



New Jersey Beach Profile Network

Cape May County

Great Egg Harbor Inlet
to Stow Creek

NJBPN Profile #'s
225 - 100

New Jersey Beach Profile Network Cape May County Site Locations

There are thirty-one NJBPN survey sites along the beaches of Cape May County, consisting of a combination of barrier islands, coastal headlands and the Delaware Bay shore. Twenty-seven sites are Atlantic Ocean profiles and the remaining four are set along the Delaware Bay shoreline of western Cape May County. The ocean profile sites are located in the following municipalities: the City of Ocean City, Strathmere in Upper Township, the City of Sea Isle City, the Borough of Avalon, the Borough of Stone Harbor, the City of North Wildwood, the City of Wildwood, Lower Township, the City of Cape May, and the Borough of Cape May Point. Profile #112 on South Pointe in Stone Harbor was lost due to erosion and was replaced by profile #212, which is located south of 121st Street in Stone Harbor. Development forced the shifting of three sites over the years to allow an unobstructed survey line. The four Delaware Bay profiles are located in the communities of Reeds Beach in Middle Township, Villas in Lower Township, North Cape May in Lower Township and at the Higbee Beach State Park.

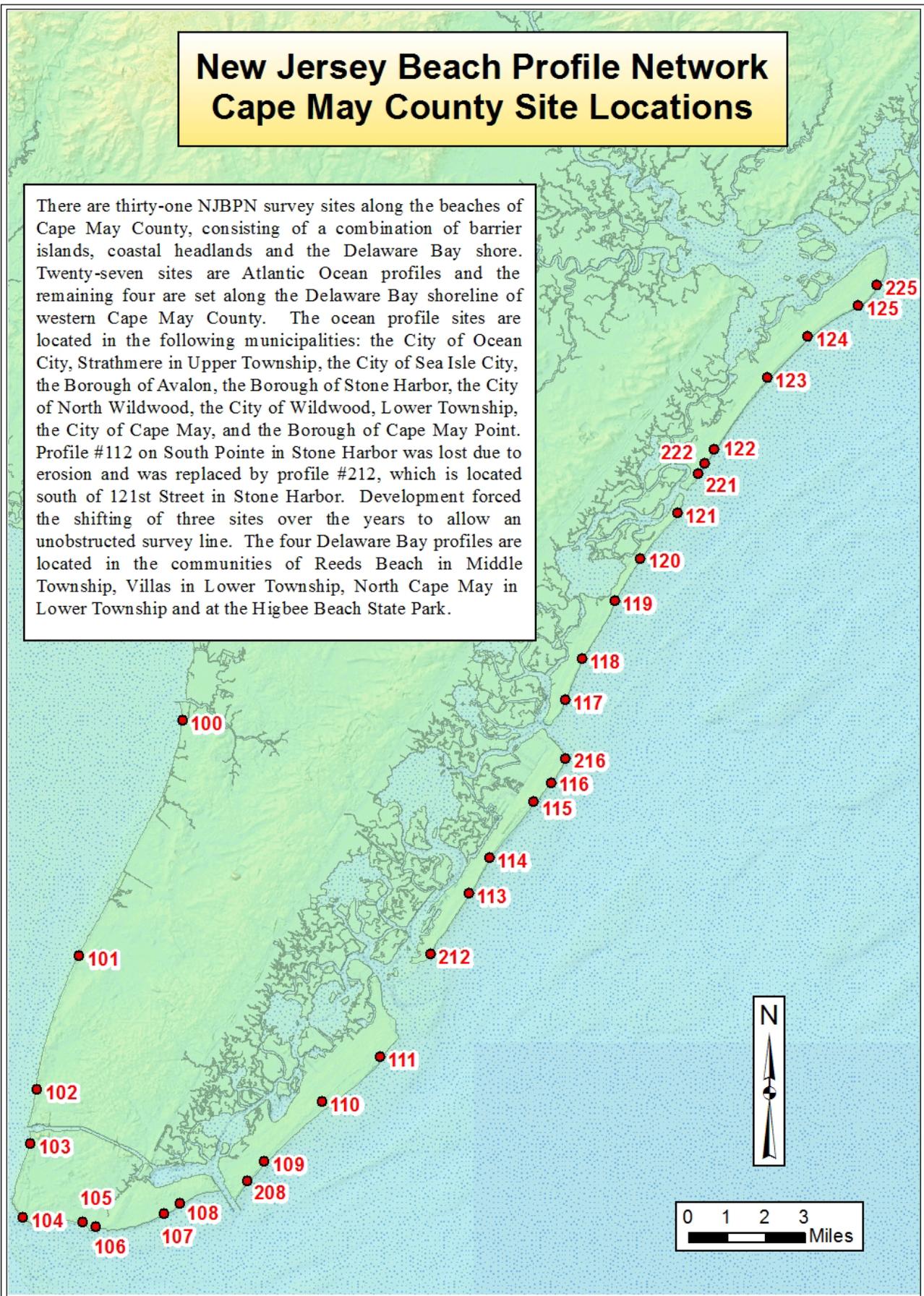


Figure 146. Map of Cape May County showing the locations of the 31 profile sites in the county.

Cape May County Oceanfront and Delaware Bay:

There are 31 NJBPN survey stations in Cape May County between Reeds Beach on the Western Cape May County Delaware Bay shoreline, around Cape May Point and up the ocean coastline to Great Egg Inlet in Ocean City. This county has five tidal inlets separating four barrier islands and a coastal geomorphic compartment that is the site of Cape May City, a US Coast Guard base and Cape May Point. This southernmost shoreline in New Jersey consists of barrier beaches, a low-relief bluff of older sediments at the shoreline plus the possible presence of a relict barrier beach (called Cape Island on old maps) from an earlier high stand in sea level prior to the Wisconsin ice sheet advance (~32,000 years ago).

Each inlet has near identical geomorphic conditions with a narrow, rapidly changing southern spit that curves deep into the inlet, a large ebb-tidal delta offshore and a distinct offset in the seaward position of the southern inlet shoreline due to wave refraction around the ebb-tidal delta. This makes the northeast corner of each island vulnerable to northeast wave conditions especially when the main tidal channel lies close to the southern shoreline of the inlet. The general northeast to southwest coastal orientation in Cape May County exacerbates the impact of northeast storms on each island's northeast-facing beaches particularly the northernmost oceanfront. This impact includes all three Atlantic County barrier islands as well, where maintaining the beach/dune system in each of the affected communities is a difficult battle with the elements.

Each island has at least one profile location where the 34-year surveying history is one of repetitive erosion cycles following each restoration attempt going back to 1983 in Ocean City and 1984 at Strathmere (NJ State/local projects followed later by Federal shore protection work). Avalon conducted a State/local project in 1987, followed 22 years later by the State and North Wildwood in 2009. Episodic deposition has occurred in the mid-section of the four barrier islands yielding generous dunes and wide beaches (20th Street in Ocean City, Williams Road in Strathmere, 35th to 56th Streets in Avalon, and Cresse Avenue in Wildwood Crest). Sand moves eventually to the southern tip of each island creating a rapidly changing environment at the northern side of each tidal inlet (Corson's Inlet state park, Townsend's Inlet, South Point in Stone Harbor, and the Cape May Nature Conservancy). During an extended period of sand starvation along the Stone Harbor shoreline in the late 1980's, the entire South Point spit eroded away and became an array of shallow sub-tidal shoals in Hereford Inlet. A state/local project in 1997 built a base sand supply for rapid spit growth following the 2003 initial federal project in Stone Harbor eventually to recreate South Point (in 2016) as a 7,500-foot long supra-tidal platform for shore birds. This spit remains as a reconstituted feature, the direct result of beach nourishment.

The large scale federal shore protection projects did guarantee the acceleration of these two processes evidenced by the expansion of the Corson's Inlet State Park, the growth of beach width at the south end of Sea Isle City and the spectacular growth in South Point on Seven-Mile Island since 1995 are all entirely due to beach nourishment in Cape May County coastal communities. The expansion of The Nature Conservancy beach south of Cape May City since 1989 beach nourishment commencement in Cape May City is due to sand migration via longshore transport. In winter 2017, the USACE completed the third periodic nourishment in the area from Lower Cape May Meadows to Cape May Point (345,000 cubic yards). 2017 also saw sand placement in both Avalon and Stone Harbor derived from Townsends Inlet. Avalon Borough received about 650,000 cubic yards as of November 2019, with work completed in Ocean City and Strathmere as well. Work is anticipated in North Wildwood either as the federal project goes to construction or as soon as permits can be renewed for sand placement by State and local funding.

Delaware Bay Shoreline of Western Cape May County;

During 2013 and 2014 habitat restoration work commenced through an umbrella of conservation groups funded with National Fish & Wildlife Foundation Hurricane Sandy recovery money. Sandy destroyed or severely damaged 70 percent of known horseshoe crab spawning habitat on the New Jersey Delaware Bay shoreline. These marsh edge beaches consist of thin veneers of coarse sand supporting spawning activity each May of the largest population of horseshoe crabs worldwide. Sandy's storm surge and waves inundated and over-washed these low elevation beaches removing the thin veneer of sand exposing the salt marsh below, leaving an

inhospitable shoreline for horseshoe crab spawning and successful egg production. Attention initially focused on restoring the western shoreline of Cape May County (Pierces Point – Reeds Beach) and included Moore’s Beach in eastern Cumberland County. This stretch of post Sandy degraded shoreline was determined as critical habitat and targeted for immediate restoration based on documented reliance on the region for spawning and subsequent migratory shorebird foraging. Red Knots and other northbound migratory shorebirds depend on the horseshoe crab eggs as a major source of nutrients during their stopover along the Delaware Bay, adding critical weight needed to complete their long flight from South America to the Arctic breeding grounds each spring. Sand for restoration was supplied from Cape May County quarries and the beaches engineered to have a steeper sloping beachface with a beach berm elevation just above normal mean higher high water. Restoration work expanded during 2015 westward along the Delaware Bay shoreline into Cumberland County (Fortescue, Thompson Beach and Dyer Cove (2016)) restoring additional sandy beach habitats suitable for horseshoe crab spawning damaged by Hurricane Sandy.

Other efforts focused on sediment distribution budgets and documentation of wave energy flux (heights, periods and direction of travel) along the lower Delaware Bay NJ shoreline. Installation of various structure types supporting oyster growth and development is providing interesting data on wave energy reduction at the sand beach. The structures act as nearshore oyster reefs to attenuate wave energy, reduce erosion rates and prolong the stability of the rebuilt beaches. Local oystermen are interested in this and similar approaches to oyster propagation as aquaculture opportunities especially viable along the bay front in Cape May County. Structures range from natural shell to “oyster castle” concrete shapes and timber and rebar platforms. Placed nearshore in water depths that expose the structures at low tide, but covers them completely during the higher tide cycle. Wave measurements have shown a reduction in incident wave energy at the beach landward of the structures versus open approach sections of the coastline. The impact is greatest during the lower tidal cycle creating sheltered water favored by horseshoe crabs for spawning. The combined efforts and methodologies helped restore the degraded shoreline and assist the migratory shorebirds including the Red Knot that depends on nutrients from horseshoe crab eggs to gain weight to complete their migration and for successful breeding.

In 2018 and 2019, maintenance nourishment occurred in the Pierces Point to Reeds beach complex with sand placement focused on the Cooks Beach segment. This region has acted as a feeder beach shedding material to the adjacent shorelines at south Reeds Beach and Kimble’s Beach. Oyster reefs were installed nearshore at Cooks Beach to reduce erosion rates and create a sheltered environment. NFWF funds were acquired by the American Littoral Society to plan and develop a major effort to protect the mouth of the Maurice River. This included holding multiple stakeholders meeting and technical committees to address local concerns and develop the best concepts to protect areas suffering from long term erosion. Plans were developed and submitted for permitting in 2020 that would focus on protecting Basket Flats from further erosion and shelter the Northwest reach from further loss of marsh and potential breaching of the Matts Landing road dike. These actions are designed to enhance ecological and community resiliency in the region. The USACE completed a feasibility study to use dredged sands from Delaware Bay to reduce coastal storm risks in three bayshore communities, Gandy’s Beach and Fortescue in Cumberland County and Lower Township in Cape May County. Potential sources of sand are from maintenance of the Delaware River Main Channel-Lower Reach E or from the Buoy 10 open water disposal site located one mile east of the Delaware Main Channel. In March 2018, the Township of Lower submitted a proposal to the US Army Corps of Engineers (Section 1122 of the Water Resources Development Act) for the use of this source of dredged material to improve shore protection. This project is slowly moving along, dependent on the work to dredge the lower Delaware Bay navigation channel for the sand to be placed.

Cape May Point benefits from both direct sand placement and the southerly littoral transport direction from Cape May City’s beach project. Sand was placed between the easterly border with the NJ State Park at the Cape May Lighthouse and Cape Avenue. Further southwest, the Borough beaches benefitted from littoral transport adding material. Both the Cape May City project and its extension into the Nature Conservancy segment north of the State Park continuously feed sand into Cape May Point reducing the net erosion rates seen.

The last USACOE sand placement was completed in late 2016 with 110,484 cubic yards placed starting at Lighthouse up to Coral Avenues. No further work has been done.

Cape May City;

Cape May City beaches continue to shed sand into the “Cove” beach belonging to The Nature Conservancy. These losses are remedied during the US Army Corps of Engineers work between Cold Spring Inlet and Cape May Point. Added studies were approved by the City in 2016 to better understand the beach configuration and seaward slope data following a number of injury complaints alleged to be the result of a too steep a beach and enhanced wave breaking at the beach. However, an administration change in the fall of 2016 election resulted in suspending this municipal study. Recently, the Cape May beaches have received minor amounts of sand focused on the northern shoreline at the Cape May Beach Club (site #108). Erosion has been relatively minor exposing greater lengths of the individual rock groins/stormwater outfall lines. The dry beach remains at design elevation with sufficient space for summer tourist recreation. The City dunes are slowly growing with sand derived from wind transport into vegetation propagating naturally. The most volatile region lies at the southern terminal groin leading onto the Nature Conservancy beach where the shoreline shifts landward with a steep beach followed by a spit growth from Cape May City’s beaches producing a rapid shoreline advance seaward for a period of time.

The Wildwoods;

The North Wildwood beaches have become critically eroded particularly between Hereford Inlet and 15th Avenue where emergency bulkhead installations and complete erosion of the dunes have occurred. Inlet/oceanfront sediment exchange continues to complicate the sand positioning both on the beach and offshore. At the moment, the inlet channel exists well northeast of the 2nd and Kennedy Boulevard point where the inlet and oceanfront meet with very shallow inlet or ocean floor extending over 1,000 feet offshore from the beaches, but with no singular indication of where sand might build up above either low or high tide elevations.

Emergency installation of sheet pile bulkhead extension has progressed south from 3rd Avenue to 12th Avenue and discussions are underway with the NJ Division of Coastal Engineering to renew the 2009 State-sponsored beach restoration project prior to the US Army Corps going to construction with its shore protection project for the Wildwoods. Meanwhile, North Wildwood has continued to truck sand north from the stormwater outfall positions on the beach for placement in the erosion zones. Since 2013 the City has moved over a million cubic yards of sand from both Wildwood Crest (2013 only) and Wildwood City (2014 to 2020). This methodology is similar to the proposal from the US Army Corps project, but with the larger plan to incorporate hydraulic dredging and sand pumping from Wildwood City to North Wildwood instead of using trucks.

Wildwood City, Wildwood Crest and Lower Township oceanfront beaches remain in excellent condition with surplus sand supplies generating abundantly wide beaches with and without a dune system. Dunes vary between excellent and absent entirely depending on specific locations. The US Army project will establish a consistent dune footprint within the project extent that will provide more consistent protection for the development on this barrier island.

Avalon & Stone Harbor;

These two communities have been leaders in shore protection by having successfully managed to have Federal shore protection projects constructed and, for years, have promoted wider, higher dunes with coordinated development of pedestrian access pathways that do not make a breach easier at street end access points. The US Army Corps of Engineers completed a project restoration from the 8th Street jetty to 31st Street in Avalon and from 70th Street in Avalon south to the terminal groin south of 123rd Street in Stone Harbor with initial sand placement in 2002 and 03. Work following Hurricane Sandy was completed under PL 113-2 Emergency Restoration funds for Sandy damage to the federal project. Since that was completed in early 2013, erosion

claimed the sand to the revetment rocks at 12th Street in Avalon. The Borough conducted its individual beach project in 2015 adding 740,000 cy between 9th and 25th Streets. The USACE returned in 2017 adding over 900,000 cy to the Avalon beach. Avalon also employs a sand back-passing operation to move sand from the mid-island borrow zone beaches to the erosional part of the island. The US Army Corps returned to Avalon in 2019 to pump 745,000 cubic yards of sand onto the beach between 9th and 25th Streets, but the CBRA prohibition forced the Corps to seek Stone Harbor's consent to extract surplus sand supplies from the dune system for additions to the beaches. Following consideration of those impacts, Stone Harbor declined to allow that to occur and there was no work done on their beaches in 2019. Stone Harbor's southern oceanfront has suffered severe loss rates culminating in NE storm damage in early 2016 that were addressed in 2017 with some Hereford Inlet sand. Sand was also pumped from Townsend's Inlet ebb-tidal delta to Stone Harbor due to issues related to Hereford Inlet being located within a unit of the Coastal Barrier Resource System (CBRS) that prohibits federal funds for use to promote "development" within or for extraction of sediment out of the CBRS unit. This prohibition was lifted by the Dept. of the Interior Secretary in the fall of 2019, but litigation against this action by the Interior Secretary was filed by US National Audubon Society. Thus far no federal funds have been committed to pump sand directly from the authorized borrow sites in Hereford Inlet for beach nourishment. There is no prohibition for state, county or local funding for such activity.

Sea Isle City & Strathmere;

A 2009 NJ State and locally sponsored shore protection project saved these two communities substantial damage from Hurricane Sandy with about 230,000 cubic yards of sand lost that was replaced starting April 17, 2015 in Ocean City under a federal responsibility for Ludlam Island. This project covered from 42nd Street to 59th Street in Ocean City and extended from Seaspray Avenue south to 93rd Street in Stone Harbor and was accomplished using sand from offshore borrow sites previously defined. Sand was added first in Ocean City, then starting in Strathmere and working south finishing at 93rd Street in Sea Isle City. Over 3.4 million cubic yards of new sand was pumped onto this island from offshore borrow sites by 2016.

The Corson's Inlet State Park shoreline south of development in Ocean City suffered dune loss of considerable magnitude during Hurricane Sandy. Since sand moves south naturally under wave dominance from the northeast, this shoreline should benefit from any sand losses in Ocean City's part of the new project. The dune will need fencing to encourage reconstruction as the beach widens. The position of the main tidal channel in Corson's Inlet was monitored until 2019 to allow rapid knowledge of rapid shifts in channel configuration or the creation of new tidal flow pathways which could seriously affect shoreline stability. This monitoring shifted to the US Army Corps of Engineers on an annual basis. Modest restoration work was completed at both the Strathmere side and north of the State Park on the Ocean City side of Corson's Inlet using ebb-tidal delta sand in 2019.

