the boundary between Sea Isle City and Strathmere, has a 36-year survey history. Following the federal project, the dune crest height is 15 feet NAVD88, while width at the toe is approximately 160 feet. The beach width extends another 300 feet seaward to the MHW line with a berm crest height of approximately 5-6 feet NAVD88.

The tiny berm that developed on the June 2nd cross section became a feature comparable to that seen on the Sept. 2021 survey. The deep offshore bar trough became less expansive as the bar moved 200 feet closer to the beach.



Figure 2. This view to the north across the seaward dune slope on August 30, 2022, shows the continued advance of dune grass progression onto the wider dry beach. Island dunes are appearing on the back beach as the wind produces high spots that vegetate. The summer beach is 20 feet wider than it was in June.

Township of Upper, Strathmere - Seasonal Comparison **UT-1: First Street (NJBPN #120)**



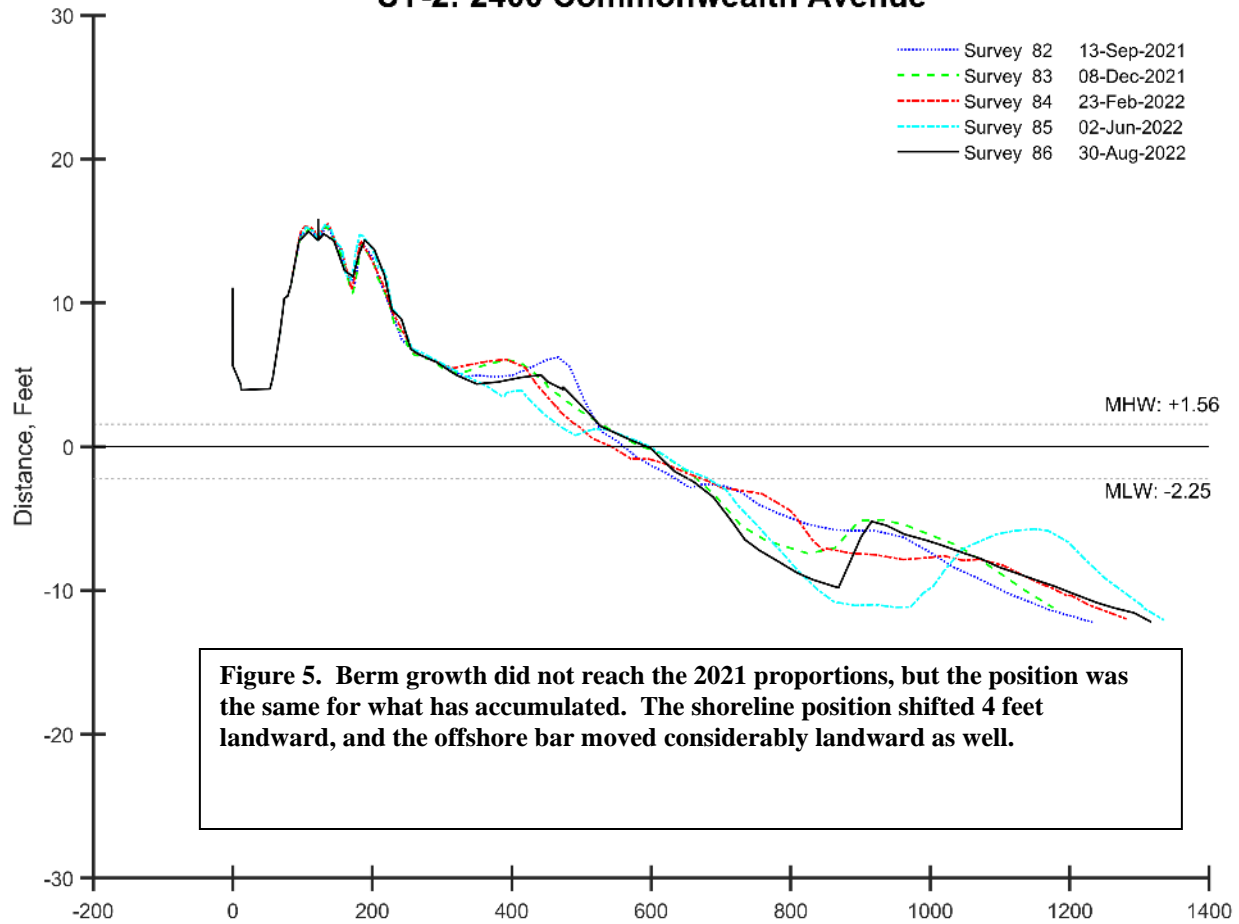
UT-2, Located at 2400 Commonwealth Avenue.

