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THE RICHARD STOCKTON COLLEGE OF NEW JERSEY

The Honorable George Stanger
and Borough Commissioners
Borough of Cape May Point
PO Box 490
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May 31, 2012

Introduction:

The Richard Stockton College of New Jersey Coastal Research Center conducted its annual survey of the nine cross section stations along the municipal beach on April 16 and 17, 2012. These were compared to previous studies that were completed in April 2010 and April 2011. This work completes the annual review of the municipal beaches prior to the tourist season.

Weather conditions during 2010 to 2012 were relatively calm with interspersed events. One of the more memorable storms that affected the Cape May shoreline during the winter of 2010 to 2011 was the Christmas Blizzard (Dec. 26th) which brought high winds and water levels and caused some beach erosion in parts of the county. This winter storm coincided with a beach restoration project that was conducted by the US Army Corps of Engineers (USACE) in response to the damages incurred to the Cape May Point beaches from the 2009-2010 storm season which resulted in three Presidential Disaster declarations. The USACE restoration project commenced December 2010 and was completed in March 2011. Sand was added to the Cape May Meadow beaches west to the State Park and Lighthouse Drive sections and in the area from Lake Drive to Cape Avenue. Approximately 360,000 cubic yards (cy) of sand was placed on all beaches with 100,000 cy placed along the Cape May Point beaches.

The remainder of the 2011 winter season resulted in several snowfalls, but the weather patterns spared the coast from significant winds, waves, and storm surges. In the late summer and fall of 2011, Hurricane Irene (August 28th) and the northeaster on October 29th produced damages to the beaches in northern Cape May County; however, the Borough's beaches did not suffer storm impacts. Mild conditions prevailed in the winter months of 2012 and prior to the April 2012 survey

Beach Monitoring Program:

The CRC established the Borough's beach monitoring program in 1991 to address the changes observed along the shoreline. Nine permanent monitoring survey lines are located at the following sites along the Borough's ocean and bay shorelines. Each profile starts at a fixed reference position behind the dunes, crosses the dunes, beach and extends over 600 feet into the water, ending at a depth of 12-16 feet. Each cross section is located midway between the rock groins that define each of the beach cells.

CMP-0: Lighthouse Avenue
CMP-1: Lehigh Ave
CMP-2: Whilldin Ave
CMP-3: Coral Ave
CMP-4: Lake Drive
CMP-5: Cape Avenue
CMP-6: Pearl Avenue
CMP-7: Stites Avenue
CMP-8: Alexander Avenue

Review of Each of the Beach Cells in Cape May Point:

Lighthouse Avenue

Figure 1. In April 2011 the dune remained stable and the berm and beachface extended noticeably seaward of the old bunker on the beach to the right in this photo. This is due to the beach sand pumping activity.

In April 2012, there was very little change to the dune and subaerial beach; though the shoreline moved landward and sand losses occurred.

CMP-0 (Cell 0) is the northeastern-most cell that borders the State Park and is bounded to the south (west) by a rock groin. This cell has the greatest exposure to Atlantic Ocean waves and fetch from northeast storms. This section of shoreline can benefit from the beach nourishment projects at Cape May as sand can be carried to the site by the littoral current. However, for 2011 to 2012, this site lost the greatest volume of sand of all of the cells within the Borough (-68.24 cy/ft) and had the greatest shoreline retreat (-84.75 ft). (See Table 1 for shoreline and volume changes for the Borough's beaches.)

