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NEW JERSEY'S DISTINCTIVE PUBLIC UNIVERSITY

HISTORICAL REVIEW OF OCEANFRONT SHORELINE CHANGES SINCE 1986 IN NORTH WILDWOOD, CAPE MAY COUNTY, NEW JERSEY

Introduction:

Repetitive surveys of New Jersey coastal beaches commenced in the fall of 1986 in the aftermath of damages from Hurricane Gloria that could not be substantiated with any type of detailed survey data. The NJDEP introduced the New Jersey Beach Profiles Network in 1986 to establish over 100 survey sites between Sandy Hook and Cape May Point with several others on Raritan and Delaware Bay shorelines. The Coastal Research Center (CRC) has been tasked with conducting fall and spring (since 1994) surveys at the established sites every year since. Results are tabulated and presented as an annual report to the Office of Coastal Engineering (OCE). Every five years the CRC generates a review of the changes recorded in the shoreline position and the amount of sand volume lost or gained at each of the sites. In 2021 the 35-year report was delivered and excerpts from it are presented below to show the magnitude of the shoreline sand volume and position differences between the 15th Avenue site in North Wildwood and the Cresse Avenue site in the City of Wildwood.

15th Avenue, North Wildwood, NJ:

This location is the closest to Hereford Inlet and about 3,500 feet south of the inlet jetty at 2nd Avenue at the city oceanfront. The site lies to the immediate south of the North Wildwood lifeguard headquarters on the beachfront set at a timber piling in front of the building toward the dunes.

In 1986 the beach was 1,500 feet wide with island dunes of significant elevation scattered along the oceanfront. These had developed at points where natural debris had been placed from raking the beach during the season. Sand accumulated, plants grew, and these island dunes were impressive along with the distance folks had to traverse between the public streets and the water's edge.

The "figure 3" below is from the 2021 spring beach report to the City of North Wildwood showing the northern beaches including the lifeguard headquarters in September 1987 with the wide primary dunes along Kennedy Boulevard and the island dunes on the wide beach extending almost 2,000 feet seaward from Kennedy Boulevard. The tide channel arrangement in Hereford Inlet acted to focus sand deposition immediately seaward of the oceanfront in North Wildwood where it migrated onto the beach shoreline expanding the beaches.

Figure 3. A September 1987 view of the northern oceanfront beach in No. Wildwood showing the original dunes, the massively wide beach complete with 7 dune islands seaward where beach raking debris generated large plant zones on the beach. Note the huge island shoal in Hereford Inlet dividing the inlet into two diverse channels, the one next to North Wildwood hard against the City development with no existing sand beach seaward of the rock revetment at that time. All inlet ebb-tidal sand transport was being deposited on the extensive lobe pushing seaward at 8th and 9th Avenues by another 300 feet. The 15th Avenue lifeguard building is located at the southern end of the oceanfront vegetated dunes and little vegetation if any was present seaward of the boardwalk.
Photo by S. Farrell

Shoreline retreat commenced immediately in 1987 with 200 feet of landward retreat of the zero-elevation position. The sand volume remained relatively constant until 1994 while the shoreline retreated approximately 300 feet landward. By 1995 erosion was manifest with an annual 50 to 100 cubic yards of sand per foot of beach sand volume loss continuing until 2005. The total retreat amounted to 1,140 feet taking the island dunes and just under 600 cubic yards of sand from each foot of oceanfront locally. Between 2005 and 2009 the situation stabilized at the retreated position.

In 2009 a cooperative beach restoration project was undertaken with the NJDEP OCE designing, contracting for, and funding 75% of the cost for a 1.35 million cubic yard beach nourishment project pumping sand from Hereford Inlet's ebb-tidal shoals. Almost 400 cubic yards of sand per foot of shoreline were deposited at 15th Ave. advancing the shoreline 400 feet seaward.

Between 2009 and 2021 multiple significant storms (Irene, Sandy, Jones, Ian as named storms) plus many minor northeast events have eaten away at this project in spite of a post-Sandy recovery of the eroded material with FEMA reimbursement for damage to Category G recreational facilities (the engineered beach) using Hereford Inlet material again. The city has conducted a series of sand harvesting operations using the beaches

of Wildwood and Wildwood Crest (once) to collect material that accumulates in surplus along their part of the island shoreline and truck hauling it back to North Wildwood as "sand back passing operations".