The site is located along the southern undeveloped eastern side of Commonwealth Avenue across the road from 2400 Commonwealth Avenue. The current dune crest elevation is 15 feet NAVD 88 and 160 feet in width at the toe. The beach extends an additional 300 feet seaward from the dune toe to the MHW line. This cross section performed similar to the UT-1 site to the south with minimal beach sand loss and a very large bar developed offshore. The berm developed at the same location as it appeared in Sept. 2021, but not as elevated. The offshore bar moved landward as well (150 feet).



Figure 4. The dune toe slope has generously expanded since the federal project was completed and gradually merges with the dry beach as grass plants colonize toward the ocean. The wide beach remained as it was in June with a four-foot shoreline retreat. The site gained 2.71 yds³/ft. all of it on the beach (7.34 yds³/ft.)

Township of Upper, Strathmere - Seasonal Comparison UT-2: 2400 Commonwealth Avenue



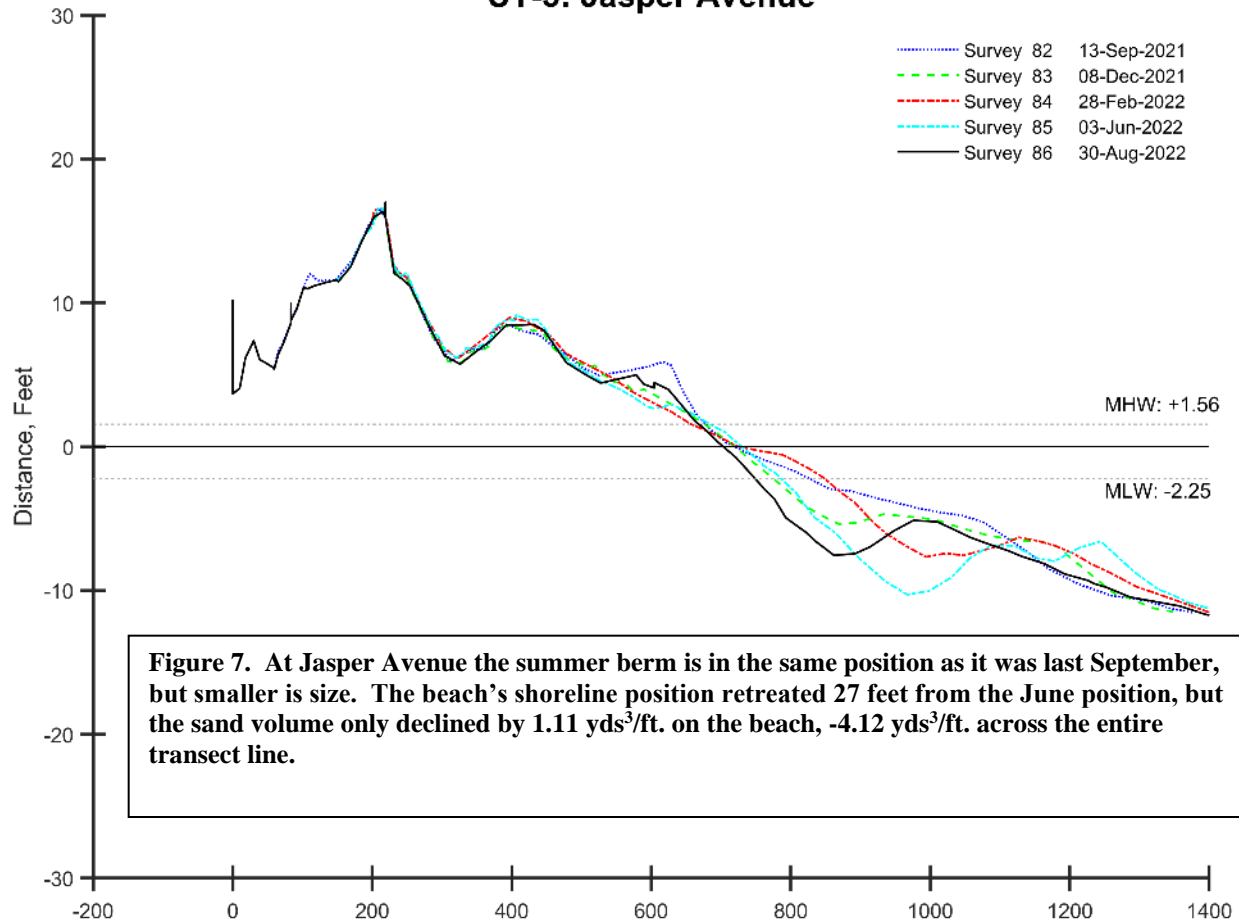
UT – 3, Jasper Avenue.