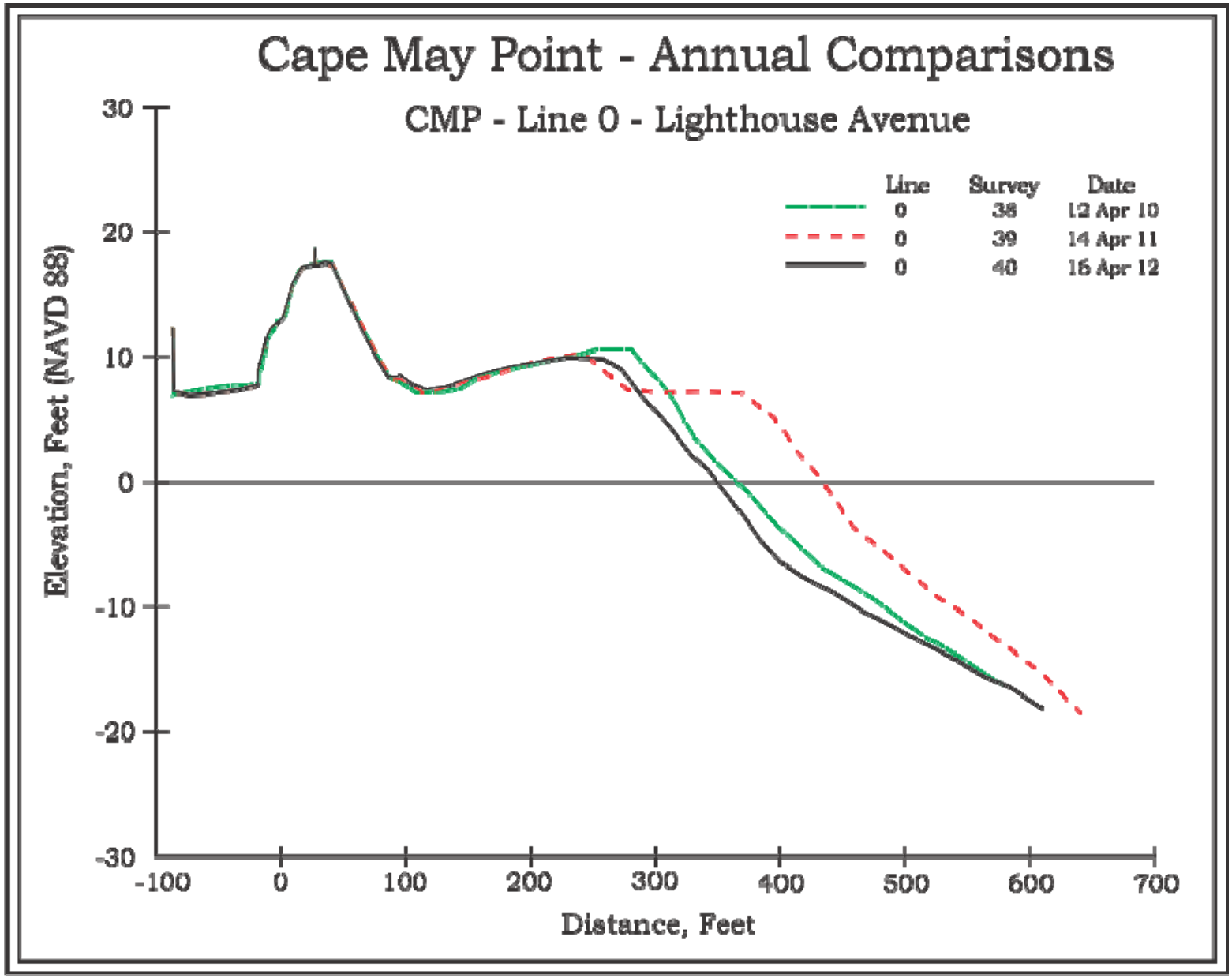

Figure 2. The Lighthouse Avenue 2012 profile resembles that of 2010. The shoreline moved landward (-84.75 ft) from its 2011 position and there was a net loss of sand from this location (-68.24 cy/ft). This loss took all the added sand seen in Survey 39.

Lehigh Avenue

Figure 3. April 2011 shows a wide beach from the bunker to the first groin. Note that with the exception of the seaward end, the groin is buried by sand.

April 2012 More of the rock groin is exposed from the previous year.

CMP-1 (Cell 1) stretches from the Lighthouse Avenue groin to Lehigh Avenue. The cell is bounded on its west end by the longest groin in the array of rock structures around the Borough's shoreline and there are no "Beachsaver" units in this (first) closed groin cell compartment in Cape May Point. This section of shoreline lost a significant amount of sand in 2011-2012. The two red arrows point to the same raised rock in the groin showing the amount of retreat in the beach related to the amount of groin extending into the sea.

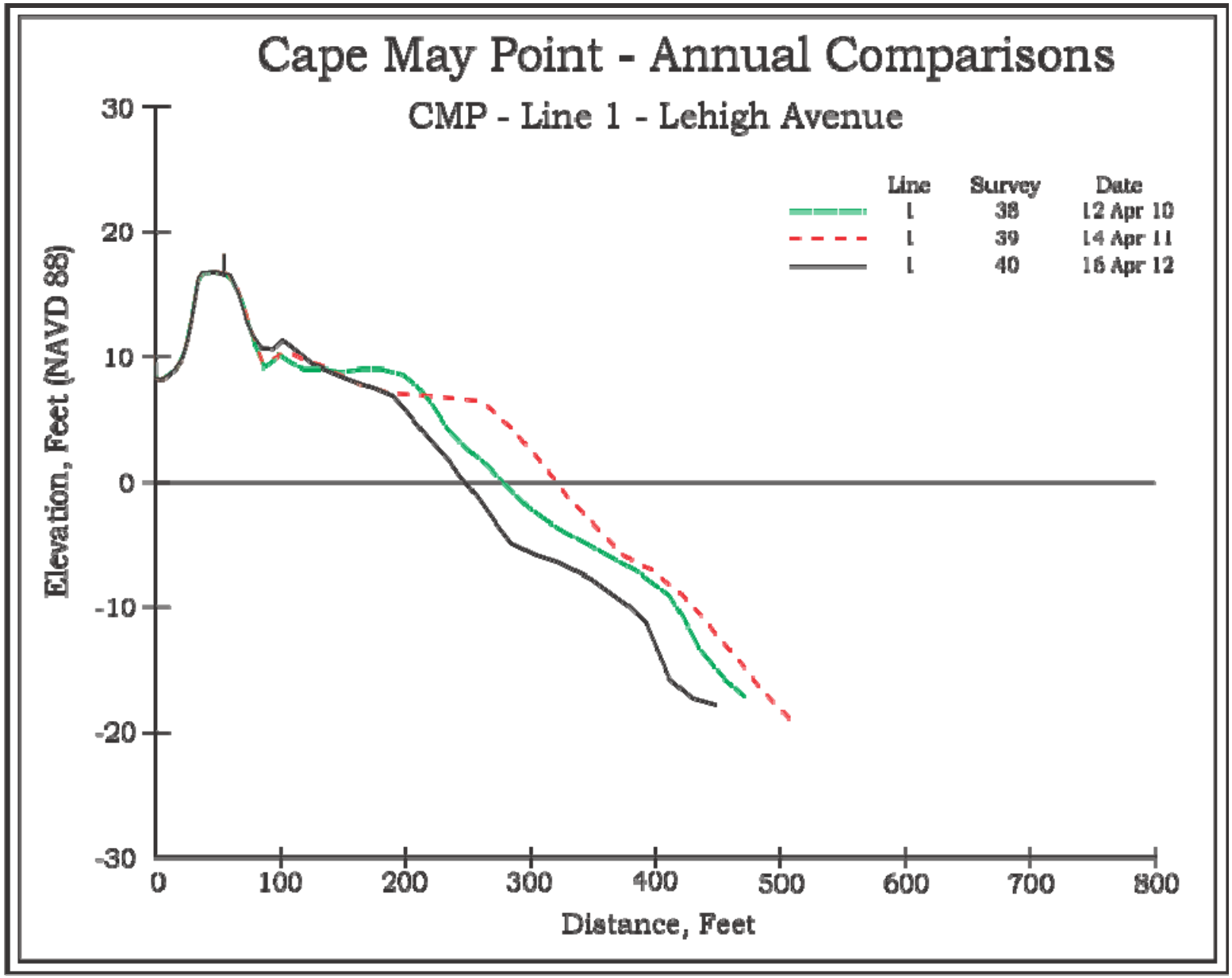

Figure 4. At Lehigh Avenue, the shoreline moved landward (-73.73 ft) from its 2011 position. The site experienced sand losses (-54.36 cy/ft) across the entire profile erasing the 2011 deposit of sand.

Lehigh to Whilldin Avenues

Figure 5. In April 2011 no additional fencing had been installed but plants were now spreading seaward onto the upper beach.

By April 2012, the dry beach changed very little, though there was some gain in elevation.

The CMP-2 (Cell 2) beach is the northeastern-most of the groin cells with an early installation of the "Beachsaver" units from 1993, which still show on the profile cross-section at the 520-foot distance from the reference point and remain relatively stable. The top of the "Beachsaver" unit remains at about -6 feet and 125 feet from the zero elevation shoreline position, the base of the unit is in about -10 feet of water in the middle of the cell. This site had variable results for 2011 to 2012. The system continues to retain sand within this closed beach compartment and sand accumulated seaward of the structure, though the shoreline moved landward (-20.62 ft).