Ocean City;

Ocean City has been under USACOE jurisdiction since 1992 with the initial large-scale shore protection project sand placement between the Gardens shoreline and 34th Street. Subsequent sand supplies were provided to the erosional zone that persists between North Street and 12th Street at the northeast facing part of the barrier island. Early beachfill attempts centered at 6th Street all had short survival times due to rapid rates of sand loss both back to Great Egg Inlet and south along the beachfront. This transport mechanism is so effective that since the 1992 episode of sand placement south of 14th Street to 34th Street in 1992, no additional material has been needed. The survey site at 20th Street has one of the widest, most stable dunes with a 250-foot wide dry beach seaward of those dunes. Back in 1991, the low tideline was located at the boardwalk at this site.

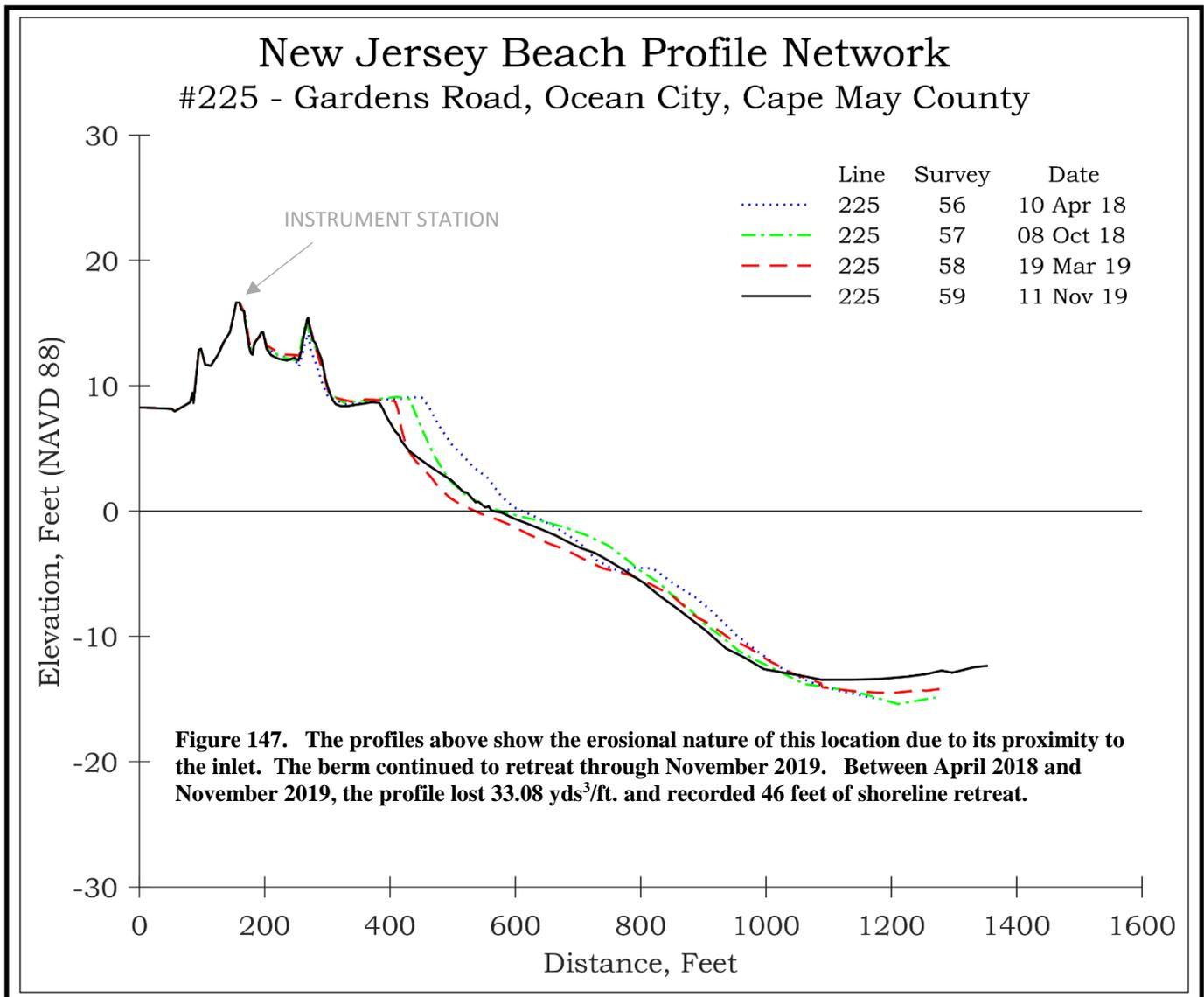
The Ludlam island project also included 1.5 million cubic yards of sand for the southern shoreline of Ocean City that was damaged by Hurricane Sandy due to low, narrow dunes. This places the shoreline between Great Egg Inlet in Ocean City and Hereford Inlet in Stone Harbor under USACE project jurisdiction with a 3 to 5-year expectancy of maintenance work on restoring these beaches to the design specifications.

Site Photographs and Profile Plots:

NJBPN 225 - Gardens Road, Ocean City



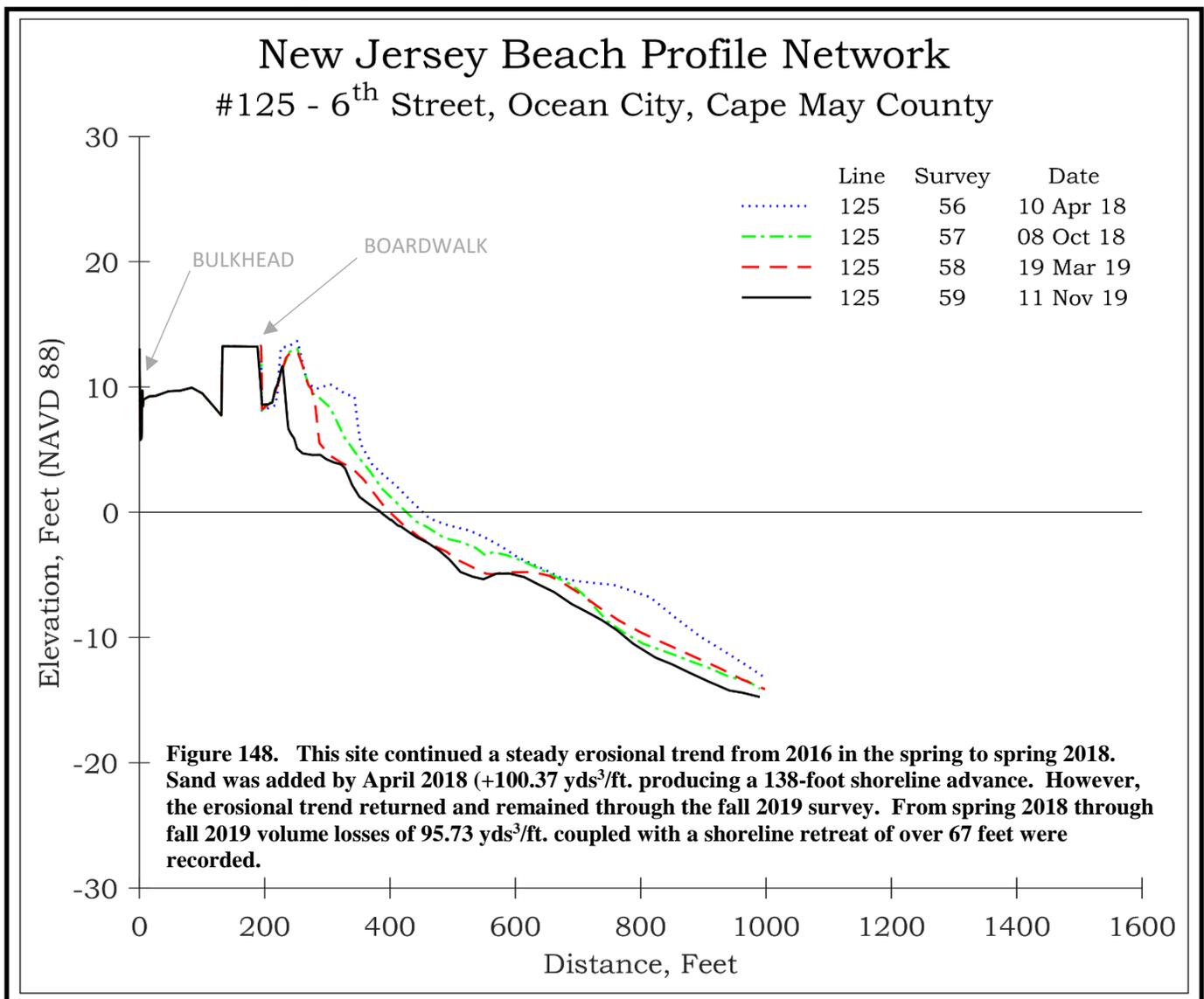
The Gardens Road site is the northernmost profile in Ocean City and located near Great Egg Harbor Inlet. (Left photo is from October 8, 2018. Right photo is from November 11, 2019). Sand was added by April 2018. The dune fencing has been buried by dune growth. The berm and beach face has eroded by November 2019.



NJBPN 125 - 6th Street, Ocean City



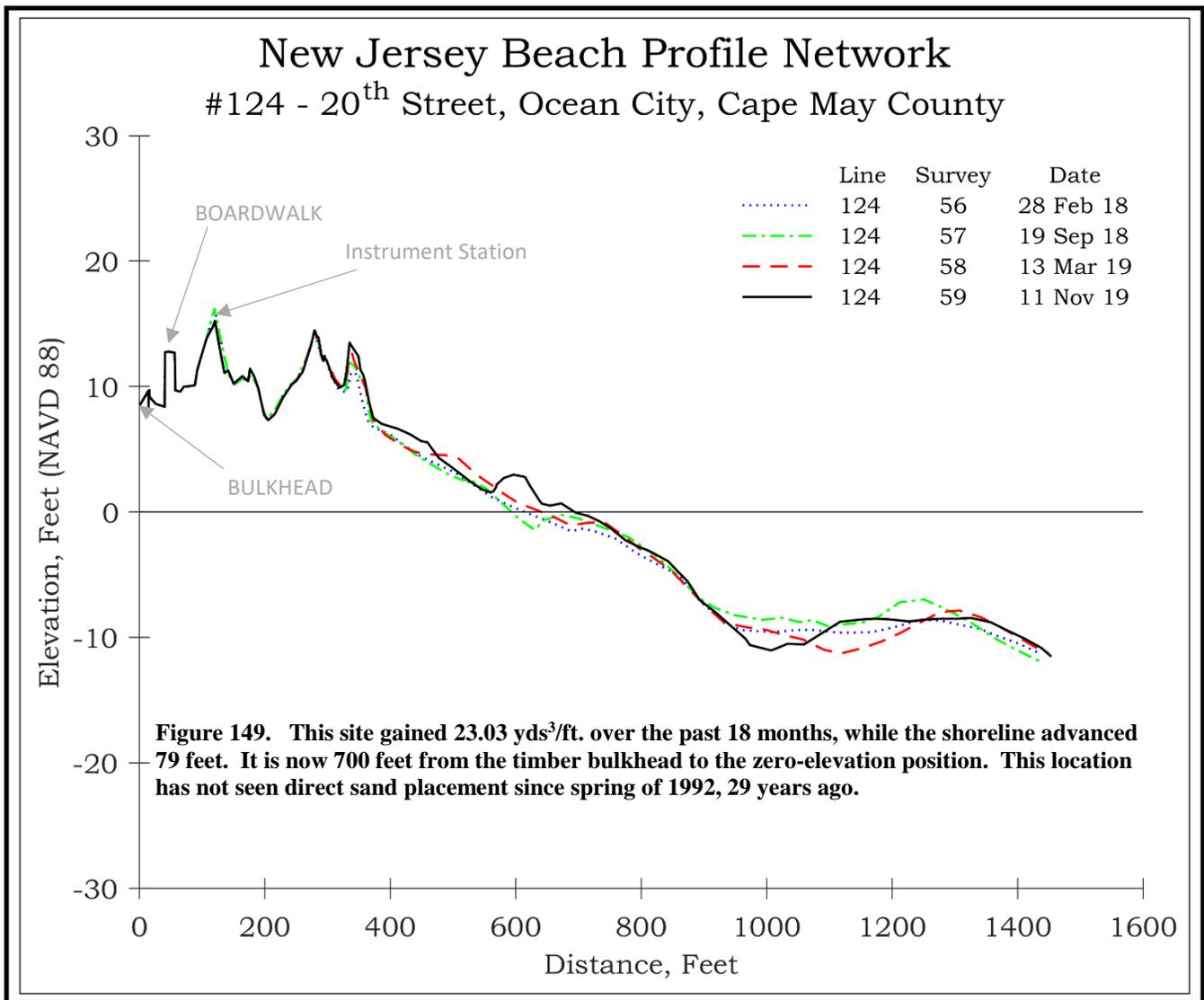
The left photo (taken October 8, 2018) shows sand placed up to the scarped dune vegetation line. The right photo (taken November 11, 2019) displays the magnitude of erosion at this location. A significant scarp has formed deep into the primary dune while the beach face has experienced continuous erosion.



NJBPN 124 - 20th Street, Ocean City



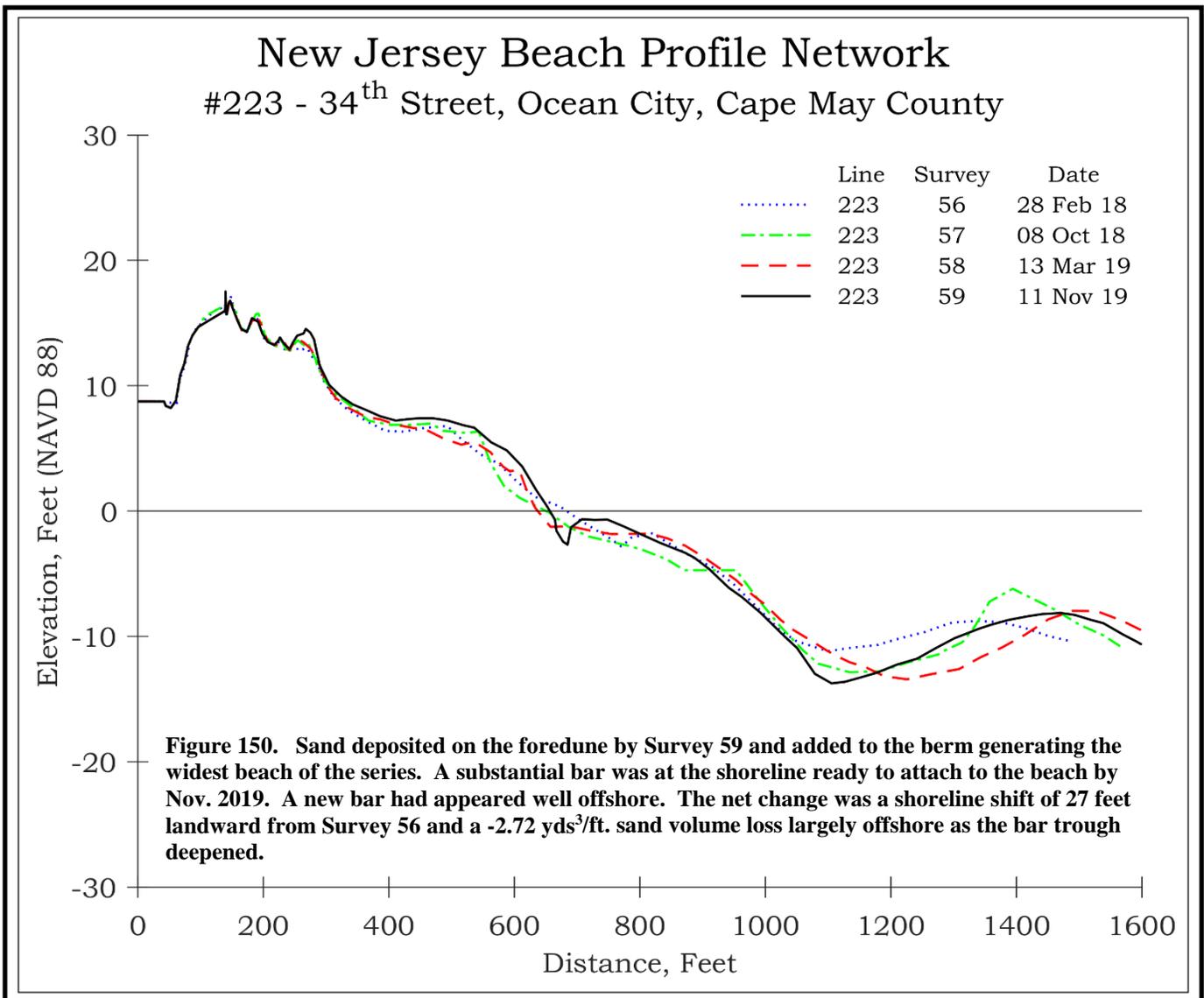
The 20th Street profile is located near the center of the island and hosts an extensive dune and wide berm. The area has been stable since the initial beach restoration in 1992. Photo on left taken September 19, 2018. Right photo taken November 11, 2019. The view from the instrument location provides a panoramic feeling for the expanse of this beach. In 1991, the low tide line was under the boardwalk to the extreme left of the pictures.