A federal beach restoration project has been in the pre-construction phases since 2016 awaiting final resolution of issues related to starting the work. This US Army Corps project proposes to utilize the sand accumulation between Lower Township beaches and the City of Wildwood as the source of material rather than Hereford Inlet because of the Coastal Barrier Resource Act's prohibition of using federal funds within these special units and because the Corps feels that taking large volumes of sand from Hereford Inlet exacerbates the rate of sand accumulation in Wildwood and to the south.

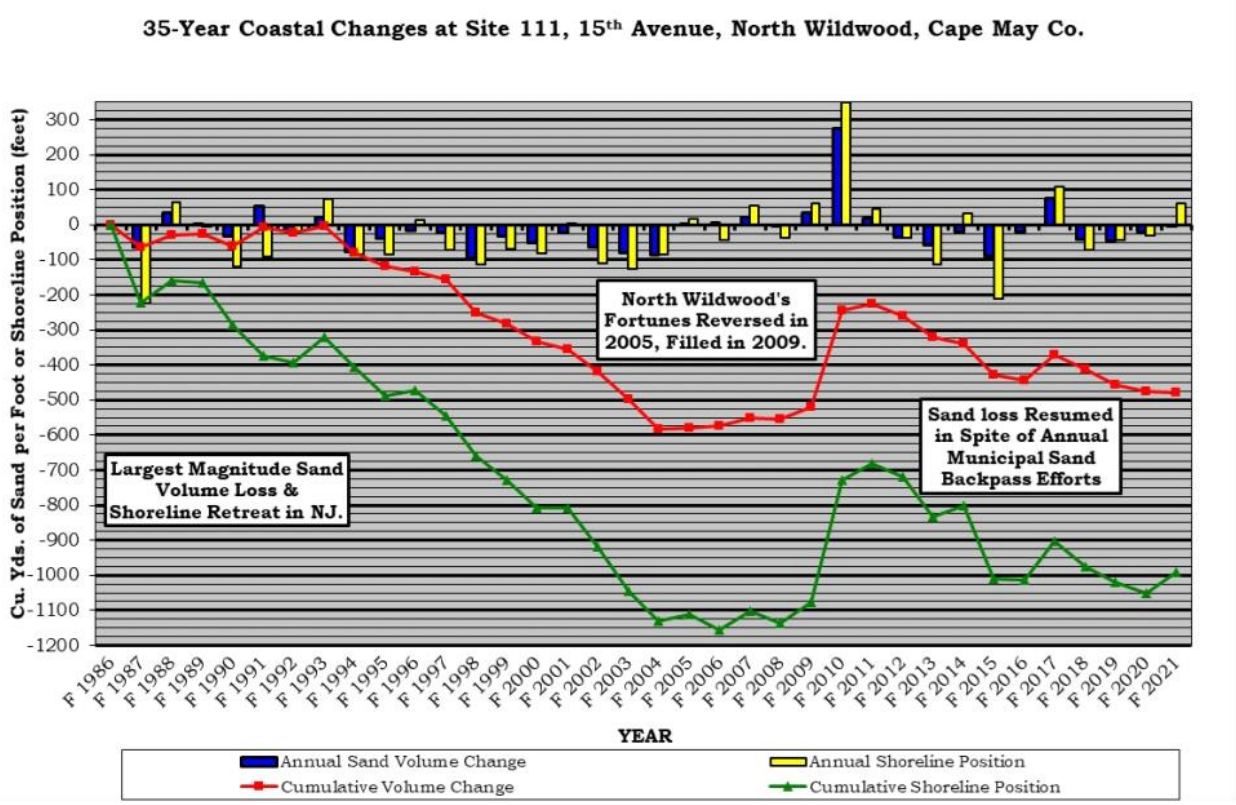

Figure 249. 15th Avenue in North Wildwood represents the most erosional site in New Jersey. Losing almost 600 yds³/ft. by 2006 accompanied by a 1,150 ft. shoreline retreat, this site retreated over a city block from the 1986 position. In 2009 the State and North Wildwood conducted a major beach restoration adding 450 feet of beach width. Since then, the width has been reduced by 320 ft. The sand volume also declined from the restored volume by 220 yds³/ft. All of these losses are divided between sediment accumulation along the North Wildwood Hereford Inlet shoreline and south into Wildwood City. Although curbed, sand losses continue despite the municipal sand backpassing projects.