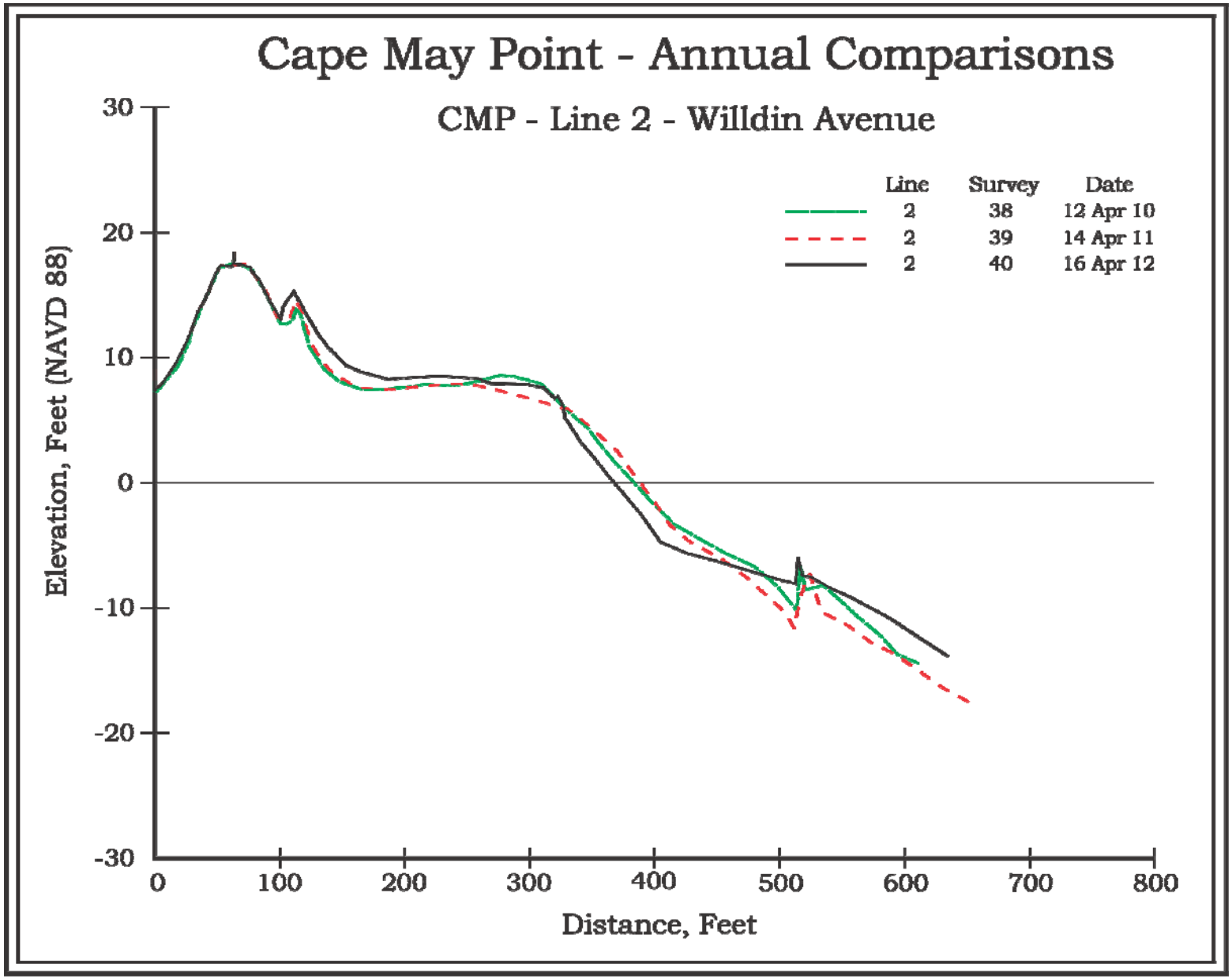

Figure 6. At Whilldin Avenue, the shoreline position moved landward (-20.62 ft); though the profile experienced a net gain of 12.71 cy/ft of sediment across the entire profile. Note the accumulation of sand on the berm and seaward of the breakwater unit from the 2011 position.

Whilldin to Coral Avenues

Figure 7. April 2011 the foredune had spread seaward and nearly engulfed the vehicle access path. No additional fencing was installed but plants had spread onto the upper beach, trapped sand and expanded the dune toe.

In April 2012, the foredune continued its seaward expansion.

Another "Beachsaver" unit can be found at CMP-3 (Cell 3 –bounded by rock groins at Whilldin Avenue and Coral Avenue). Wind-blown sand allowed the foredune to grow upward and seaward from the 2011 position. Sand was retained at this cell from 2011 to 2012, though the shoreline was measured at -3.35 feet landward of the 2011 position. This cell retained nearly all the positions for the beach, zero elevation position and the offshore profile elevations it had a year ago.