This site is located at Jasper Avenue, where development of property on the eastern side of Commonwealth Avenue is virtually complete. There was a 27-foot shoreline retreat landward between June and August, but the sand volume on the beach decreased marginally by 1.11 yds³/ft. Another 3.01 yds³/ft. was removed offshore as the bar configuration shifted landward significantly.



Figure 6. A view across the continually growing line of dunes that started 4 years ago as separate islands of vegetation, now amalgamated into a foredune ridge of considerable significance to shore protection. The dry beach width is reduced by at least half, but the sand in strategic reserve is far larger than that residing just in a flat back beach zone 350 feet wide.

Township of Upper, Strathmere - Seasonal Comparison UT-3: Jasper Avenue



UT – 4, Tecumseh Avenue.

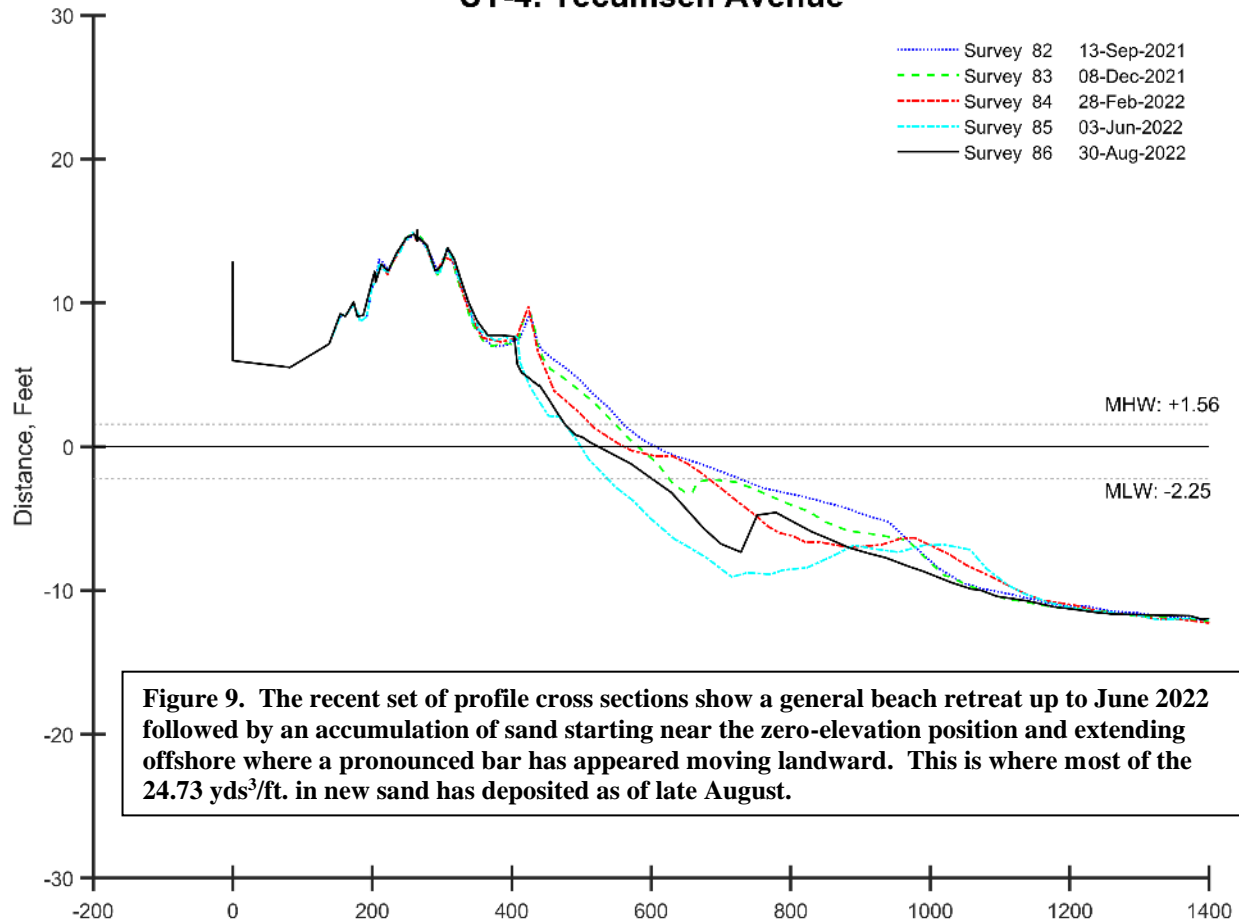
This site provides data on the transition in the beach orientation and taper into a zone of influence of Corson's Inlet tidal dynamics on the northern beaches. The timber bulkhead jogs landward south of Sherman Avenue one block south of Sumner Avenue, because of a natural setback in the shoreline.