NJBPN 223 - 34th Street, Ocean City



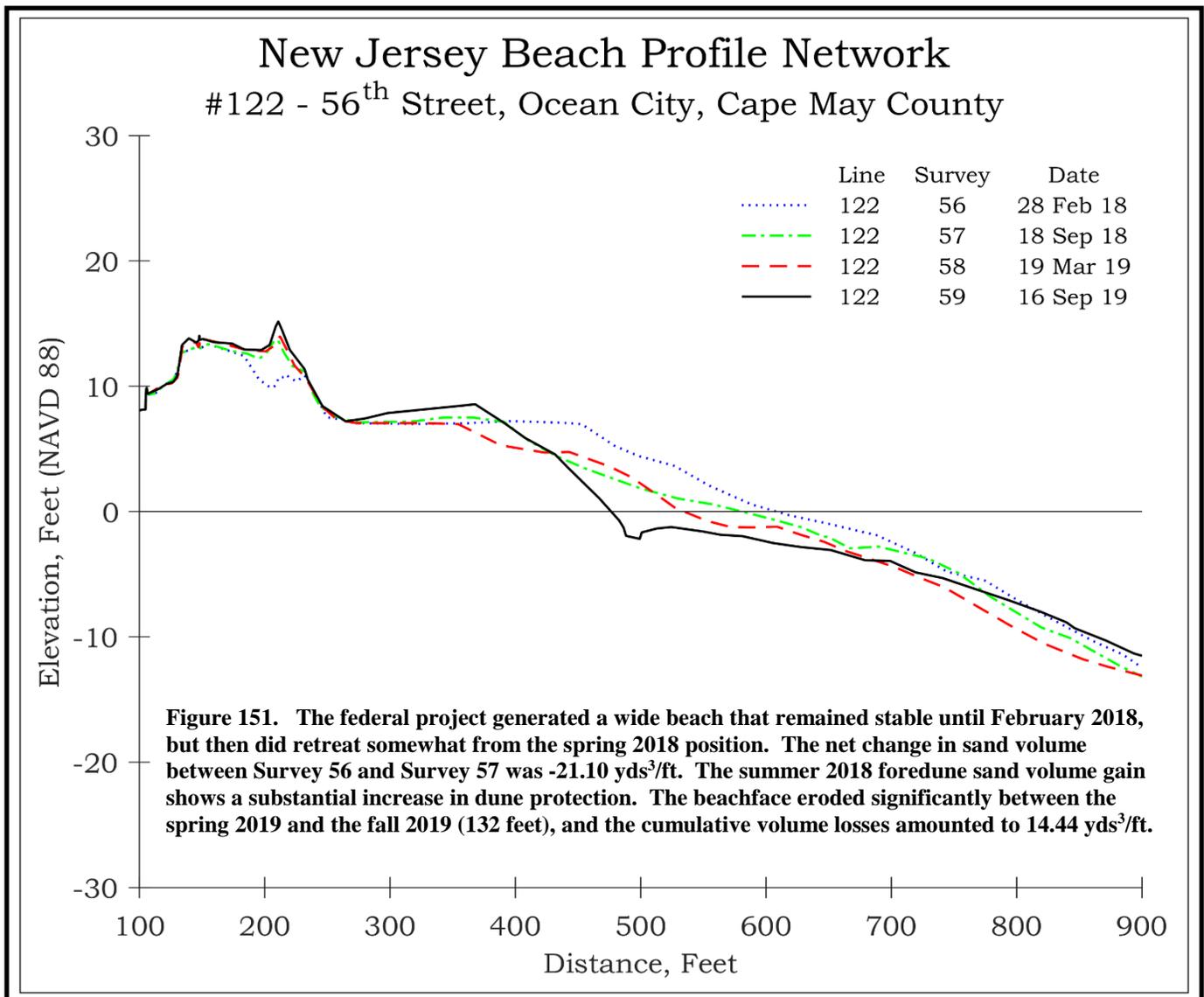
The comparison photos to the south (left taken October 8, 2018 and right photo taken November 11, 2019) show changes in dune erosion over the past 18 months. The old fence from 2014 has been buried, with a new fence nearing complete burial by October 2018. By November 2019, the seaward foredune crest elevation has increased slightly.



NJBPN 122 - 56th Street, Ocean City



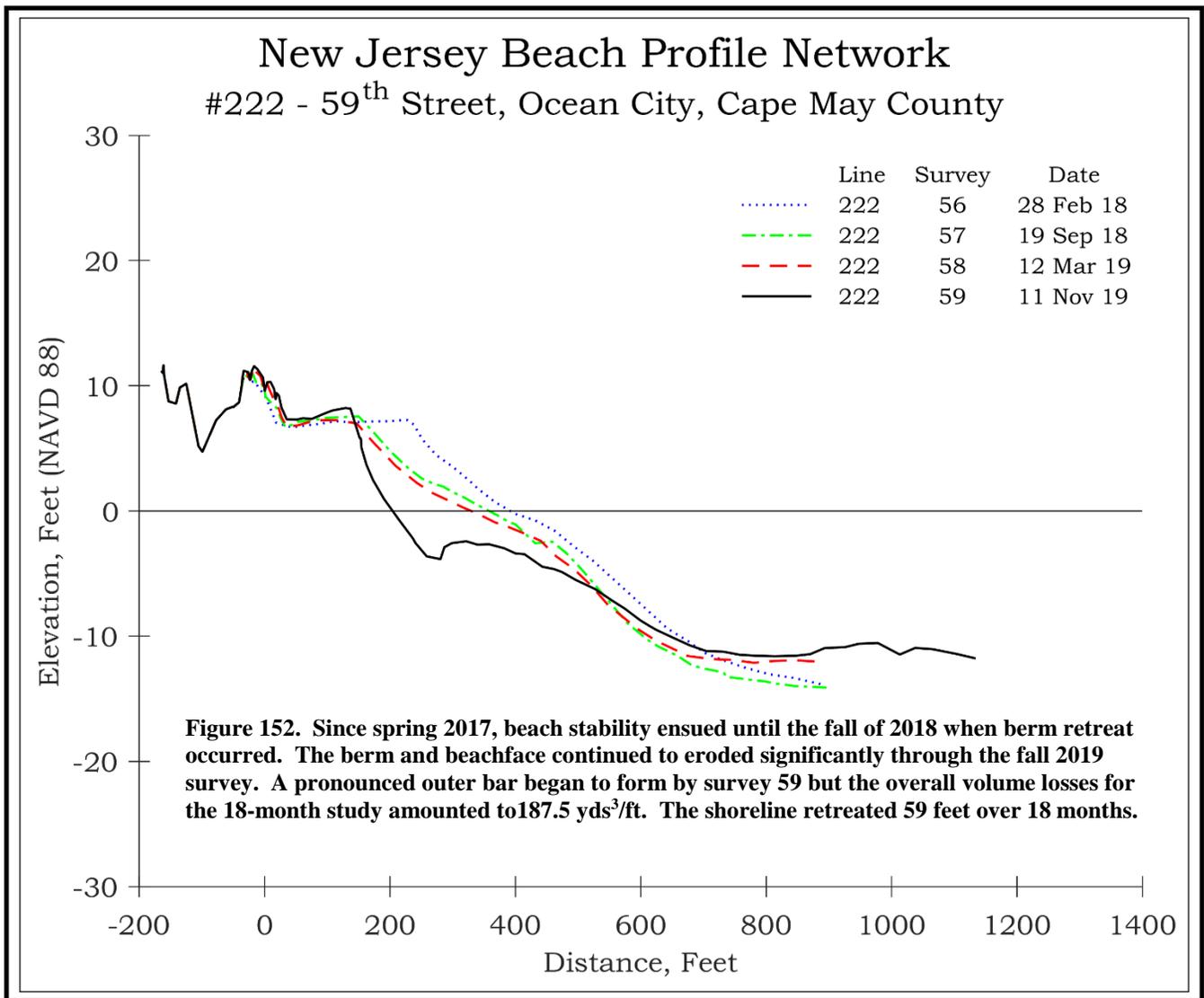
In 2015, the 56th Street site received its first sand replenishment since the 1995 state beach fill. The new dune was planted and fence that was placed is virtually covered by sand as shown on the left photograph (September 18, 2018). The right view was taken November 11, 2019 and shows that the newest line of sand fencing remains buried by accreting sand with the foredune vegetation growth remaining strong.



NJBPN 222 - 59th Street, Ocean City



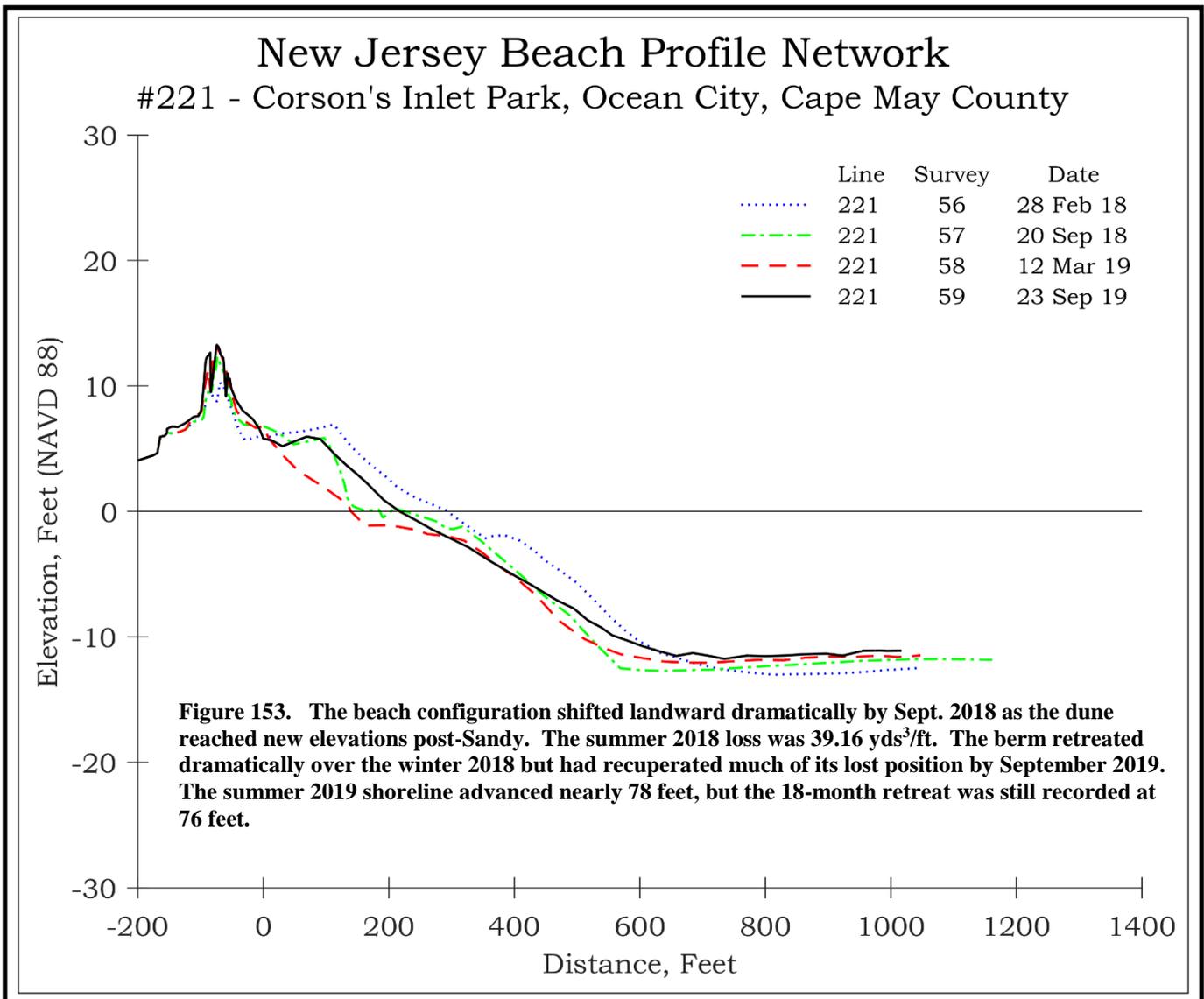
The 59th Street site is located at the southern end of the developed section of Ocean City within the Corson’s Inlet State Park. This site is also within the 2015 federal beach fill project area. (Left photo taken September 19, 2018. Right photo taken November 11, 2019). Significant beach and berm losses can be seen by November 2019.



NJBPN 221 - Corson’s Inlet State Park, Ocean City

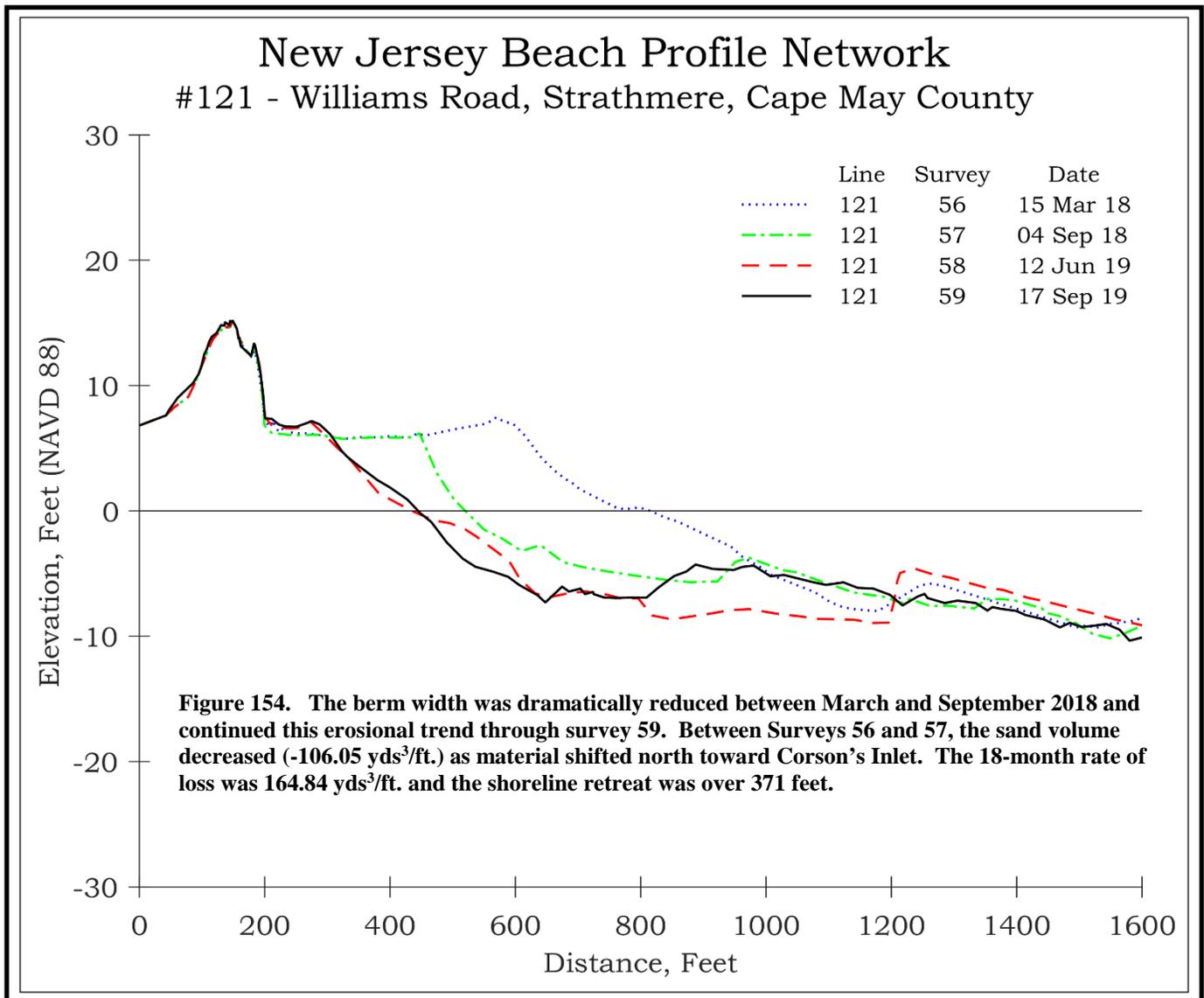


Natural dune recovery has continued following Hurricane Sandy which destroyed the foredune. The left photograph, taken September 20, 2108 shows the beach (view to the south from the toe of the fore dune) was considerably narrower, but the dune exceeded 12-foot crest elevation. By September 23, 2019 (right photo), the beachface has been eroded as materials shifted nearshore.





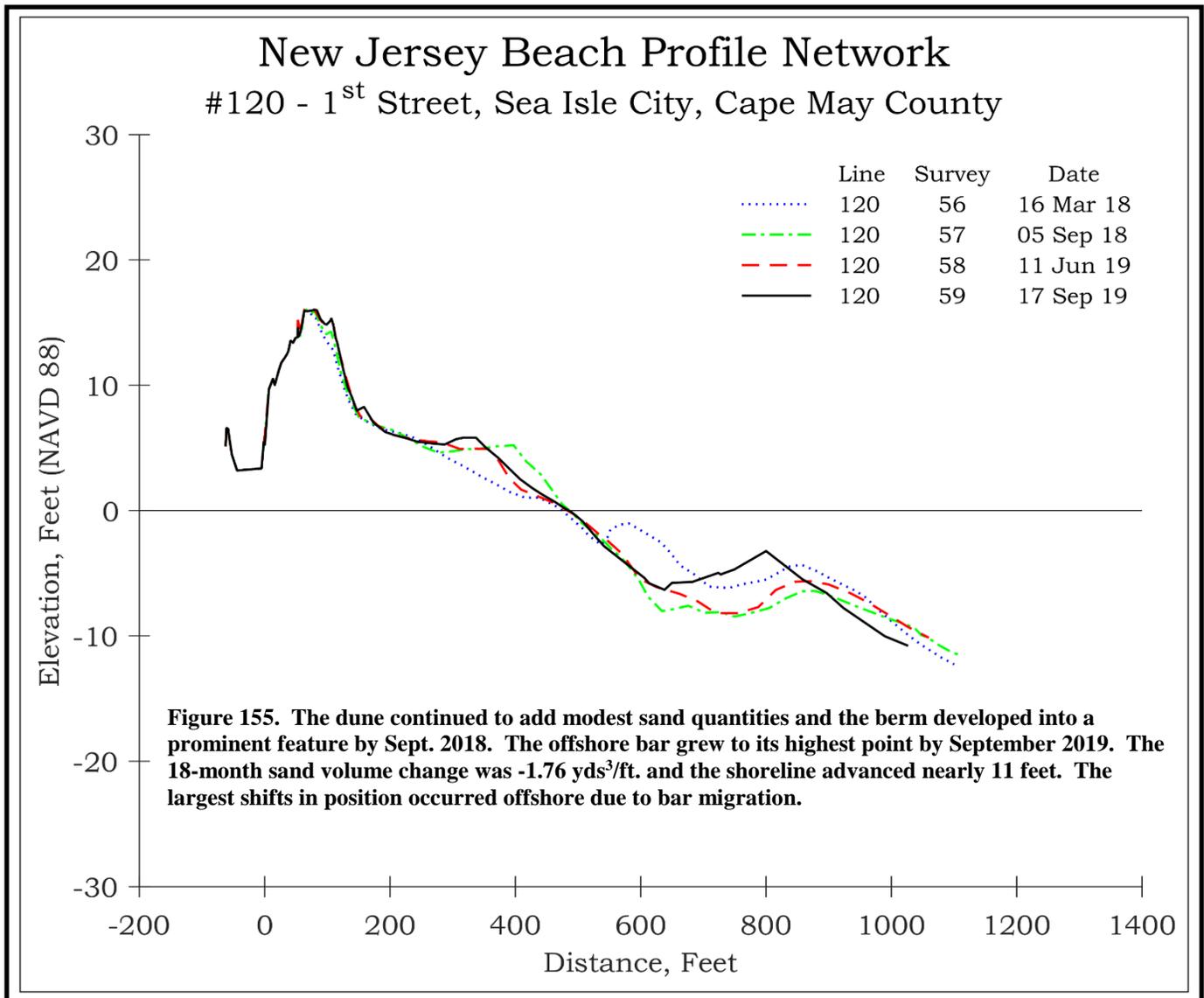
The Williams Road site is dominated by the ebb-tidal delta at Corson's Inlet. The extensive width of the dry beach serves to protect the dunes from wave damage. The summer beach was eroded back as of September 4, 2018 (left photo). This erosional trend of the beach continued through the September 17, 2019 survey as shown in the photograph on the right.