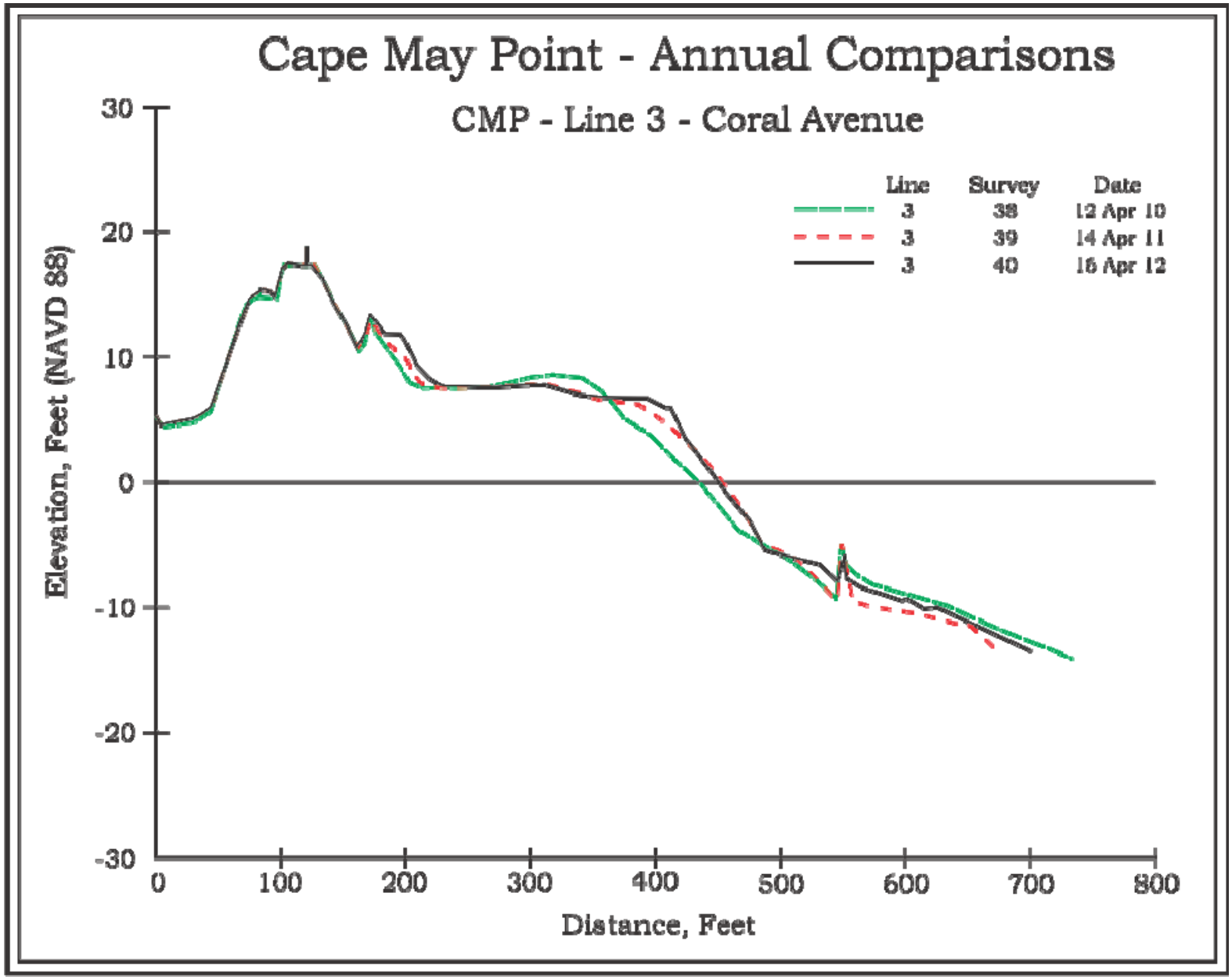

Figure 8. The Coral Avenue profile remained stable for 2011-2012. The site gained a moderate amount of sand (7.47 cy/ft) across the profile and the shoreline moved slightly landward (-3.35 ft). A moderate volume gain occurred seaward of the breakwater unit.

Coral Avenue to Lake Drive

Figure 9. April 2011 the ACOE maintenance fill was complete leaving a wider beach. No effort has been made to install additional dune fence at this site.

The April 2012 photo shows the accumulation of sand on the northeast (updrift) side of the groin at Coral Avenue.

The Lake Drive (CMP-4 [Cell 4]) beach cell is bounded by the rock groins at Coral Avenue and south of Lake Drive (closer to Surf Avenue). This cell does not contain any nearshore structures. In the absence of a nearshore sand retention system, this beach is subjected to periods of erosion. This cell is influenced by the flood- and ebb-tides from the Delaware Estuary and little sand is brought to the area by the longshore current.

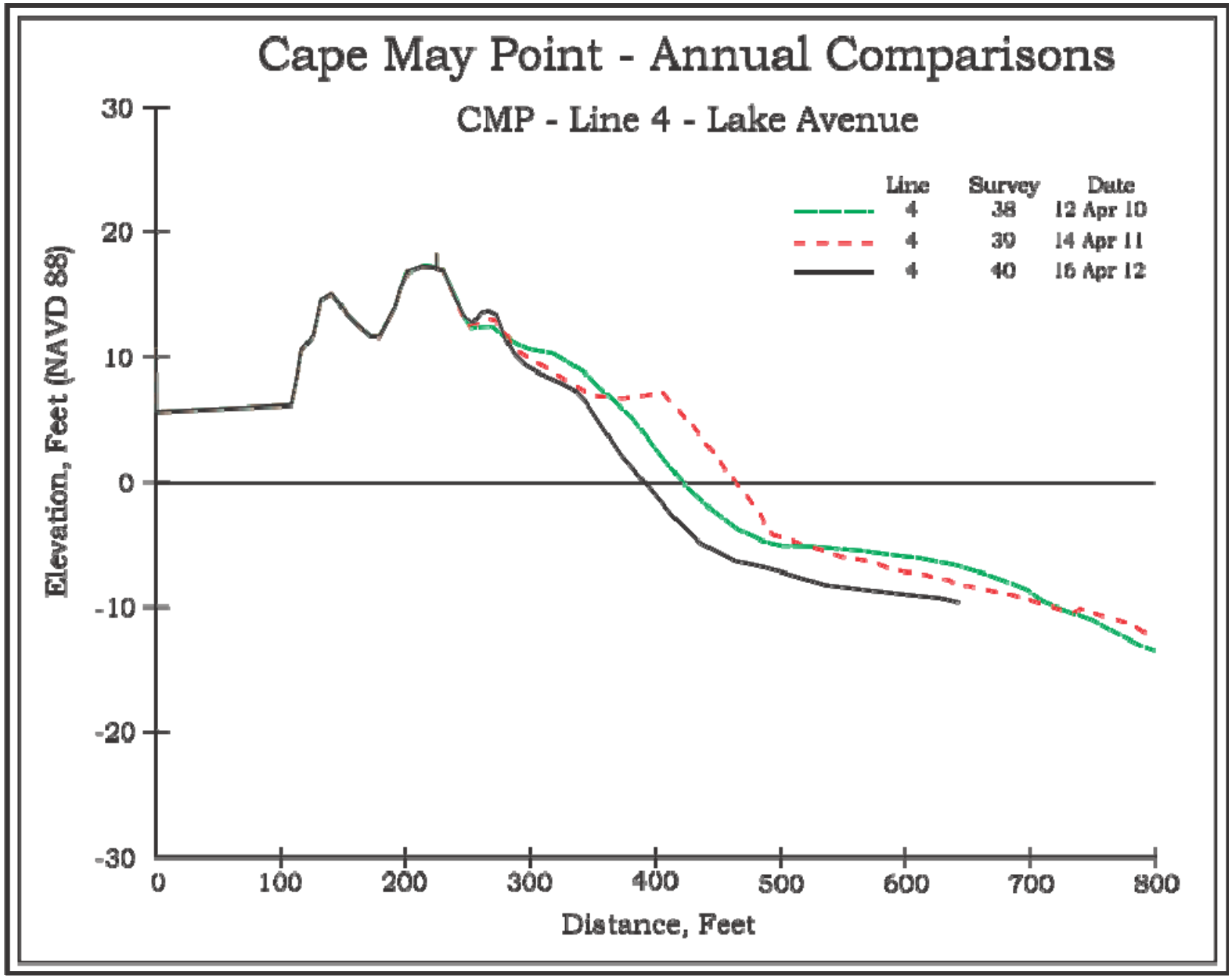

Figure 10. The shape of the Lake Avenue 2012 profile resembles that of 2010. Between 2011 and 2012, sand losses were recorded across the profile (-46.77 cy/ft) and the shoreline moved landward (-73.63 ft). The April 2011 sand volume added was lost.