Tecumseh Avenue was the beneficiary of nearly all the sand accumulation seen during the summer of 2022. The beach gained 3.10 yds³/ft. while the offshore region accumulated 21.62 yds³/ft. The shoreline advanced 24 feet seaward as sand filled in the deep trough that appeared immediately offshore as of the June 2022 survey. This material was most likely derived from the erosion seen further north along the beachfront.



Figure 8. This June 2, 2022, view to the north shows a narrower beach since the February 2022 and earlier surveys shown in Figure 9 and with a scarp cut into the toe of the foredune slope at Tecumseh Avenue. The complication with this is that this site was the only location where sand accumulation occurred on both the beach and offshore in any magnitude between June and late August.

Township of Upper, Strathmere - Seasonal Comparison **UT-4: Tecumseh Avenue**



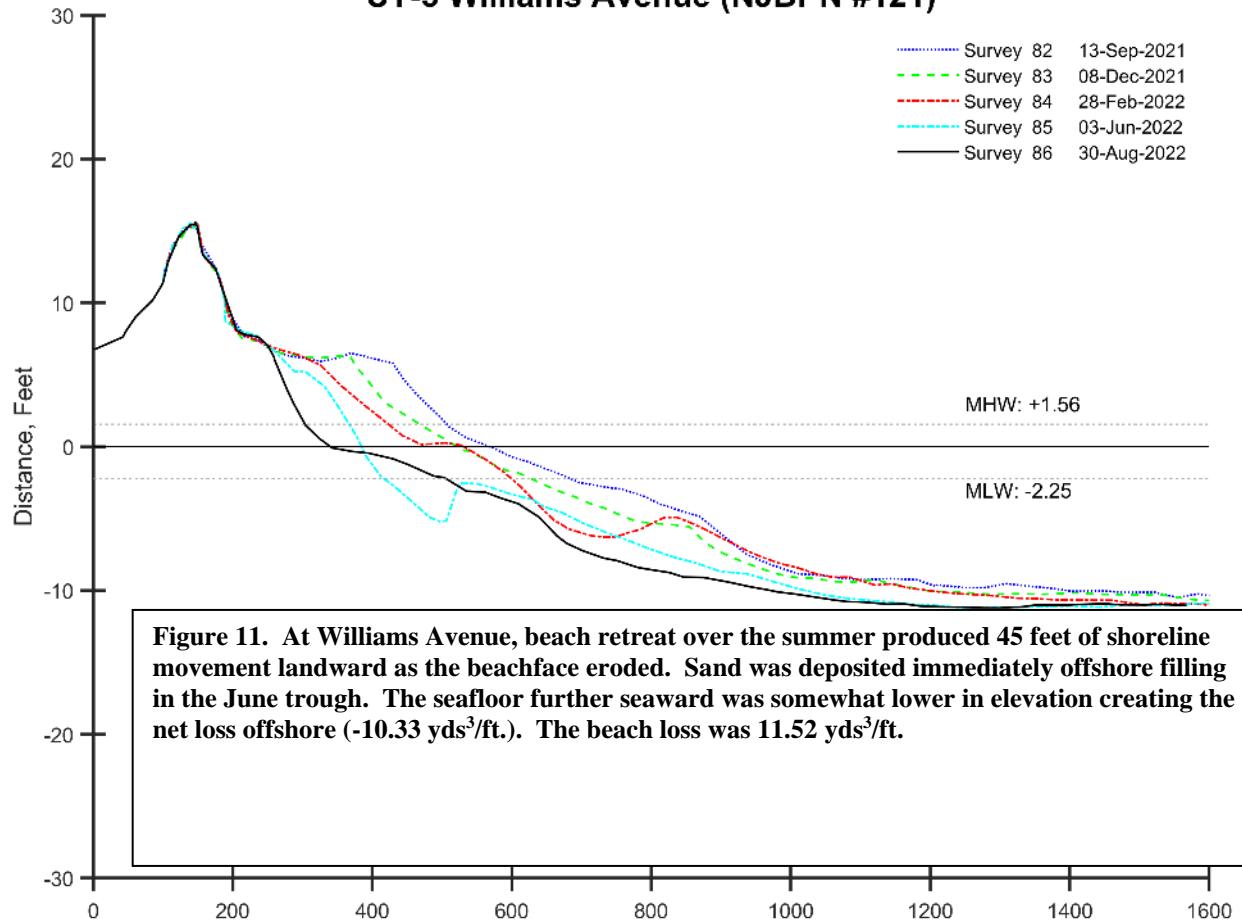
UT – 5, Williams Avenue (NJBPB #121).