NJBPN 120 - 1st Street, Sea Isle City



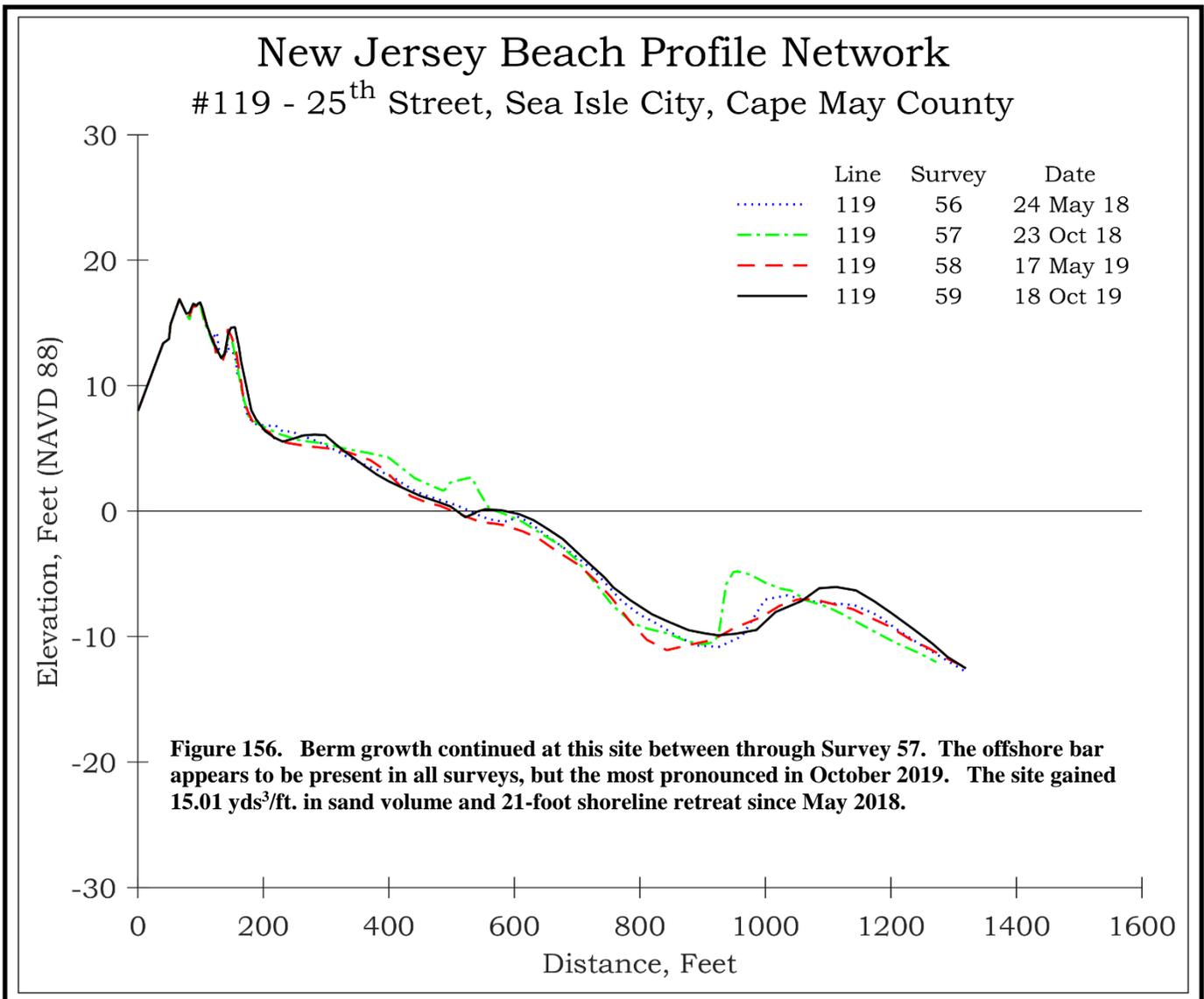
The dune here at the 1st Street location consists of a geotextile core covered by sand. The core has been in place for 26 years without failure, so worked better than an I-5 gravel core. However, more extensive beach maintenance has occurred since 2001 leading to the federal project in summer 2015. The left photograph was taken September 5, 2018 and shows more mature dune grass with extensive foredune development at the buried fencing installed in 2015. The right view was taken September 19, 2019 and displays the dune grasses have remained dominant.



NJBPN 119 - 25th Street, Sea Isle City



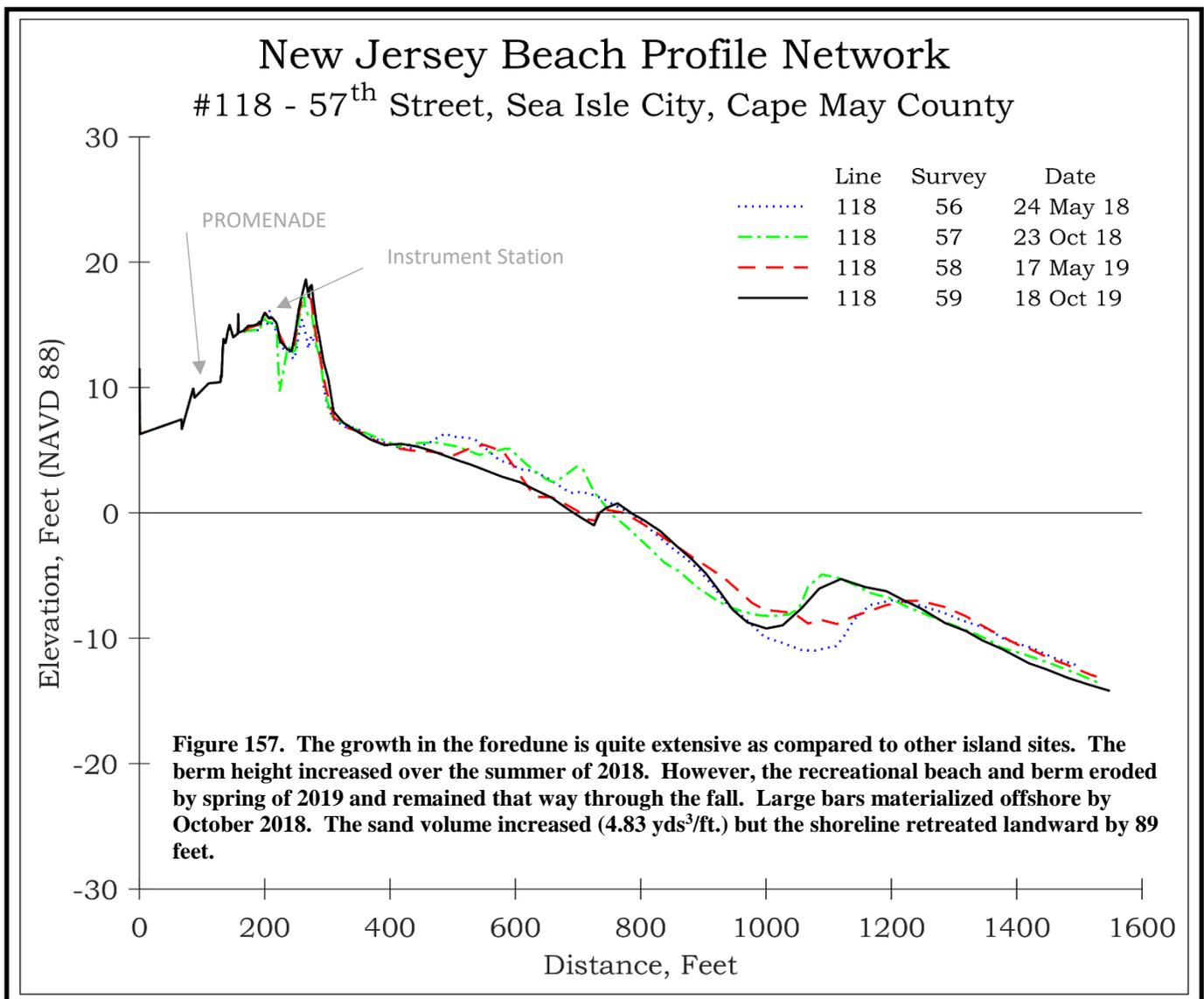
The 25th Street site is reasonably stable and was enhanced in 2009 under the NJ State project. The 2015 federal project greatly widened the beach and added to the dune. The left photograph from October 23, 2018 shows the foredune development with growing vegetation having buried the 4-foot fencing. The right photo taken on October 18, 2019 shows dune grasses have remained and matured on the seaward dune face.



NJBPN 118 - 57th Street, Sea Isle City



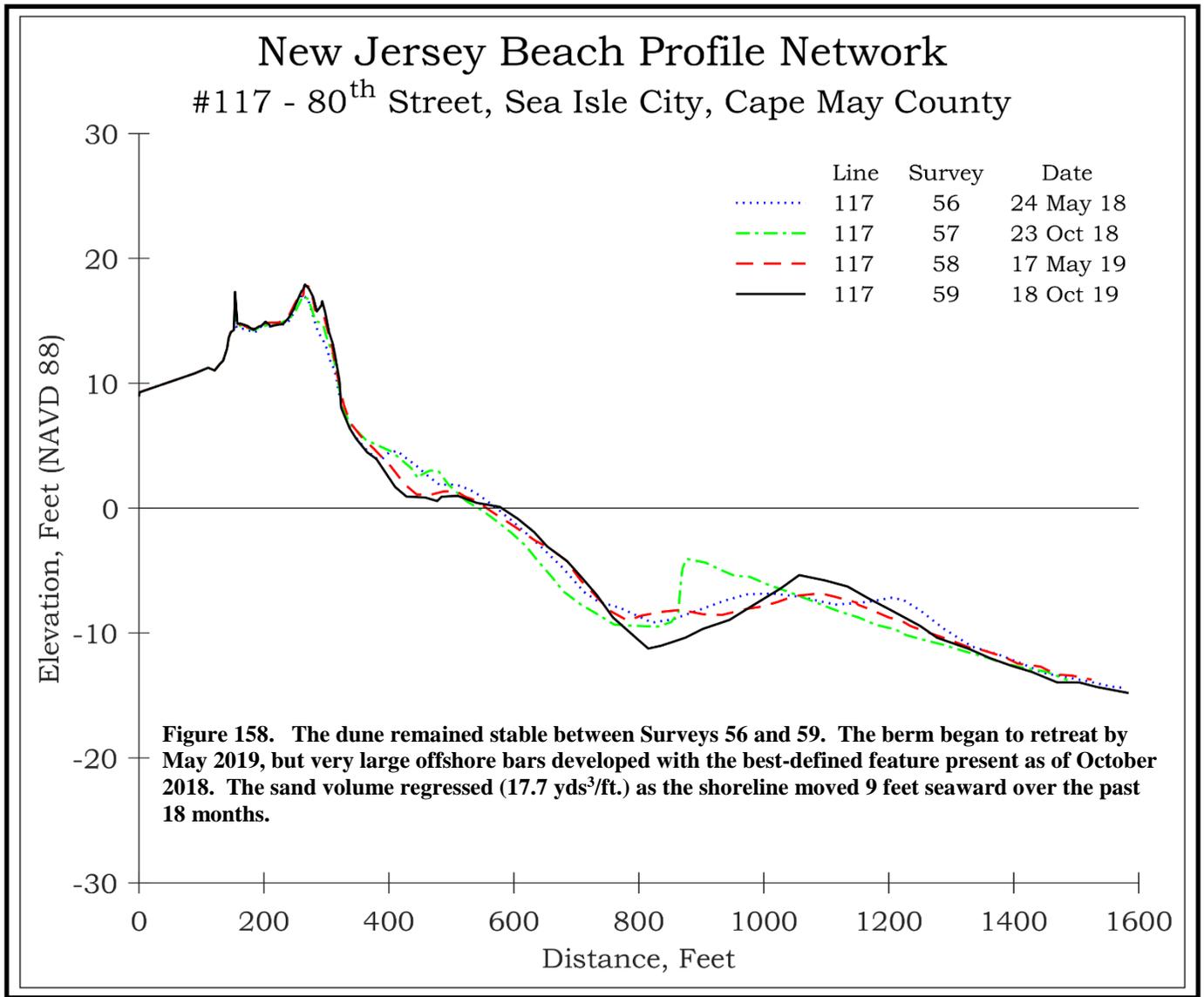
The left photo (taken October 23, 2018) shows some dune grass growth over the two summers and a beach in very good shape. The right photo (taken on October 18, 2019) shows the flourishing dune grasses and buried dune fence along the foredune face.



NJBPN 117 - 80th Street, Sea Isle City



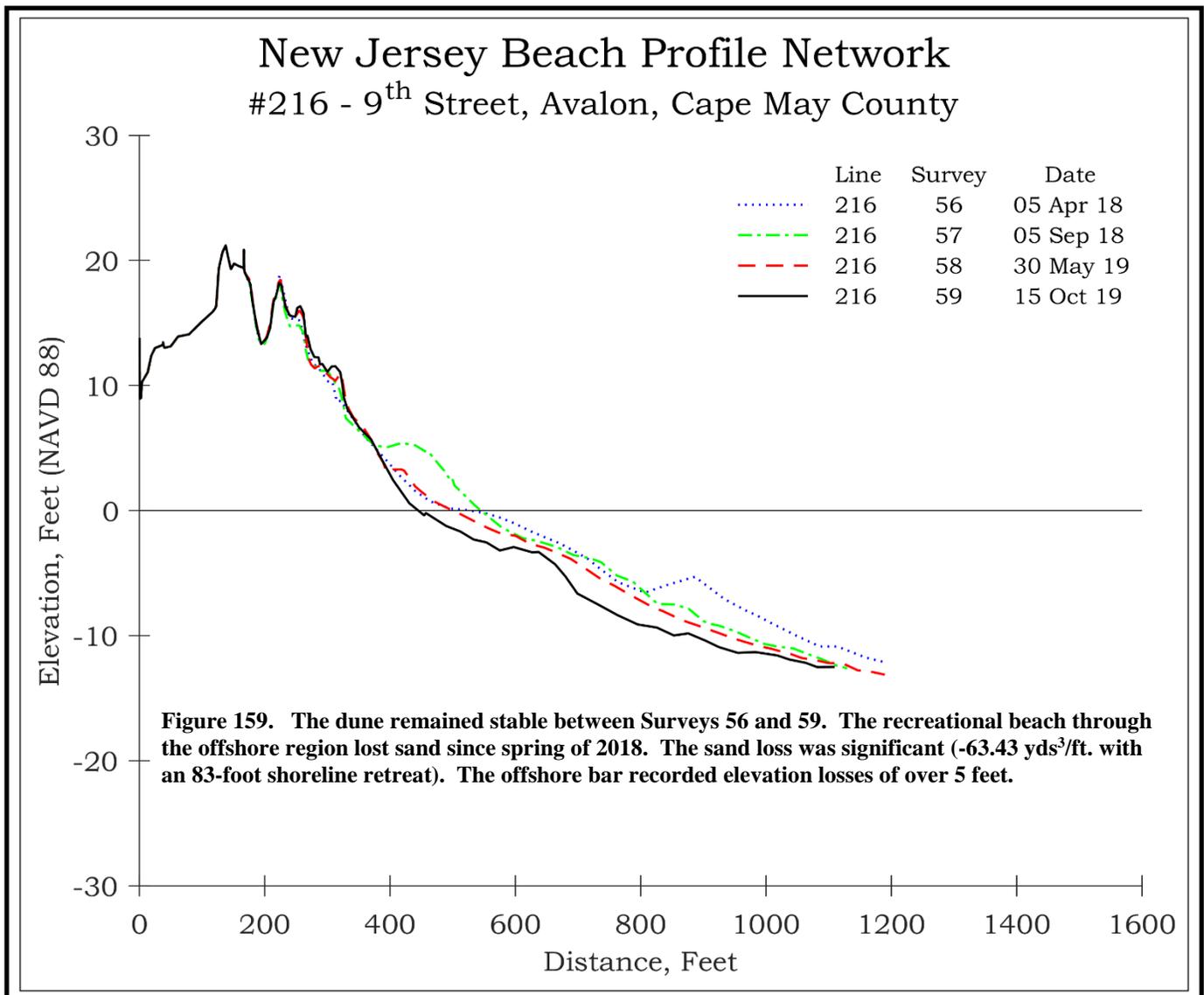
The left photo was taken October 23, 2018 and shows the southern Sea Isle City beach and dunes with the dune fencing buried and grass growth underway. The right photo (taken on October 28, 2019) shows the dune fencing remains buried while the dune grasses have progressed seaward.



NJBPN 216 - 9th Street, Avalon



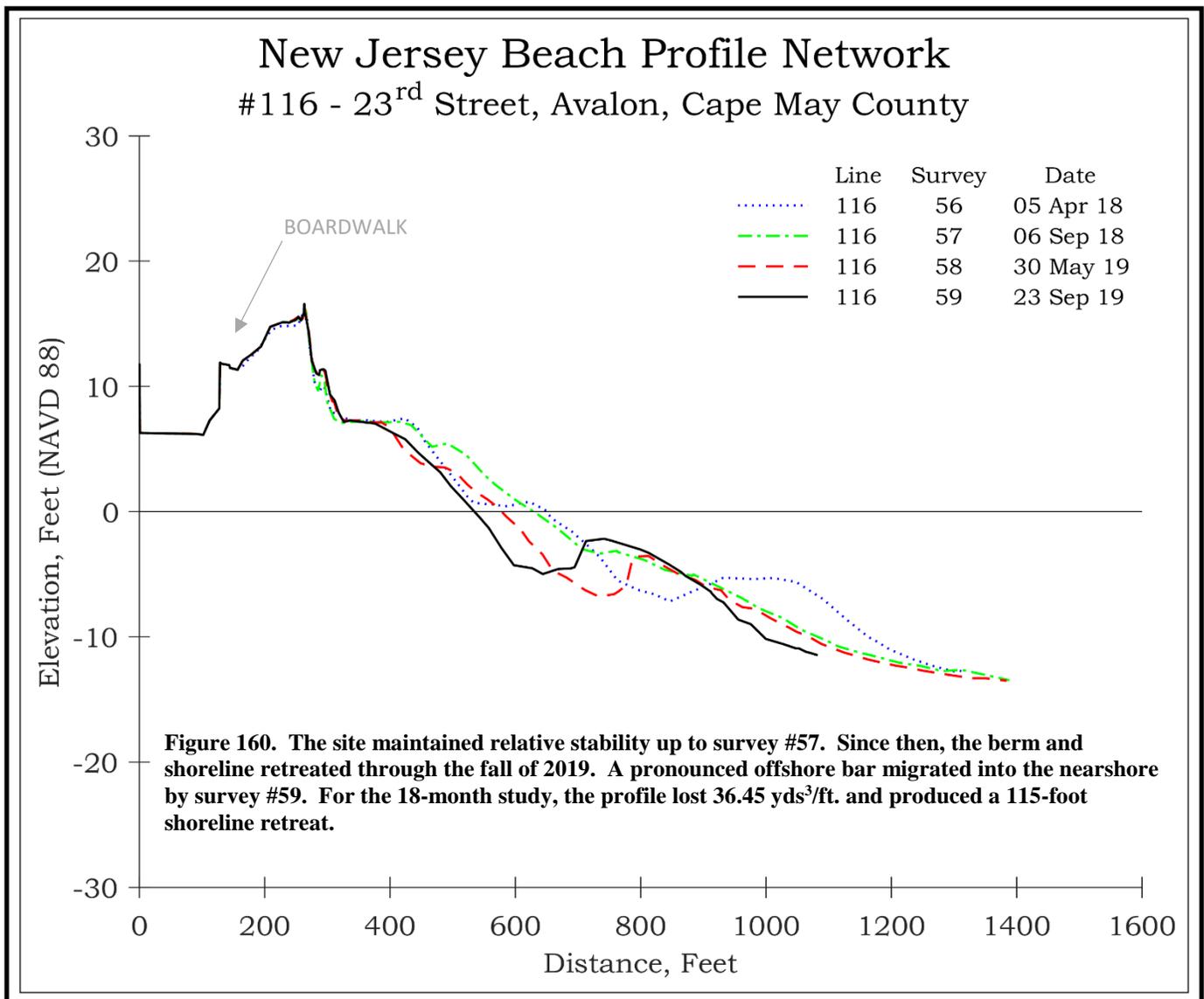
The 9th Street site is located near the Townsend's Inlet south jetty. The fall of 2018 survey (left photo taken September 10, 2018) shows the recreational beach remained usable to beach goes, though eroded back from the placement of sand following the most recent beachfill. The erosional trend of the recreational beach continued through the fall 2019, but the dune here was not affected. (Right photo taken October 15, 2019.)