Surf to Cape Avenues

***Figure 11.** April 2011 the foredune had grown into a significant feature. Wind-blown sand accumulated around dune grass that has spread across the dune onto the beach.*

By April 2012 the foredune continued to grow in elevation from the previous year.

CMP-5 (Cell 5) contains a nearshore breakwater unit that was installed in 2002 for the USACE CMP-227 experimental project. For the 2011 to 2012 study time frame, wind-blown sand continued to accumulate along the seaward dune slope increasing the overall width and height of this feature, though the dry beach was reduced in size. Sand losses were recorded for the nearshore as well and may indicate that the breakwater unit has limited ability for retaining sand in this cell. This cell is also subject to the influences of the Delaware Estuary tidal exchange. This beach has sufficient distance between the zero elevation position and the breakwater units for safe swimming.

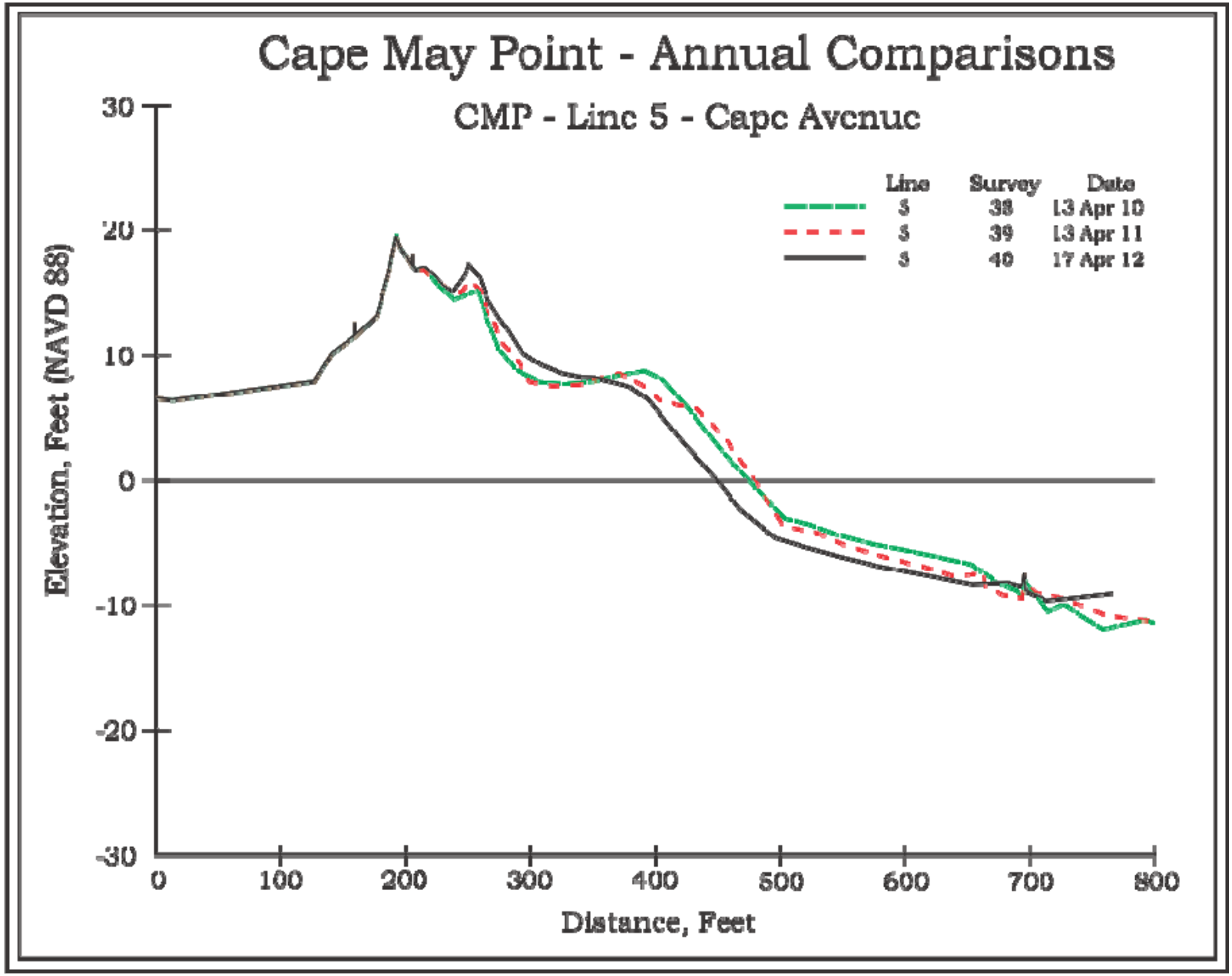

Figure 12. At the Cape Avenue location, sand losses were recorded across the profile (-11.8 cy/ft). The shoreline moved landward (-29.98 ft) from the 2011 position.

Cape to Pearl Avenues

Figure 13. April 2011, This dune continues to accumulate sand with extensive plant coverage spreading seaward onto the beach. The wider beach allows for natural dune advances without the

By April 2012, the foredune increased in elevation and expanded seaward from its 2011 location.

CMP-6 (Cell 6) is bounded by the rock groins at Cape Avenue and Pearl Avenue (approximately 350 feet to the northwest from the Cape Avenue groin). The nearshore here contains the "Double Tee" structures were installed as part of the USACE CMP-227 experimental project and have remained buried by sand in the past three annual surveys. At this time, the structures have limited ability in influencing sand retention. Wind-blown sand continues to increase the dune and dry beach and there has been an overall increase in volume across the entire profile. Despite the shoreline advance there is no probability of swimmers reaching the submerged Double Tee structures located on the seafloor in 11 feet of water and nearly 140 feet offshore. The units however might be accessible adjacent to the rock groins, and any activity in the water close to the rock groins should probably be restricted in any event.