This figure is taken from the NJ Beach Profiles Network report from 2021 showing the 35-year history for the North Wildwood 15th Ave. survey site at the lifeguard headquarters. The erosional process has been partially mitigated by the city's back-passing efforts which have proven to be insufficient to balance sand volume losses sustained at the site.

Cresse Avenue, Wildwood, NJ:

The next profile location to the south on the island is at Cresse Avenue at the boundary between Wildwood City and Wildwood Crest. The boardwalk in Wildwood ends at this location and the beach width is extensive and has grown progressively wider since 1986. Shoreline retreats do occur from year to year, but the trend has been upward over time by 873 feet of new beach width deposited as a result of littoral transport of sand shed from beaches to the north. The sand volume available at the site increased by 484 cubic yards of sand per foot of shoreline. This advance extends north toward the Wildwood city boundary with North Wildwood in a decreasing amount and continues south through Wildwood Crest into Lower Township and eventually into the Cape May Wildlife Refuge just north of the Cold Springs Inlet jetty. These jetties have generated very long-

term sand accretion between Wildwood and the jetty by trapping the littoral transport at the inlet where beach widths have increased since they were completed in 1910.

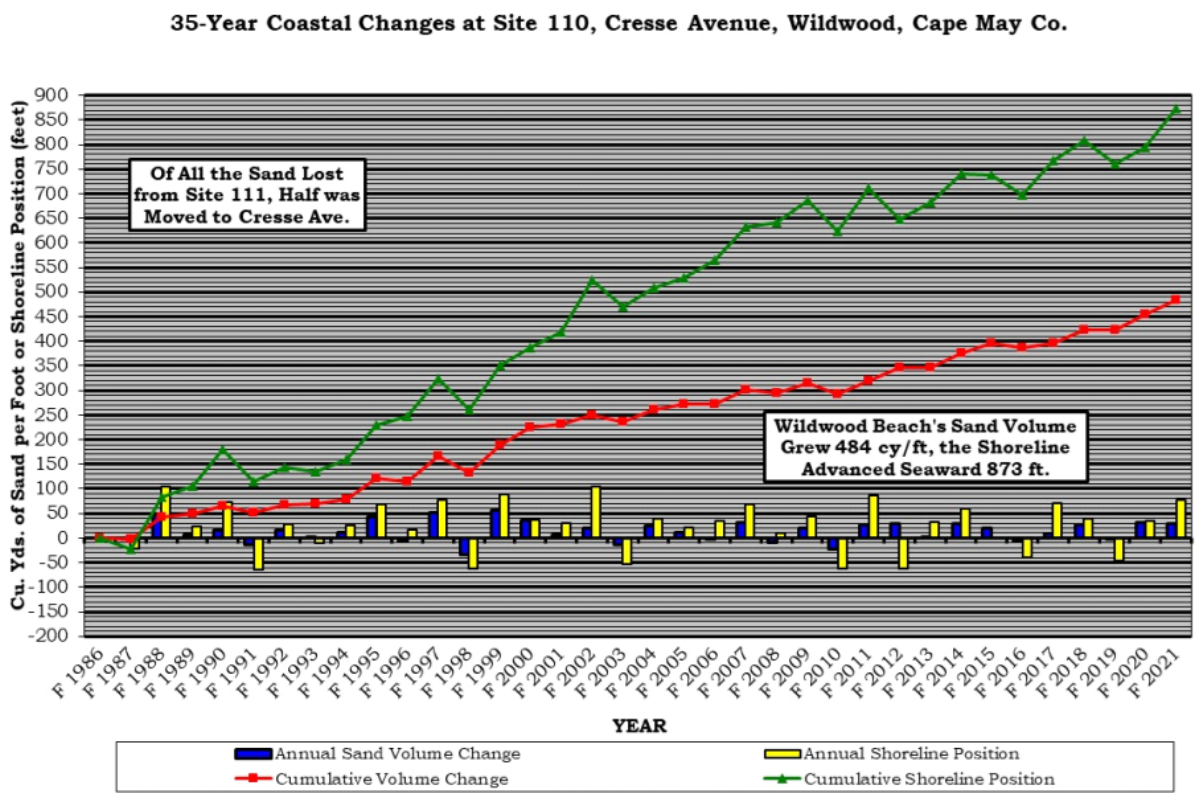

Figure 251. A partial answer to where all the North Wildwood sand went is found at the Cresse Avenue site at the border between Wildwood and Wildwood Crest. Only the series of northeast storms produced negative sand volume and shoreline change data. The beach sand volume increased by 484 yds^3/ft. and the shoreline advanced by 873 feet, which is one of the largest, naturally occurring shoreline adjustments at all NJ sites.

The figure above shows the Cresse Avenue accretion trends over the past 35 years where sand lost from North Wildwood is carried south and deposited along this part of the island shoreline. This location is within the region slated for harvesting in the proposed federal project to provide sand for restoring North Wildwood beaches.

Recent North Wildwood Surveys:

Following the 2009 NJ State and local sand pumping project in North Wildwood, the city contracted with the CRC to survey the oceanfront beaches at a 200-foot interval between the Hereford Inlet jetty and the border with Wildwood. One of these survey lines is positioned in the zone (base of 9th Ave.) where chronic erosion has decimated the primary dunes requiring investment in a robust bulkhead along Kennedy Boulevard. The past five surveys up to October 21, 2022, are shown below. The lifeguard headquarters is about 3,500 feet south of the inlet jetty and 1,500 further south than this station and currently suffering similar dune erosion.