NJBPN 116 - 23rd Street, Avalon



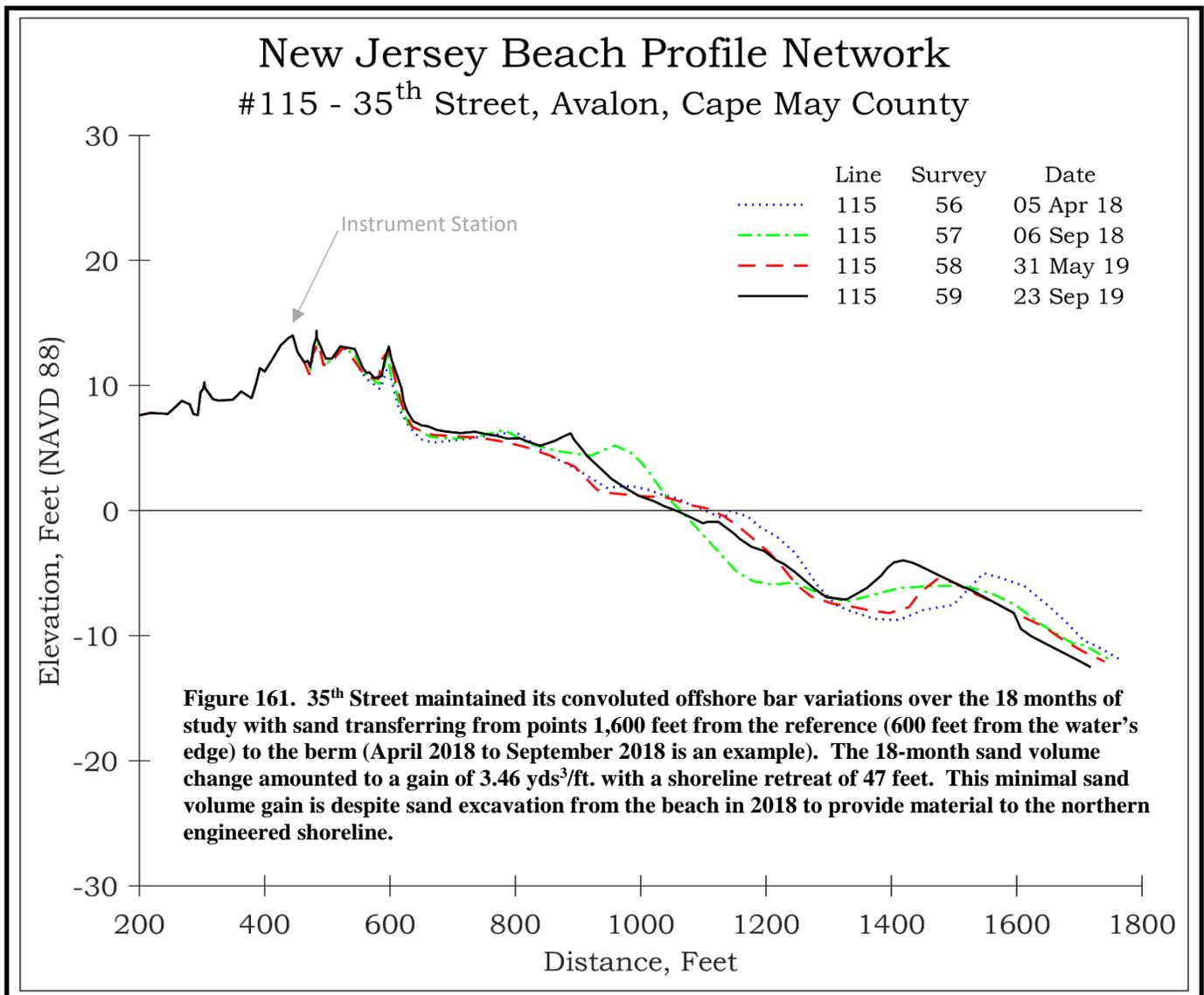
The left photo (September 6, 2018) follows the 2017 federal maintenance. The right photo taken on September 23, 2019 shows the foredune fencing virtually covered by accreting sand, while the berm elevation has eroded back minimally.



NJBPN 115 - 35th Street, Avalon



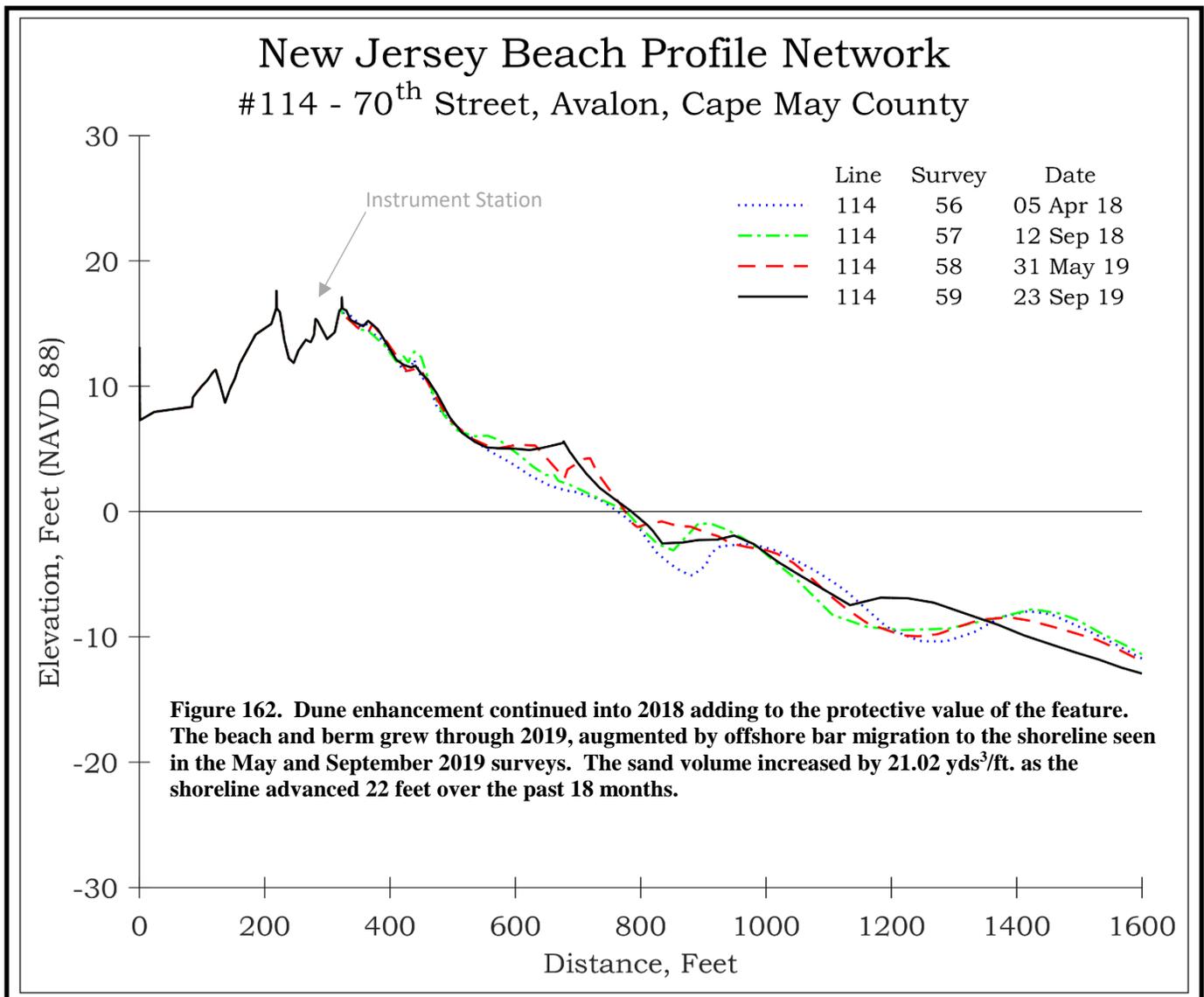
This site lies south of the Avalon beach nourishment segment and is in an accretion zone within the municipality. The left photo, (view to the south) taken September 6, 2018 shows more sand added at the base and landward side of the fencing. The right photo, taken on September 23, 2019 looking to the south, displays very healthy dune system and recreational beach area.



NJBPN 114 - 70th Street, Avalon



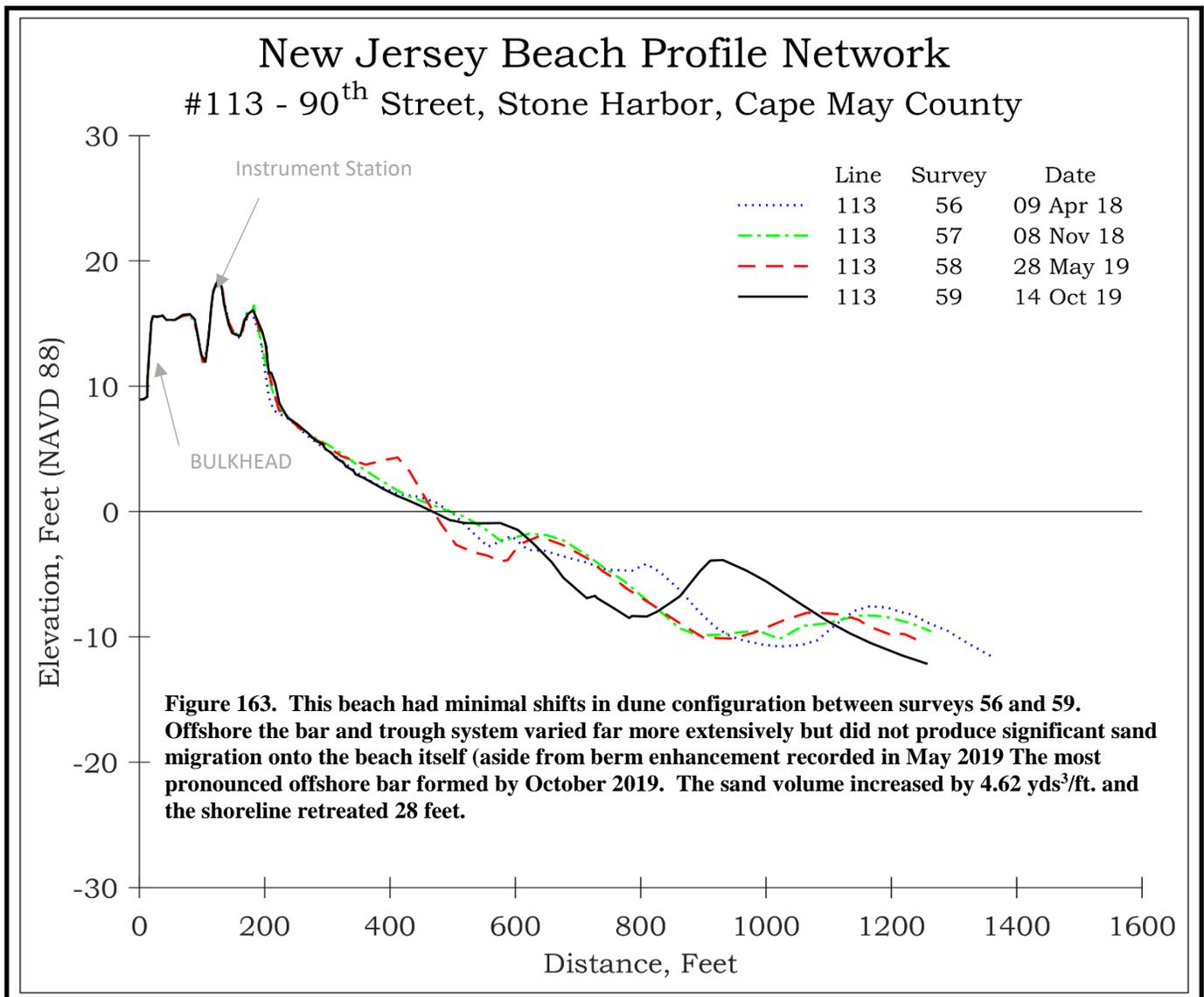
The 70th Street location has been a stable area for decades and lies at the very north limit of the Stone Harbor segment of the USACE Seven-Mile Island shore protection project, which breaks between 31st Street and 70th Street due to that shoreline not requiring maintenance. The left photo was taken September 12, 2018, shows the buried dune fencing. The right photo, taken September 23, 2019, displays the virtually unchanged foredune.



NJBPN 113 - 90th Street, Stone Harbor



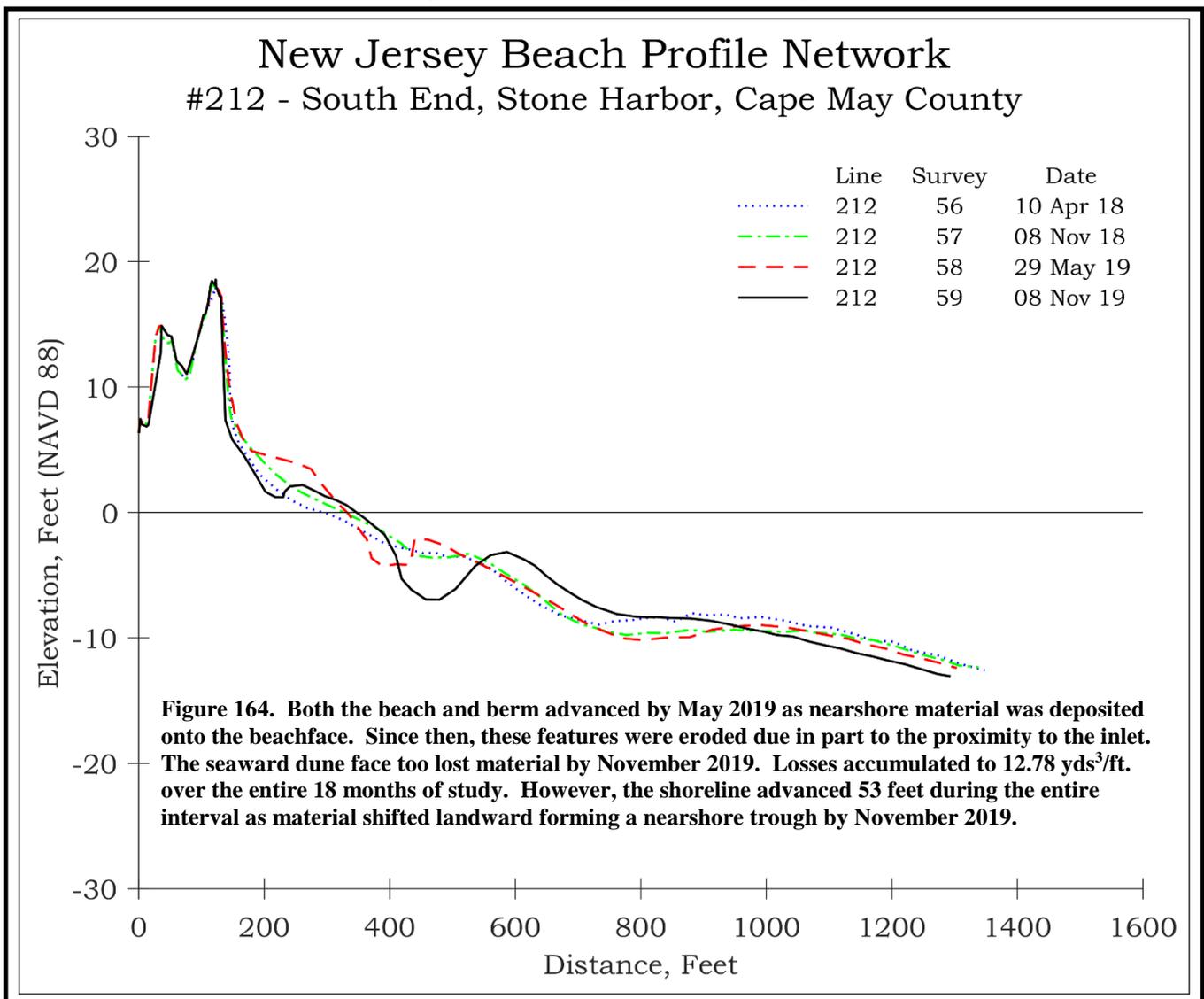
The 90th Street location been quite stable not needing maintenance as frequently as sites further south. The left photo, taken November 8, 2018, includes the berm and seaward dune toe. The right photo, taken on October 14, 2019, shows a slightly narrower beach.