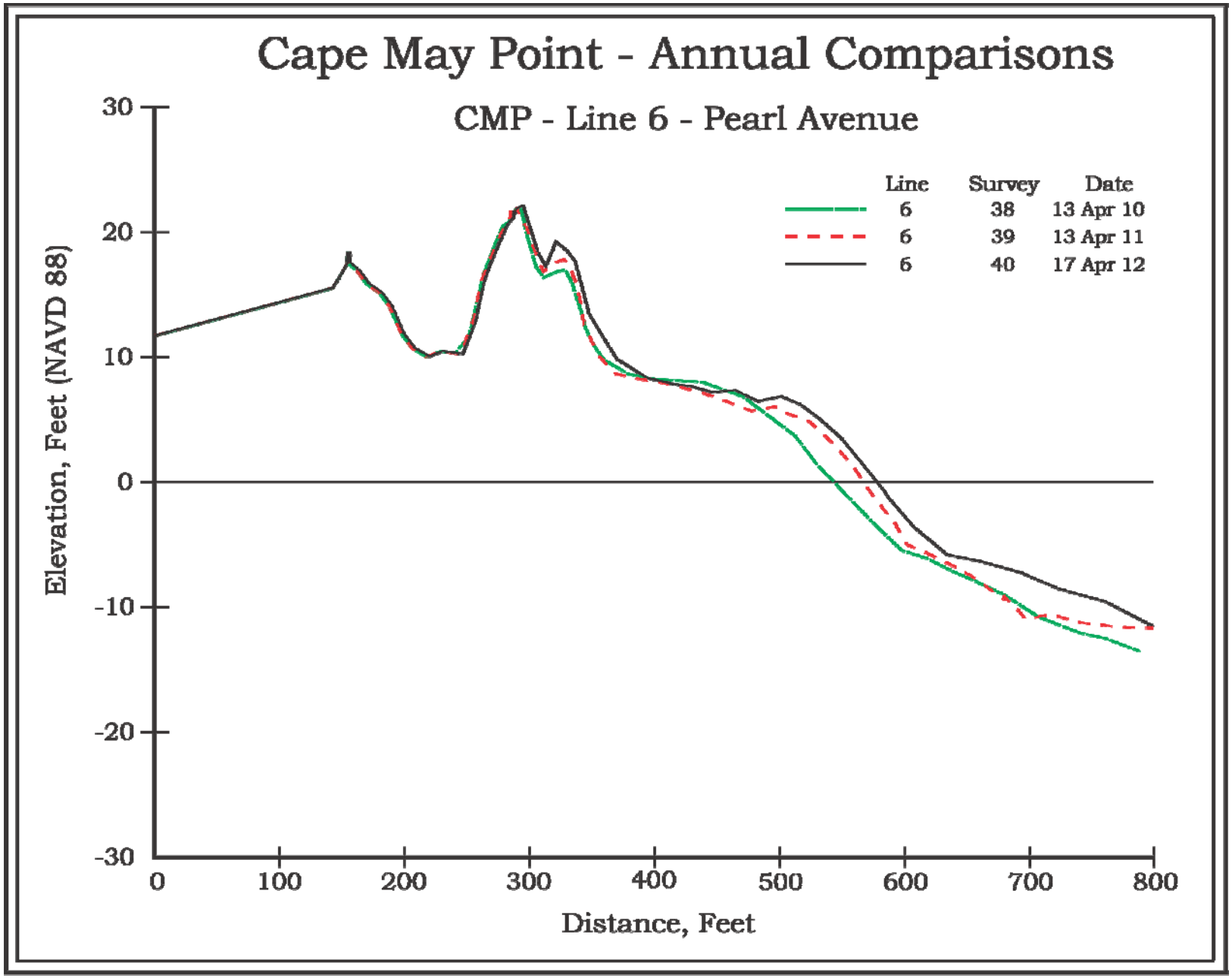

Figure 14. The CMP-6 location gained sand (23.82 cy/ft) over the entire profile between 2011 and 2012. The shoreline advanced 10.72 ft. This is the site of the "Double Tee" breakwater structure which has been buried by sand for the past three years.

Pearl to Stites Avenues

Figure 15. April 2011 The wider beaches continue to support seaward dune growth. Note the dune crossovers are now engulfed by the foredune expansion.

By April 2012, the foredune continued its upward and seaward growth from wind-blown sand.

Profile CMP-7, located southeast of Brainard Avenue, (Cell 7) is bounded by the rock groins near Pearl Avenue and Stites Avenue. The cell has not received any sand directly from the past USACE beach restoration projects. The beach and nearshore here are influenced by the tidal processes of the Delaware Estuary which continue to bring sand to the western beach cells. Sand accumulated across the entire profile from the dune crest to the offshore seafloor limits with an annual net gain of 15.48 cy/ft.