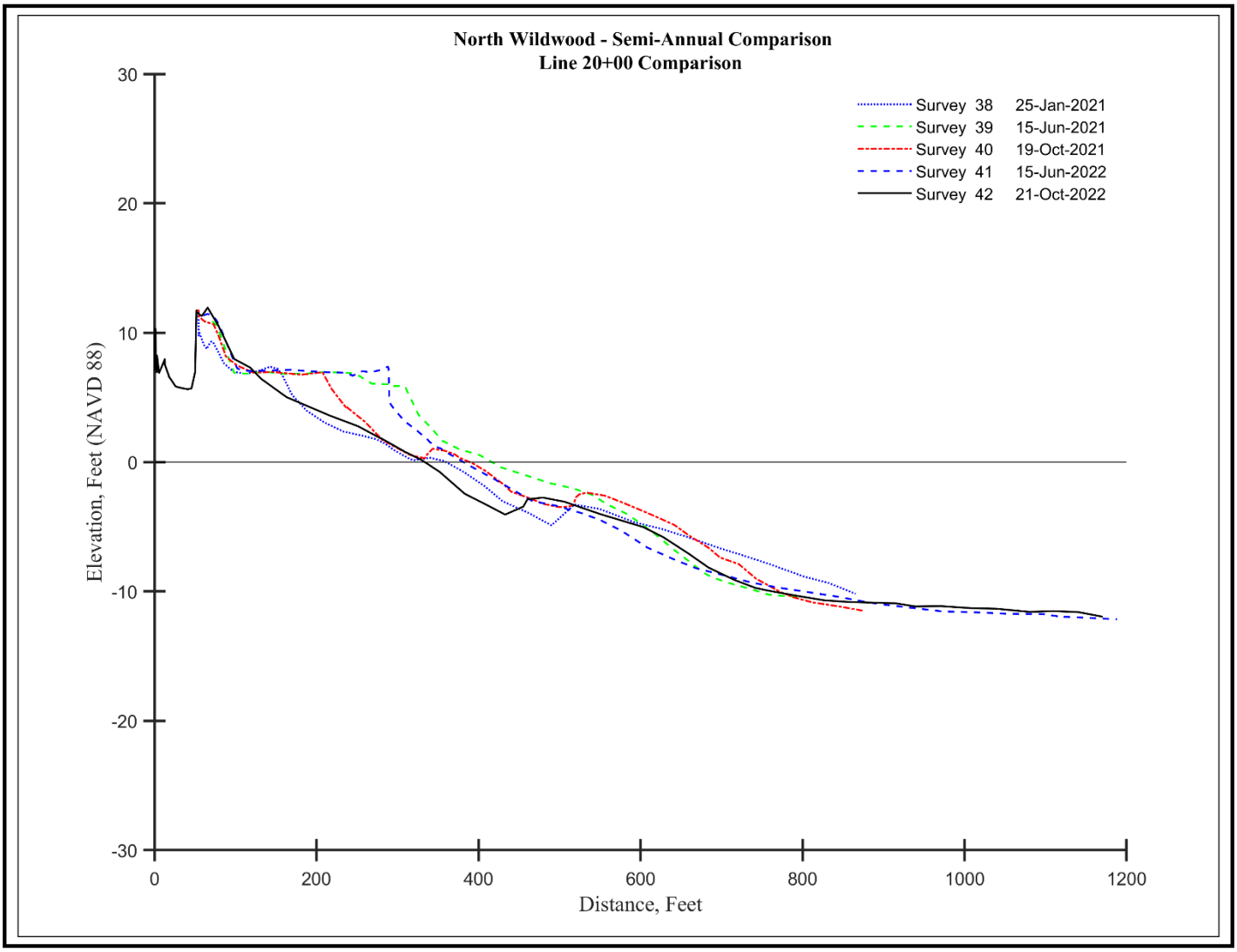

Figure 3. Line 20+00 survey with five condition surveys between Jan. 25, 2021, and October 21, 2022, show the loss rate at the beach followed by sand placement using the truck hauled back pass material. January 2021 survey shows a very flat beach against a minimal dune as of that date. By June 15, 2021, sand harvesting produced a wider beach and much better dune as sand was naturally redistributed offshore and along the oceanfront. Erosion returned as of the October 2021 survey conditions with sand moved offshore as a bar system. Further sand harvesting and distribution followed, yielding the spring survey of 2022 where renewed back passing efforts had restored a beach. Hurricane Ian effectively removed all the harvested beach sand leaving the remaining dune exposed to easy attack and erosion by the most minor of storms, even during spring tide elevated wave run-up on the narrow beach. The dune elevation of 11-plus feet NAVD 88 is certainly insufficient to protect infrastructure from wave attack during major storms or even in the event of repetitive minor to moderate events ESPECIALLY if they occur back-to-back in time.