NJBPN 212 - 121st Street, Stone Harbor



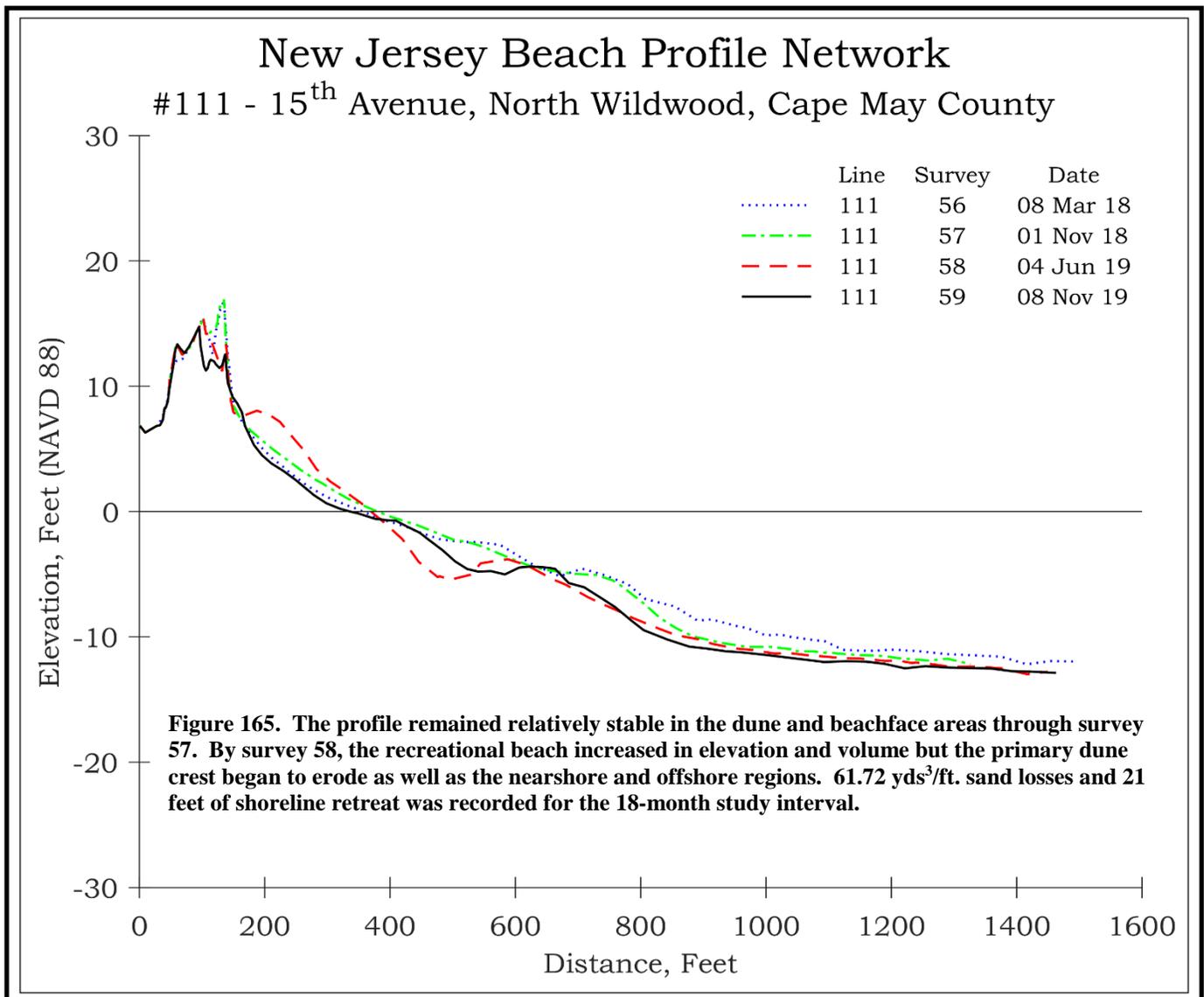
The south end Stone Harbor site has shown a long-term erosional trend that may be influenced by changes surrounding Hereford Inlet. The site has been the recipient of numerous beach nourishment projects including municipal and Federal efforts. Most recent was spring 2017 in a regular maintenance effort. November 8, 2018 (left photo) shows a new fence line on the beach, a profusion of seaside goldenrod plants at the dune crest and a slightly wider beach. The right photo, taken on November 8, 2019, shows a seaward dunescarp had formed along with a noticeable pocket of sand added to the shoreline.



NJBPN 111 - 15th Avenue, North Wildwood



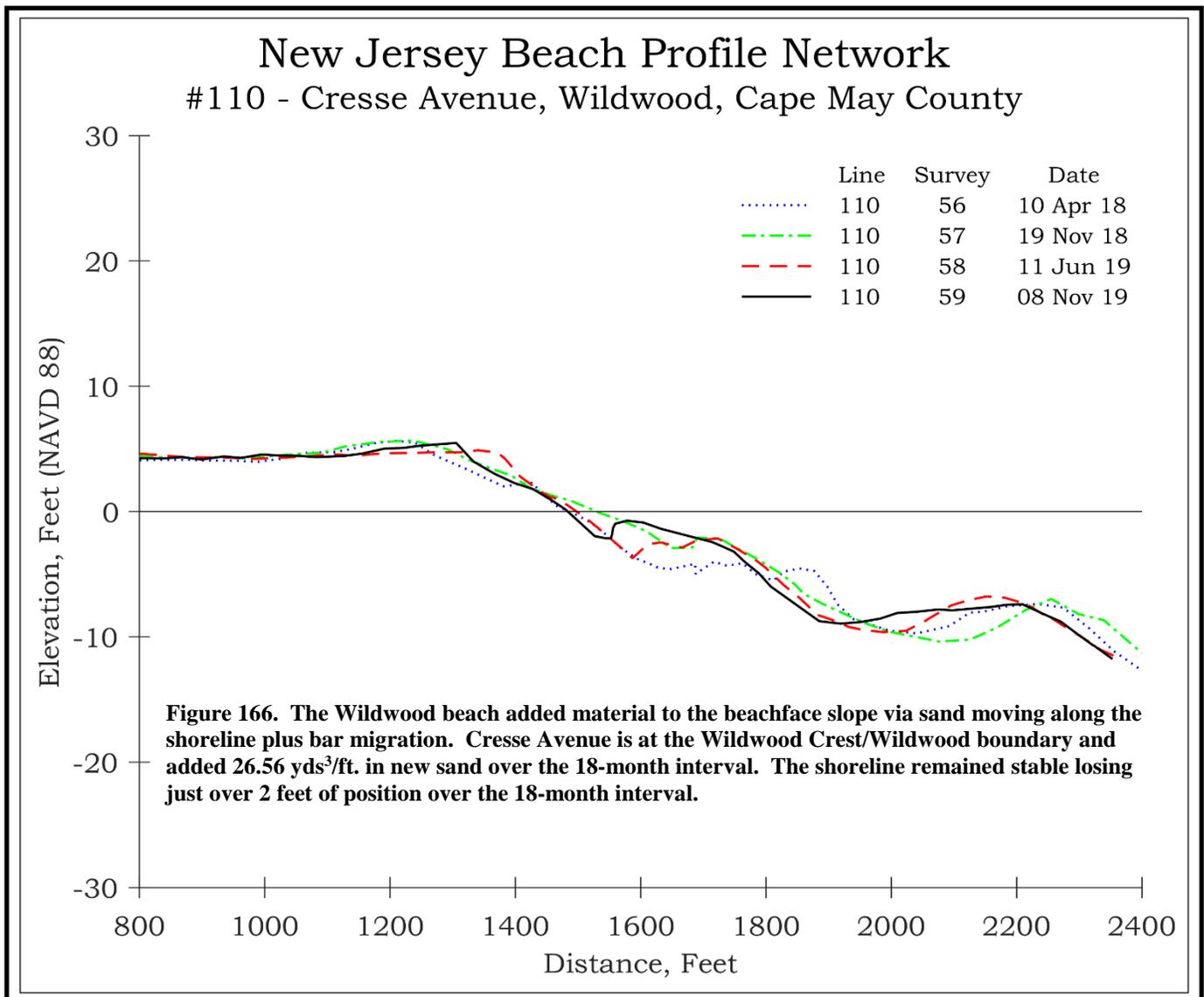
The 15th Avenue site is just south of the major erosion problems in North Wildwood. The November 1, 2018 view to the left, shows some dune retreat had occurred. By November 8, 2019 the dune retreat had worsened (distance from the white pole to the dune slope). Notice the wrackline positioned at the toe of the dune.



NJBPN 110 - Cresse Avenue, Wildwood



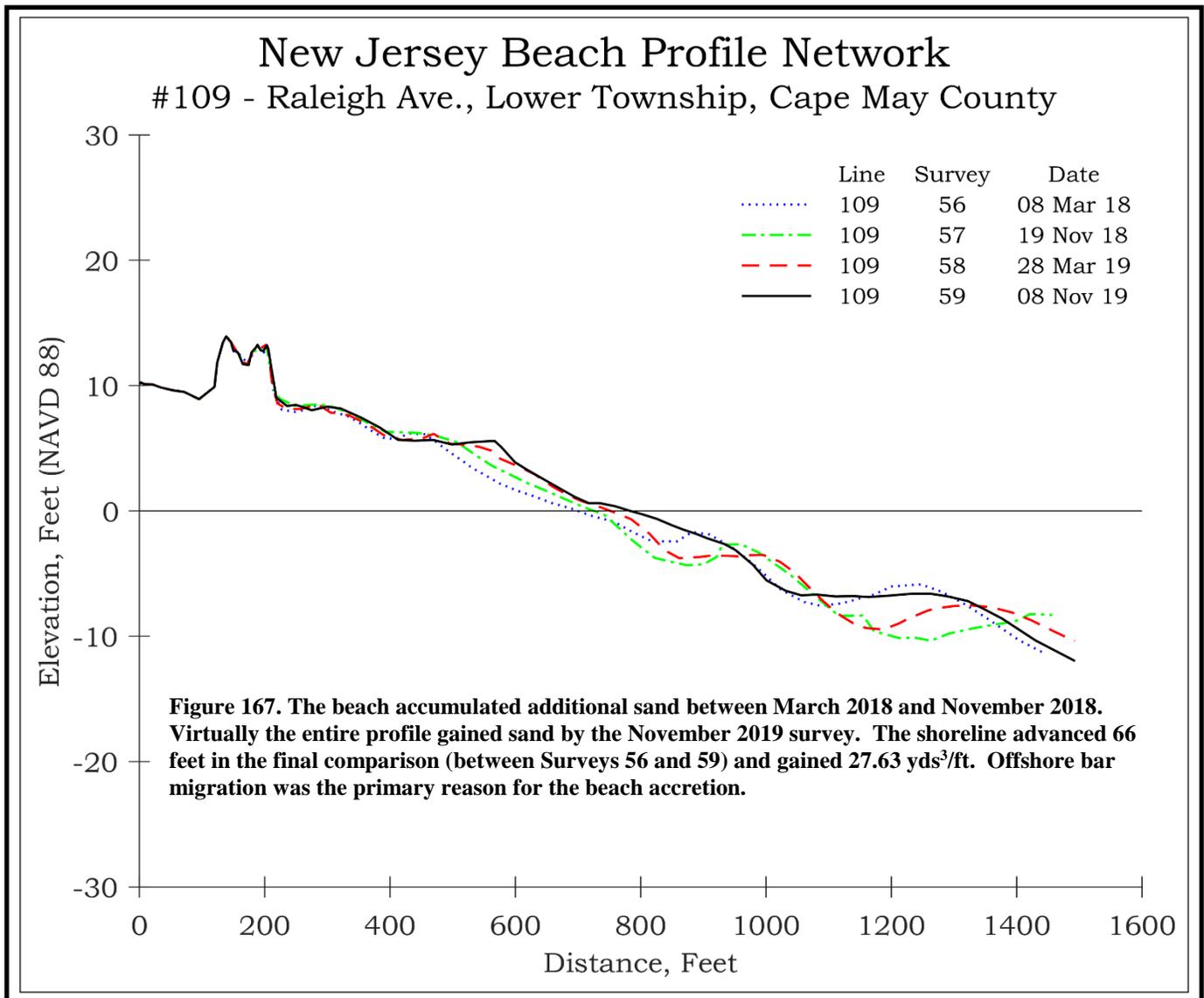
The Cresse Avenue site has been accumulating sand volume since 1992. Sand lost from North Wildwood migrates south adding to the beach width each year. The left photo, taken November 19, 2018, shows the extensive low lying beach. The right photo, taken on November 8, 2019, shows the beach width accompanied by the migration of the offshore bar onto the beachface.



NJBPN 109 - Raleigh Avenue, Lower Township



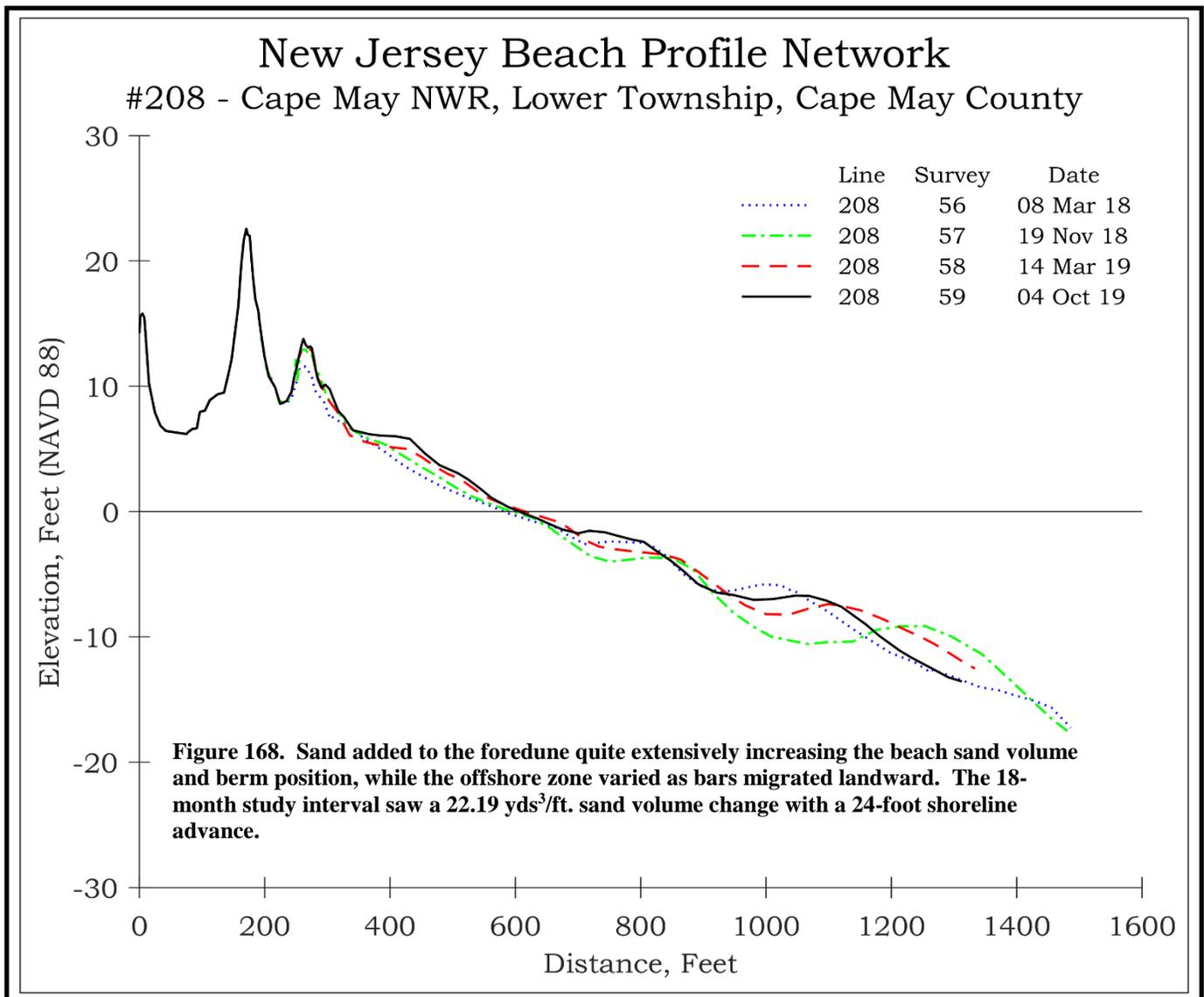
The left photo (taken on November 19, 2018) shows the wide beach present in Lower Township. The right photo, taken on November 8, 2019, shows the bottom zone of the beach and gives a good view of the width which continued to increase from the fall 2018.



NJBPN 208 – Cape May National Wildlife Refuge, Lower Township



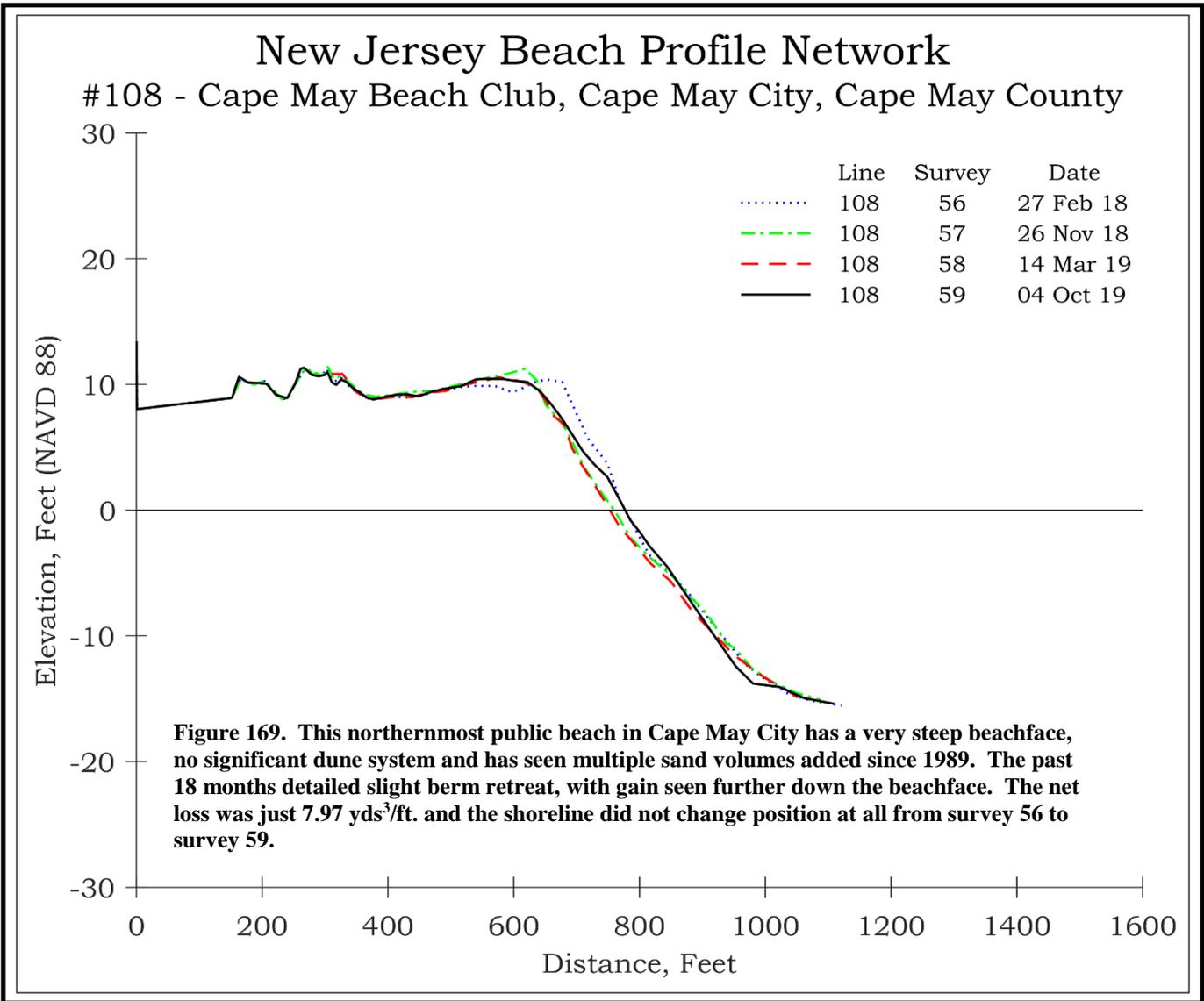
The left photo was taken November 5, 2018 and is a view along the foredune crest to the north and gentle shoreward gradient developed on the wide beach. The right photo was taken on October 4, 2019, and shows improvement in the seaward dune slope sand and grass coverage.