This site is located near the southern limit for direct inlet influences. Beach width decreased by 45 feet as of late August accompanied by a net loss of 21.85 yds³/ft. in sand volume split evenly between the beach and offshore. This erosion is tied into the greater losses observed further north toward Corson's Inlet.



Figure 10. The late August view to the south shows a narrower beach without dune damage and a relatively flat transition to the offshore region.

Township of Upper, Strathmere - Seasonal Comparison UT-5 Williams Avenue (NJBPN #121)



UT – 6, Seaview Avenue near the Park Boundary.

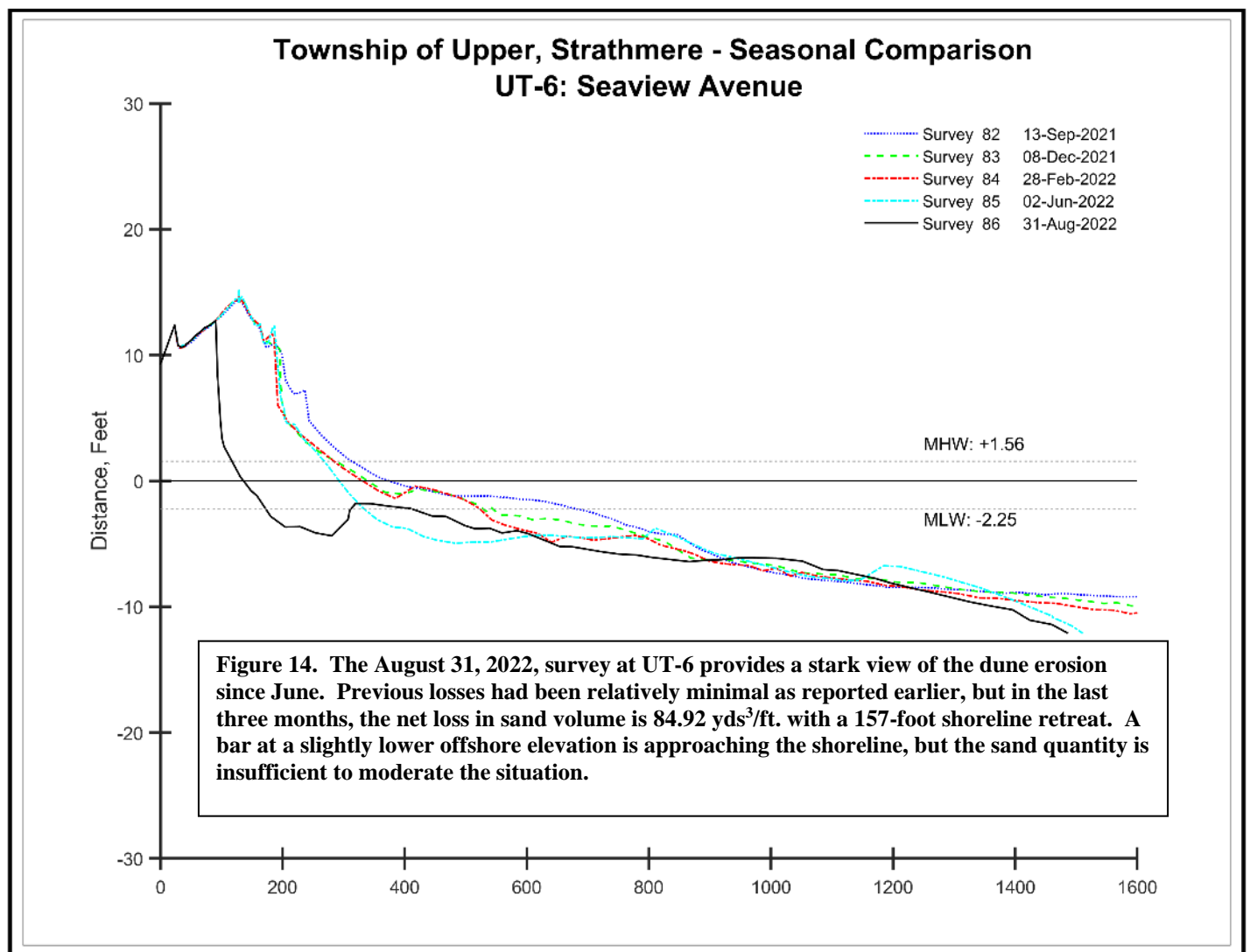
This site is located adjacent to Corson's Inlet. This makes it vulnerable to rapid beach changes from inlet dynamics and northeast storms. To mitigate these losses, the recent federal project created a wide bump out in the beach width. Shoreline retreat during 2022 started relatively slowly with 9 feet by late February, and 38 additional feet as of June 2022. Between June and August 30th, the erosion critically intensified with a retreat of 157 feet in 3 months of summer conditions. The remnant sand fencing present in February was gone by June, but the pathway fence posts at the scarp edge in February were still present in the June view (Figure 12). Figure 13 shows the steep scarp that has eroded past the dune crest into the wider back slope to the roadway. There is less than 100 feet of sand between the scarp and Seaview Avenue.