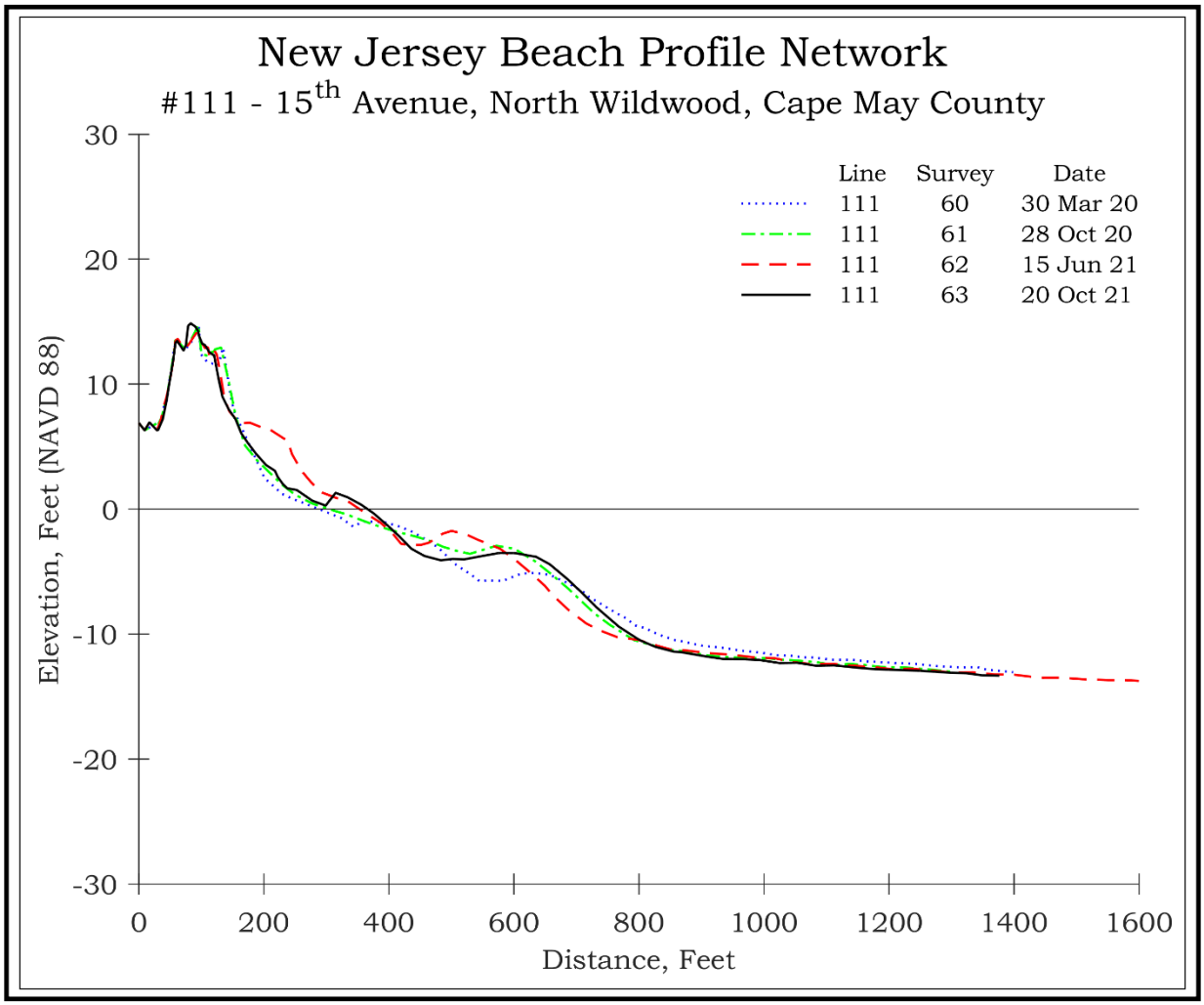

Figure 4. A presentation of the past four seasonal beach surveys at 15th Avenue in North Wildwood. The dune mass is located at the edge of normal wave run-up at a normal high tide so any storm surge or spring tide times with strong waves tend to erode into the dune toe. The 1986 shoreline position was out at the right edge of this plot at between 1,500 and 1,600 feet from the reference at the lifeguard headquarters. The dune is now in a position with the narrow beach subject to direct attack. Its elevation in the range of 15 feet NAVD 88 is modest with a footprint width at that elevation of less than 40 feet of material.

Neither the current beach width at the lifeguard headquarters nor the dune width and elevation are sufficient to be regarded as "shore protection" worthy of the term. Annual sand harvesting efforts have been unable to stem the rate of erosion and loss, so the option for hard structural solutions is a valid alternative unless the US Army project moves to construction or the NJ State Coastal Engineering office determines to restore the beach to their original 2009 template.