NJBPN 108 - Cape May Beach Club, Cape May City



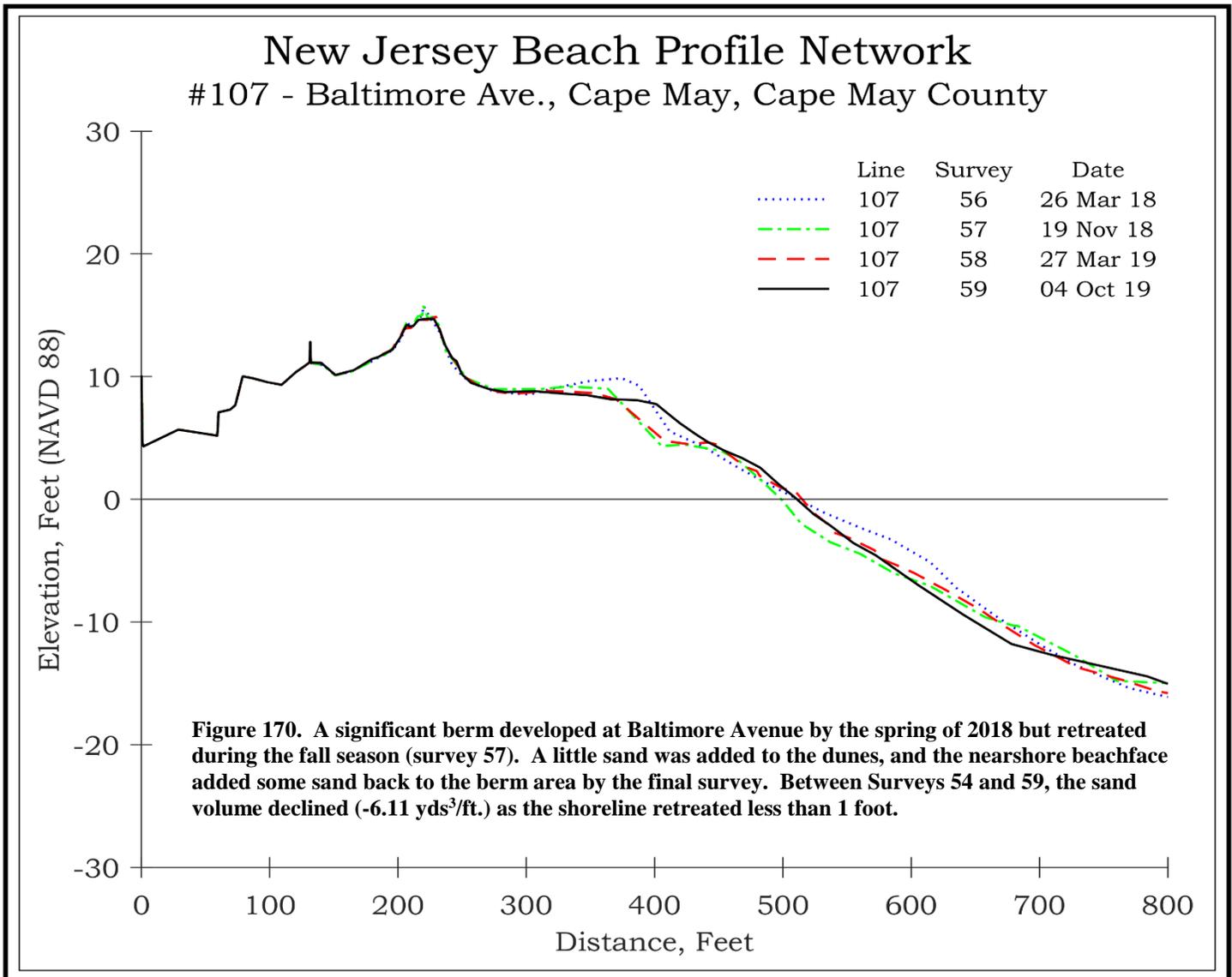
The left photo was taken November 26, 2018. The right photo was taken on October 4, 2019, and in comparison, shows relative consistency in configuration and beach elevation. The berm did retreat minimally over the 18-month interval.



NJBPN 107 - Baltimore Avenue, Cape May City



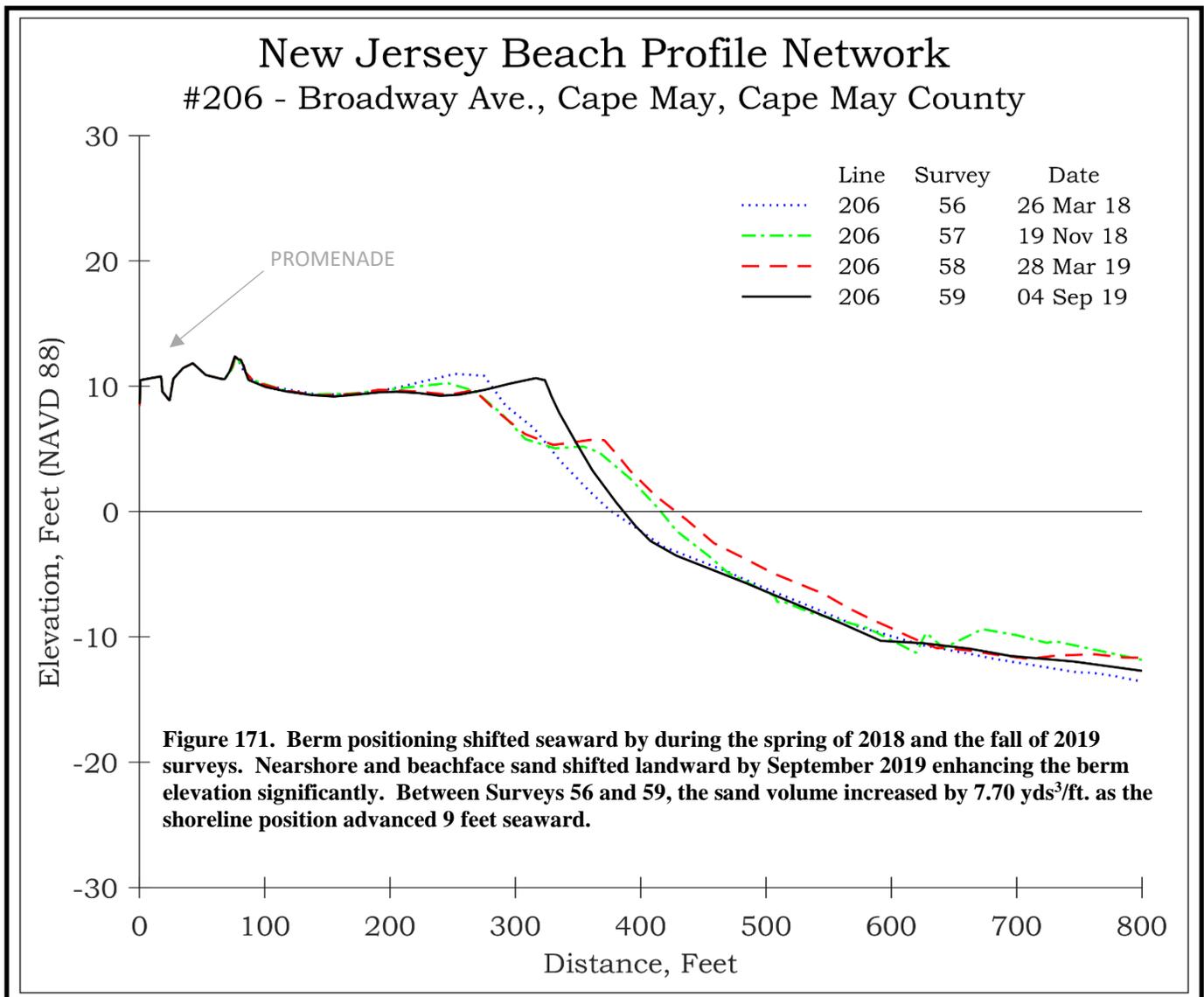
The left photo was taken on November 19, 2018. The right photo was taken on October 4, 2019. The post-beach restoration is remarkable given that in 1989, the waves broke on the rock seawall at low tide at Baltimore Avenue. The October 2019 photo displays a slightly wider beach and berm between the two-time periods.



NJBPN 206 - Broadway Avenue, Cape May City



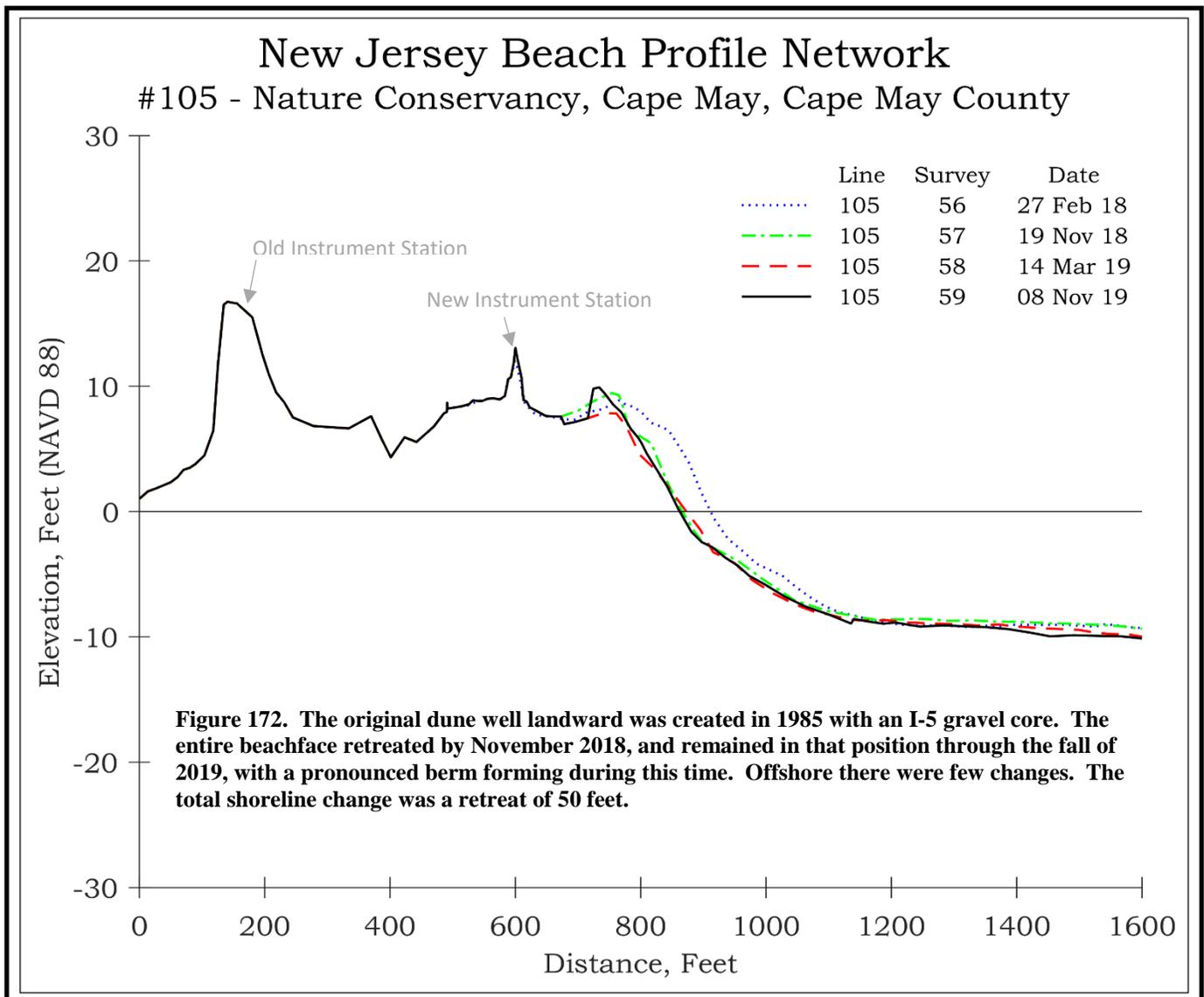
The left photo was taken on November 19, 2018. The right photo (206) was taken on September 4, 2019 and shows similar conditions within the dune system. The cross sections below display changes in the berm elevation and position by the fall 2019.



NJBPN 105 - Nature Conservancy, Cape May



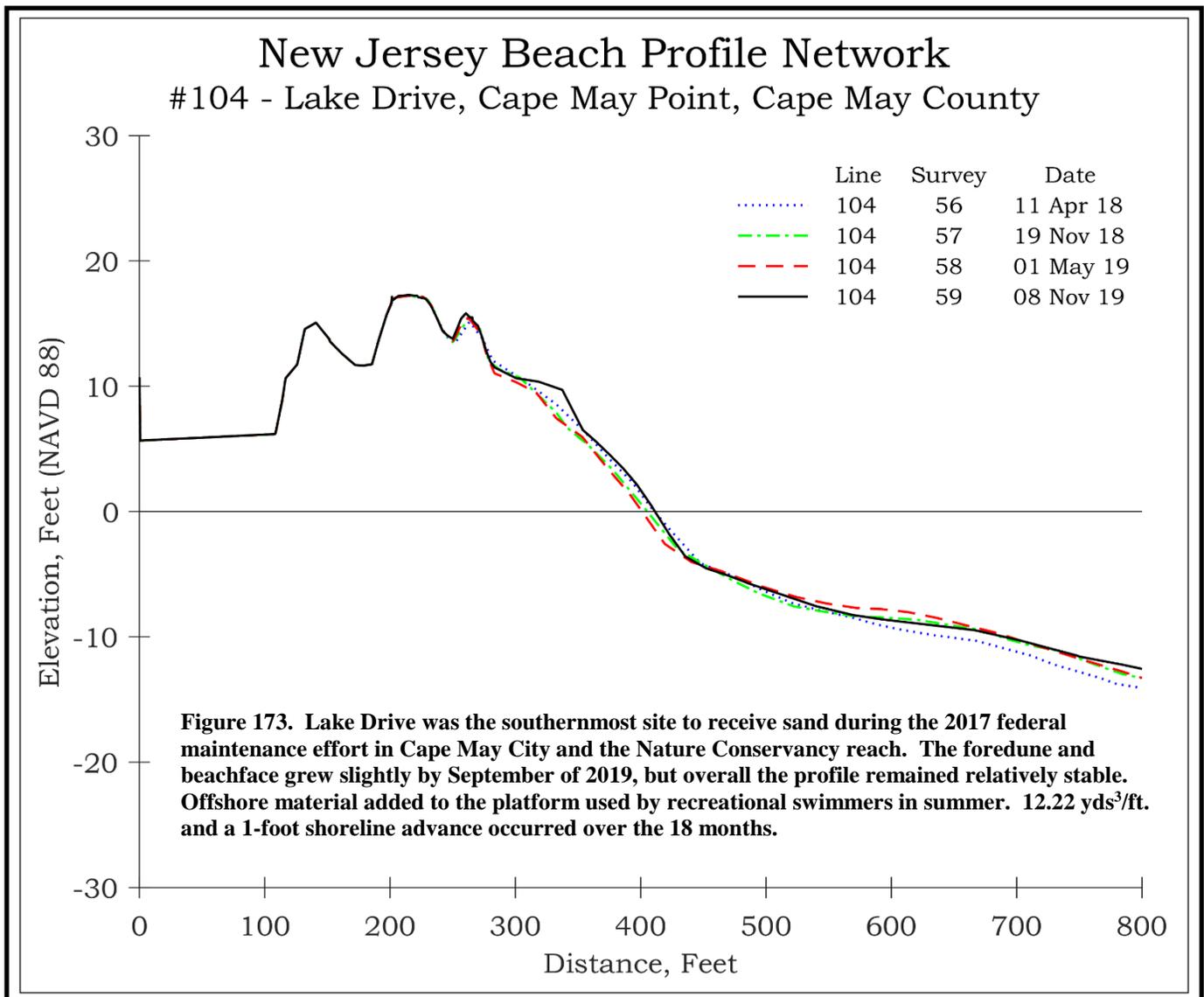
The left photo was taken November 19, 2018. The right photo taken on November 8, 2019, and shows a narrower beach 18 months later. The dune system remained very stable but changes in the beach elevations and berm positions have taken place throughout the four surveys conducted.



NJBPN 104 - Lake Drive, Cape May Point



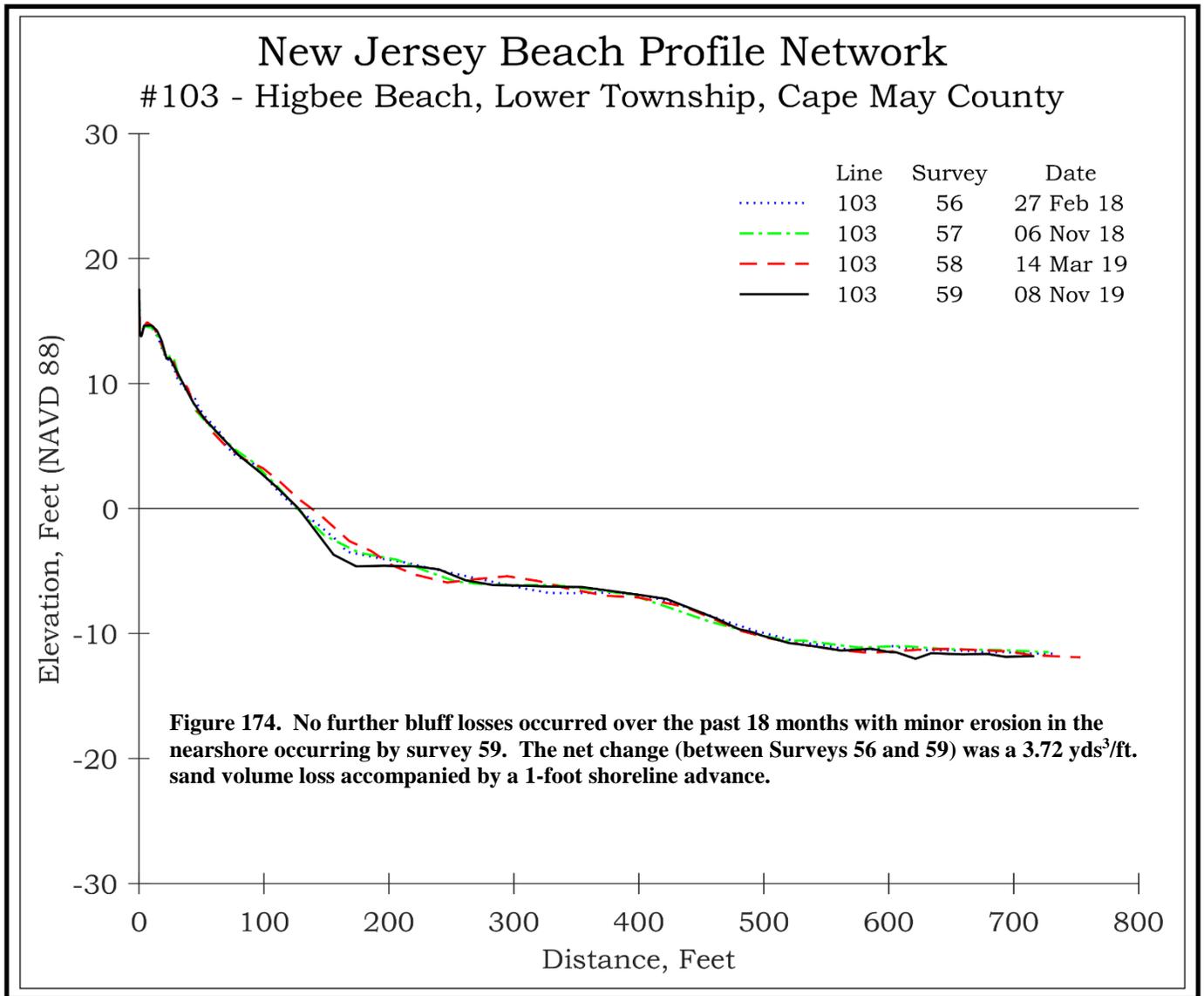
The left photo was taken on November 19, 2018. The right photo was taken on November 8, 2019. Sand was added by the USACE as far west as this groin cell in Cape May Point by spring 2017 with loss in beach width through May 2019. However, by the fall 2019 survey, the beach width reversed this trend, and expanded seaward.