Figure 12. The June 2, 2022 view to the south at the Seaview Avenue dune shows the original arrangement of pathway posts present on the beach seaward of the scarp in the same position as the February 2022 picture showed. Up to the June survey date, the beach loss was minimal, while offshore some vertical erosion took place generating the 17.81 yds³/ft. loss in sand volume. The beach and dune losses were just 1.14 yds³/ft. of that total between February and June 2022.



Figure 13. By August 30, 2022, the dune crest had been compromised and erosion was creeping into the landward dune slope toward Seaview Avenue. There is a very narrow beach seaward of the scarp so even with surf conditions this mild, scarp erosion was occurring. A significant bar lies just offshore that could moderate the narrow beach width if it reaches the shoreline soon.



Summary:

From Tecumseh Avenue south, the Strathmere oceanfront was relatively stable with sand accumulation focused at the Tecumseh Ave. site. This material was probably derived from the erosion seen on the northern beaches. Between Tecumseh and Williams Avenues there is a transition to erosional conditions. Williams Avenue retreated 45 feet while Seaview Avenue lost 157 feet in zero-elevation shoreline position.

The very sudden shift from marginal stability at Seaview Avenue seen between September 2021 and June 2022 vanished over three months during completely calm summer wave conditions without any storm events at all. Weather conditions over that interval were dominated by southeast wind conditions that historically have favored sand migration toward Corson's Inlet. However, the inlet proximal beach was severely eroded leaving a small offshore bar as the only reservoir of sand likely to move onto the beach zone. Inlet-related tidal current and wave refraction processes have emerged as the probable cause for this shoreline erosion.

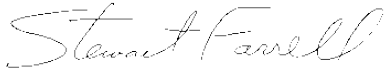
According to the US Army Corps of Engineers' webpage fact sheet on the Great Egg Inlet to Townsend's Inlet Shore Protection project maintenance timeline, Strathmere is scheduled for renourishment:

Upcoming periodic nourishment - the project is scheduled for periodic nourishment with construction expected to take place in 2023 (Dwight Pakan, Project Manager).

<https://www.nap.usace.army.mil/Missions/Civil-Works/Coastal-Storm-Risk-Management/Great-Egg-Harbor-Inlet-to-Townsend's-Inlet/>

The CRC will conduct the final 2022 survey in December. Please contact the Coastal Center with questions.

Sincerely,

A handwritten signature in cursive script that reads "Stewart Farrell". The signature is written in a dark ink and is positioned above the printed name.

Dr. Stewart Farrell
Executive Director
Coastal Research Center