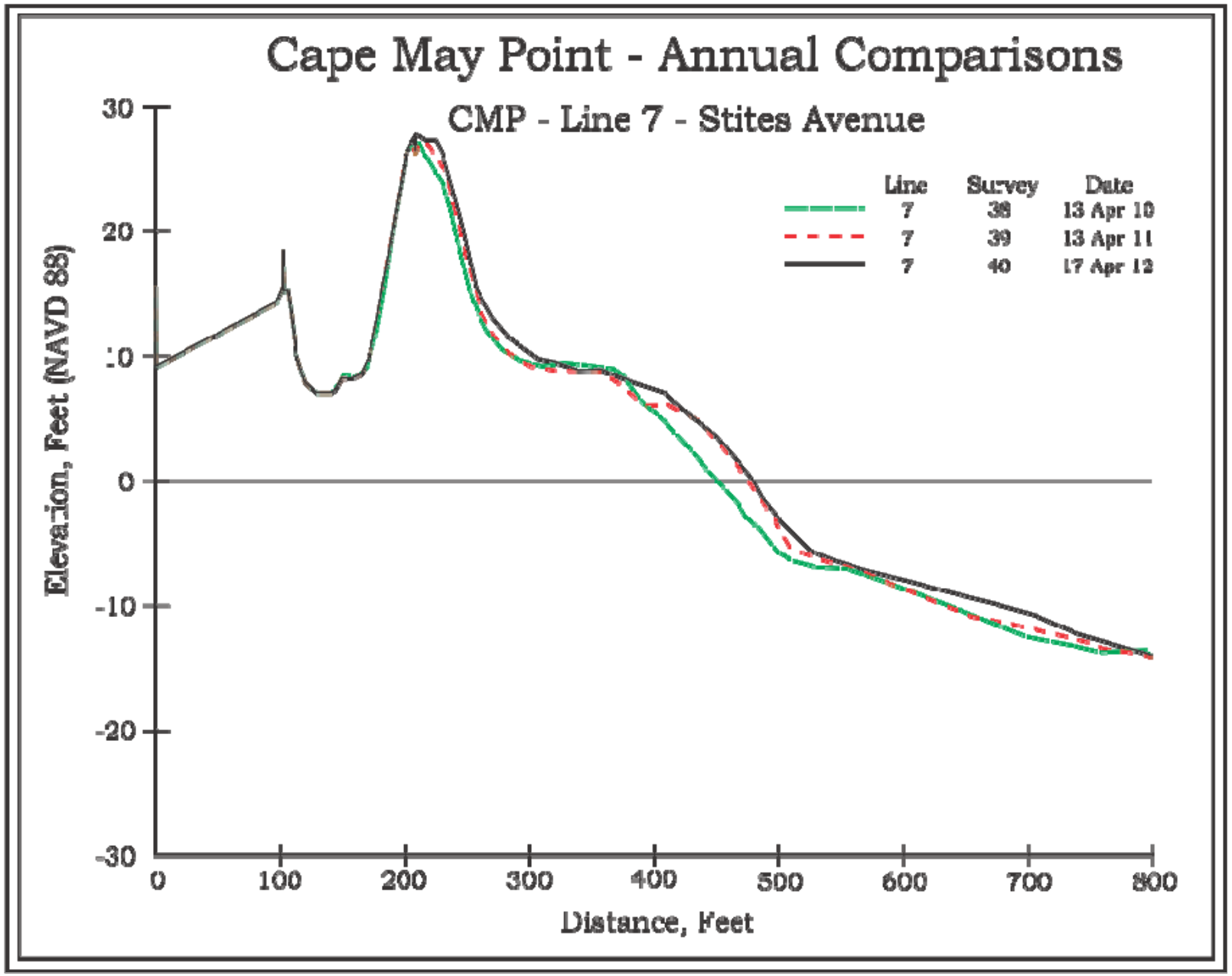

Figure 16. The Stites Avenue location continued to accumulate sand across the profile (15.48 cy/ft) while the shoreline remained relatively stable only advancing 3.88 ft seaward of the 2011 location.

Stites to Alexander Avenues

Figure 17. April 2011 the beach has extended seaward to near the tip of the Alexander groin. The beach is now wide enough to support both dune growth and recreational users.

By April 2012, wind-blown sand continued to deposit in the foredune increasing its height and seaward growth.

The Alexander Avenue location, CMP-8 and the westernmost cell (Cell 8), is positioned between the last two groins in Cape May Point. Sand has never been placed on the shoreline here either during the USACE projects or earlier, yet sand continues to move into this cell due to the high volume of material added to the east. This cell gained the most in sand volume with the largest shoreline advance of any of the Borough's beaches from sand that moved from the beaches to the east indicating that the western-most "terminal" groin at this site still has the capability to retain sand. It is evident that sand escapes the Alexander Avenue groin to move further into Delaware Bay toward the Sunset Beach area, but there is a strong shoreline offset at the Alexander Avenue groin with abundant gravel at the surface on the western side of the structure. Swimming is currently not allowed here because this is both a popular fishing beach, and has very strong tidal currents sweeping past on either flood- or ebb tides.

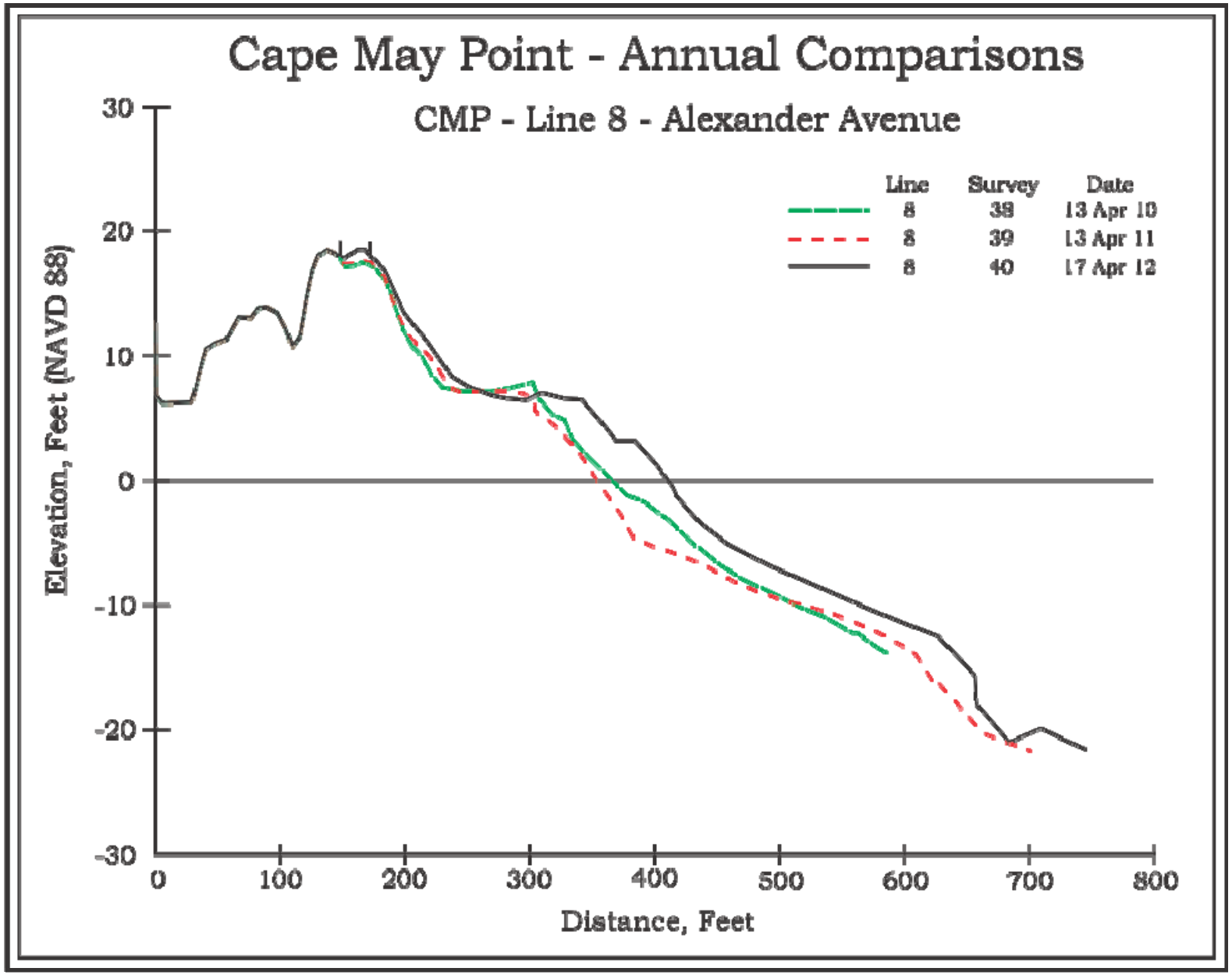

Figure 18. The Alexander Avenue location continued to accumulate sand across the profile (48.11 cy/ft) and the shoreline moved 56.66 feet seaward of the 2011 location.