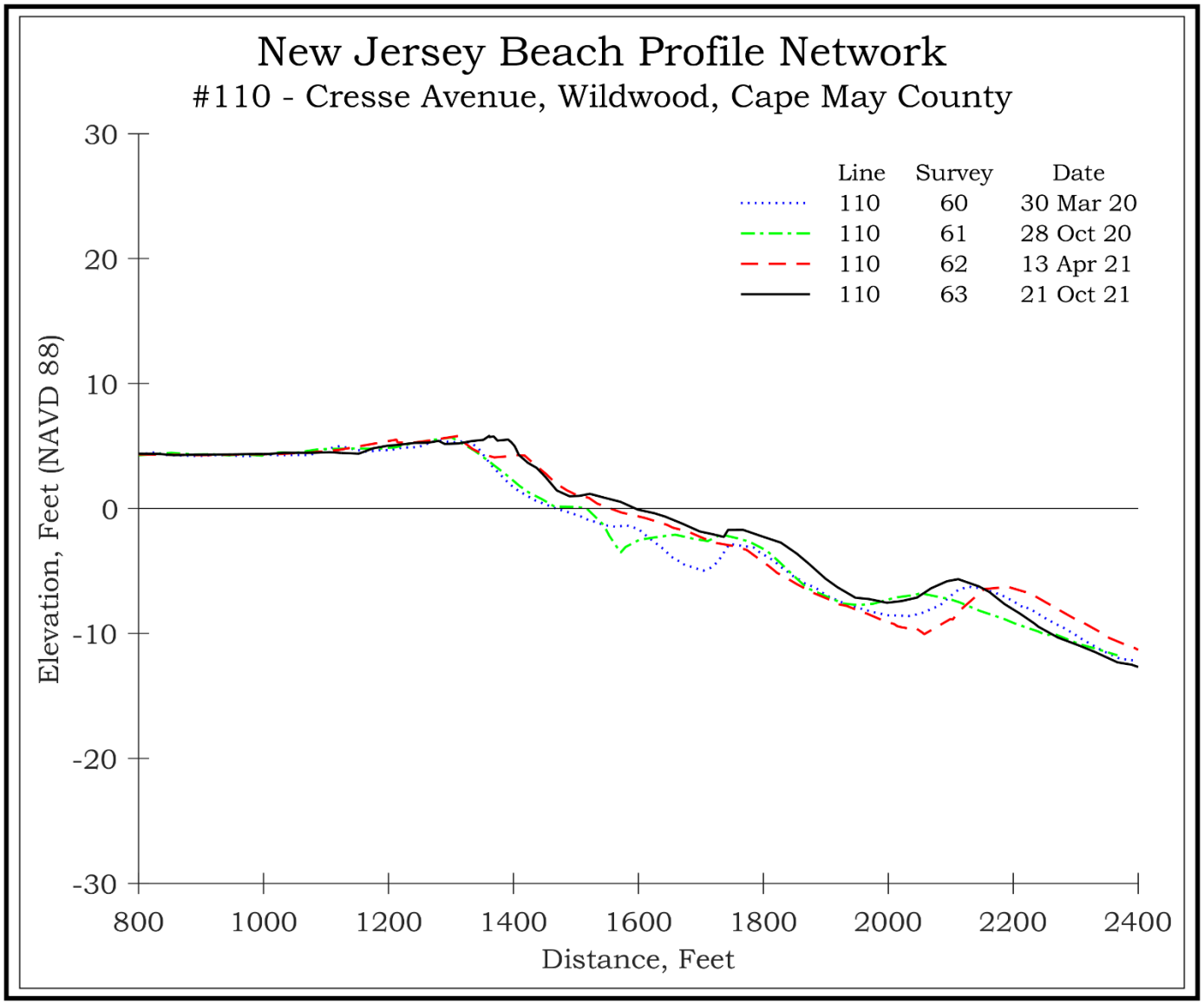

Figure 5. This is the same series of plots for Cresse Avenue where the reference position is located at the boardwalk another 800 feet landward of the left edge of the graph. The water's edge is 1,600 feet seaward of the boardwalk and is double the width seen in 1986.

Conclusions:

The North Wildwood oceanfront beach has undergone a 30-year history of chronic erosion removing hundreds of feet of dry beach and progressively impacting development along Kennedy Boulevard from 2nd Avenue south to the 15th Avenue lifeguard headquarters. Beach loss further south has also been documented because 15 years ago the Morey's organization was forced to install a steel bulkhead immediately in front of its Surfside pier on the southern North Wildwood beach. In 1986 there was 350 feet of dry sand beach seaward of the end of the pier while today each high tide reaches the bulkhead.

This sand moved both into Hereford Inlet along the North Wildwood inlet shoreline as a major sand spit, today partially set aside as a wildlife sanctuary for nesting shore birds. The remaining material has been moved south and distributed along the southern half of the island's oceanfront as a wider dry beach.

North Wildwood is left with their stop-gap measures moving surplus sand back to their beaches from Wildwood with growing reliance on either the US Army Corps of Engineers and the Office of Coastal Engineering (NJDEP) to conduct a state and local beach restoration project or implement the federal shore protection plan.