Table 1.
Summary of Shoreline and Profile Sand Volume Changes
Between
April 2011 and April 2012 at the Cape May Point Beaches

Profile Number	Shoreline Change (feet)	Volume Change (yds^3/ft)	Cell Distance (feet)	Net Volume Change (yds^3)
CMP-0	-84.75	-68.24	420	-28,661
CMP-1	-73.73	-54.36	445	-24,190
CMP-2	-20.62	12.71	460	5,847
CMP-3	-3.35	7.47	450	3,362
CMP-4	-73.63	-46.77	675	-31,570
CMP-5	-29.98	-11.8	690	-8,142
CMP-6	10.72	23.82	710	16,912
CMP-7	3.88	15.48	680	10,526
CMP-8	56.66	48.11	660	31,753
		Total Volume Change for Cape May Point =		**-24,163**

The summary table above compiles the shoreline change information for 2012. The changes are based on the advance (seaward) or the retreat (landward) of the zero elevation position on each cross section. This elevation represents the "shoreline" position; it approximates the proper change horizontally for any shoreline point selected on the beachface subject to daily wave run-up. The unit sand volume computed for the cross section in cubic yards of sand per foot of shoreline is multiplied by the distance between the groins in Cape May Point to arrive at the net volume in the right column. For the April 2011 to April 2012 time frame, the Borough's beaches recorded a net loss of -24,163 cubic yards of sand.

No beach fills were conducted on Cape May Point's beaches between April 2011 and April 2012. Of the nine beaches surveyed at Cape May Point, the greatest sand losses were recorded at the northeastern-most locations - CMP-0 and CMP-1. Sand was placed at those locations by the USACE in 2011 (prior to the April 2011 survey), but natural processes have moved that sand to the downdrift beaches where moderate sediment gains were recorded in 2012 at profile locations CMP-2 and CMP-3. Both CMP-2 and CMP-3 show sediment gains seaward of the breakwater structures.

Sand that was placed at the CMP-4 location by the USACE in 2011 relocated to the downdrift beaches in 2012 as this profile recorded significant losses for 2012. The sand from that location did not accumulate in the downdrift cell (CMP-5) as this site too lost approximately a quarter of the Cell-4 losses despite the presence of nearshore breakwater units. Sand continued to add to Cells 7 & 8 under the influence of waves plus incoming tidal currents. Natural accretion added sand to the westernmost cells (CMP-6, CMP-7, CMP-8). Only the cell at CMP-6 contains a nearshore breakwater (Double T unit); however, the unit has been buried by sand for the past three monitoring sessions. The beach cells for CMP-7 and

CMP-8 do not contain nearshore breakwaters and beach gains can be attributed to the tidal influences of the Delaware Estuary.

The impact of these changes to the degree of safety from collisions by bathers on the submerged breakwater units remains relatively unchanged from last year with two important possibilities.

1. Cells 0 and 1 do not have structures, just steep slopes into deep water with strong tidal currents into and out of Delaware Bay. Swimming has been restricted here due to swift currents.
2. The zero elevation position (NAVD 88 zero, which equals about 1.5 feet above the average low tide) in Cell 2 at Lehigh and Whilldin Avenues is at about 125-foot distant from the breakwater structure. The water remains relatively deep between the water's edge and the breakwater units so swimming depths are limited, but marginally available this year. The CRC still recommends installing a line of floats indicating the maximum distance for swimming that should be about 30 feet from the breakwater reef. Swimming near the groins should always be avoided since the units are slightly closer to the beach adjacent to the rocks.
3. Cell 3 remained relatively stable. There was a moderate recovery of sand but the shoreline retreated slightly at -3.35 feet. The distance from the zero elevation position on the profile to the breakwater unit is approximately 100 feet in the center of the groin cell and the slope from the beach to the breakwater is steep and ends at the same depth of -8.0 feet at low tide. The CRC recommends installing a line of floats indicating the maximum distance for swimming that should be about 30 feet from the breakwater reef. This would allow some use of the water this year with about a 70-foot width between the beach near low tide and a point 30 feet from the base of the beachsaver reef. Swimming near the groins should always be avoided since the units are slightly closer to the beach adjacent to the rocks.
4. Cell 4 has no structures offshore and a relatively flatter nearshore slope. This site lost significant amounts of dry beach in 2011-2012 limiting recreational space for beach patrons. No other issues.
5. Cells 5 and 6 contain the newer units and pose no change in swimming risk in 2011 in spite of some sand addition to cell 6. Both reef structures lie in greater than - 8 feet of water several hundred feet from the water line at low tide. The "Double Tee" structure in Cell 6 is once again buried with new sand. Swimming near the groins should always be avoided since the units are slightly closer to the beach adjacent to the rocks.
6. Cells 7 and 8 beaches are significantly enhanced with a much wider berm area and shallower water offshore. Available recreational area and swimming has been substantially improved at these beaches since 2005. Other issues have guided the Borough's decision to close the Alexander Avenue beach to swimming due to its heavy use by fishermen plus very strong tidal currents moving into or out of Delaware Bay past this beach.
7. Over sixteen years since the first breakwater units were installed and 10 years after the most recent installation, it appears as if this "reef" is still doing the job at retaining sand. With no added sand to the system between April 2011 and April 2012, cells 2 and 3 (CMP-2 and CMP-3) retained sand within the profile though the shoreline retreated.

The Coastal Research Center (CRC) will continue to monitor the conditions on the Cape May Point beaches at the Borough's request. Please contact the CRC with any questions or concerns.

Sincerely,

Stewart Farrell

Dr. Stewart Farrell
Director Coastal Research Center