NJBPN 103 - Higbee Beach State Park, Lower Township



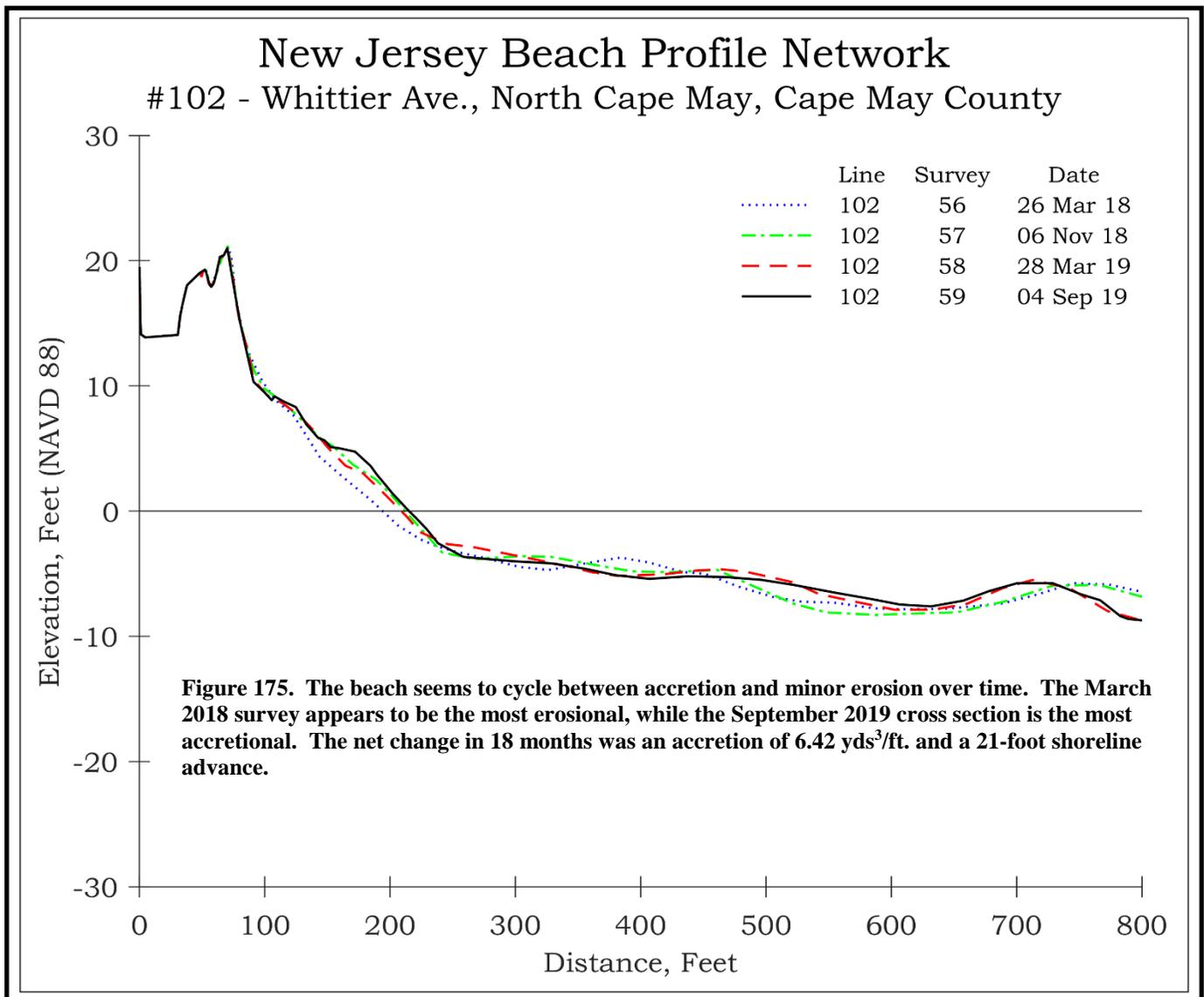
The left photo was taken November 6, 2018. The right photo taken November 8, 2019, shows minimal changes. Both photographs are looking in the northern direction.



NJBPN 102 - Whittier Avenue, North Cape May



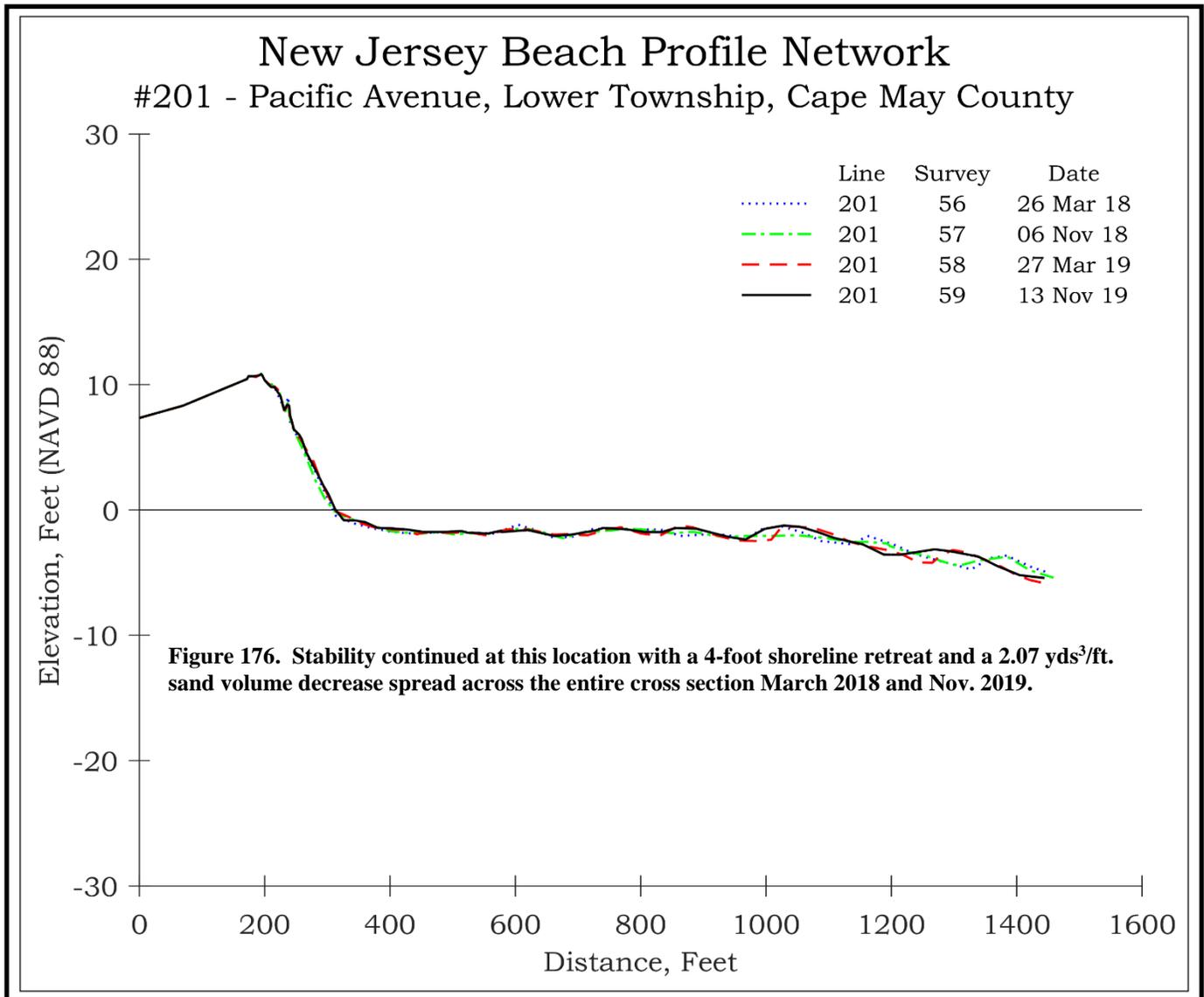
The left photo was taken on November 6, 2018. The right photo, taken on September 4, 2019, shows a continued growth in seaward dune slope grass after a substantial loss in dune sand following September 2016 conditions. A wider recreational beach is present by survey 59.



NJBPN 201 - Pacific Avenue, Villas



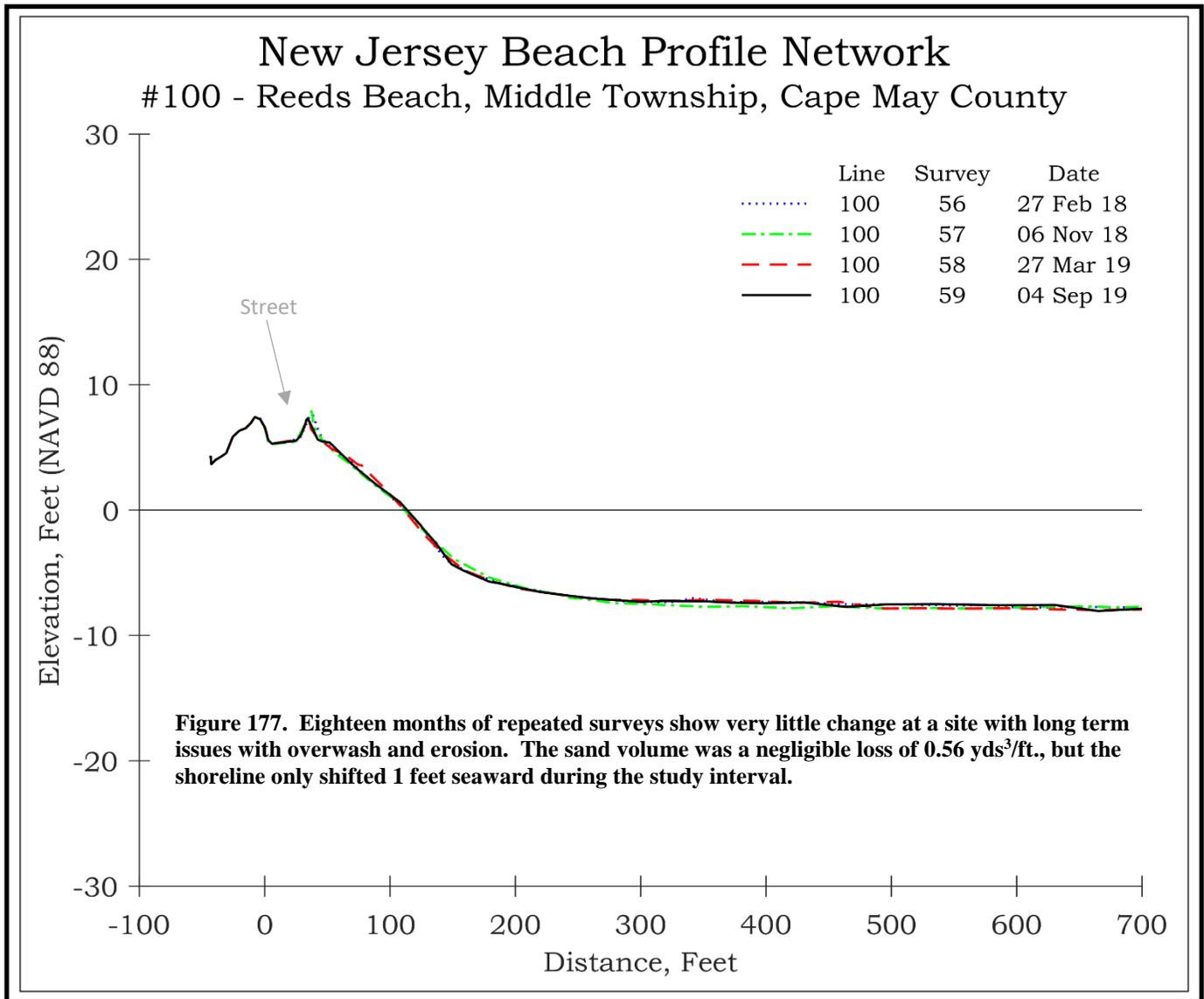
The left view was taken November 6, 2018. Right photo (201) was taken on November 13, 2019. Minimal change occurred at Pacific Avenue with some dune grass growth toward the bay.



NJBPN 100 - Reeds Beach, Middle Township



The left photograph was taken on November 6, 2018. The right photo was taken on September 4, 2019. The two views show the road and dune landward of the road and the new ridge of sand placed on the upper beach. Notice the growth of dune grass and the considerable wrackline that accumulated along the dunetoe.



Summary and Conclusions for Cape May County:

During the fall of 2017, the USACOE continued maintenance of its projects in Cape May County. Recently completed work in Southern Ocean City (completed by December 2017) and all of Ludlam Island (completed by spring 2016) continued to adjust. Sediment moved into the Corson's Inlet State Park along the northern shoreline adding to the badly damaged dune and beach system present there. Avalon and Stone Harbor received almost a million cubic yards of material by spring 2017 from Townsend's and Hereford Inlets with the NJ Div. of Coastal Engineering funding the Hereford Inlet work because the CBRS rules prohibited the USACOE from funding such activities in the CBRS NJ-09 unit. The municipalities of Stone Harbor, Avalon and North Wildwood continued to seek a policy change on using CBRS unit sand for beach nourishment using federal funding, back to those in existence in 1996 when the USACOE was allowed to commence the Seven-Mile Island shore protection project for Stone Harbor in 2003. Following meetings in Washington DC with Interior Secretary Bernhardt, Congressman VanDrew and municipal officials a letter from the Secretary was received announcing the reversal of the 2013 prohibition of using federal funding to move the CBRS sand to adjacent municipal beaches. However, the National Audubon Society filed litigation against this new authorization for use of federal funds freezing any progress in federal entities working in Hereford Inlet to move sand from the ebb-tidal shoals.

The Wildwoods shore protection project continues on its projected pathway to construction as a massive back-passing operation to restore the North Wildwood oceanfront beach using excess beach sand from Wildwood and Wildwood Crest. In 2016, maintenance work occurred in The Nature Conservancy and Cape May Point with sand placement on the berm. Recent review by the City of North Wildwood is reexamining the 2009 hydraulic dredging project that placed over a million cubic yards of sand on the municipal beach with efforts made to urge the Army Corps to reconsider use of Hereford Inlet ebb-tidal shoals as the sand source in spite of the fear of augmenting the littoral transport of that material to Wildwood and Wildwood Crest.

Erosion continued to plague the northeast segment of Ocean City, Strathmere, Avalon and North Wildwood. Northern Ocean City received maintenance, while Strathmere is maintaining a sufficient margin of protection at the moment. Avalon received federal maintenance during 2017 and again in 2019. North Wildwood succeeded in moving 154,000 cy of Wildwood beach sediment by truck to enhance the beach and dunes between 3rd and 15th Avenues, repeated the process in 2018 and 2019 with 200,000 cubic yard quantities moved. North Wildwood's northernmost oceanfront suffers from sand starvation due to ebb channels adjacent to the inlet shoreline directing sand to the northeast and not depositing any quantity offshore of the northern beaches where wave action could move it landward and add it to the beach. Cape May City remained stable. The beach in the Nature Conservancy into the eastern few groin cells of Cape May Point received federal maintenance in 2016.

The Delaware Bay shoreline remained relatively stable with no significant sediment additions. A USACE environmental restoration in Lower Township using Delaware Bay Main Navigation Channel dredged material remains in the planning phase. Further up the bay in Downe Township, a feasibility study under Section 103 of the River and Harbor Act of 1962 (PL 87-874), to design and construct small beach erosion and flood damage reduction projects is in progress. Signed in May 2015, the project's estimated cost is \$740,000 at a 65 – 35 percent federal, non-federal sponsor share. The objective is to design projects to mitigate against future damages similar to Hurricane Sandy's damages seen to impact the region (Fortescue and Gandys Beach) within Downe Township. NGO grant funded projects continued to focus on habitat improvements restoring and improving shoreline conditions for the federally listed Red Knot and the Horseshoe Crabs they rely on for nourishment, during the long migration to the Arctic breeding grounds. This included maintenance nourishment at project sites restored in 2013 and 2014 after Superstorm Sandy. In addition, nearshore oyster reefs continued to be installed creating sheltered waters during the lower tides cycles, reducing erosion rates and enhancing conditions for Horseshoe Crab spawning. A NFWF funded project to protect the mouth of the Maurice River is in the planning and development status with funds awarded in 2020 for implementation in 2021. Goal of the project is to improve ecological and community resilience in this region suffering from long term erosion.

APPENDIX – COUNTY ANNUAL BEACH VOLUME AND SHORELINE CHANGES

TABLE 4						
MOMOUTH COUNTY						
SEASONAL; OVERALL; ANNUAL SPRING & FALL BEACH VOLUME CHANGES						
	Survey & Time Period					
	Seasonal			Overall	Annual Spring & Fall	
	56 - 57	57 - 58	58 - 59	56 - 59	56 - 58	57 - 59
PROFILE SITE LOCATION	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
	Volume Change (cubic yards per foot)					
187: Cliffwood Beach, Beach Park	-0.41	-1.67	-1.51	-4.11	-2.54	-3.18
286: Union Beach, Beach Street	-0.61	-4.23	-0.53	-5.39	-4.90	-4.74
185: Port Monmouth, Spy House	-1.05	-1.26	4.38	2.56	-1.83	3.17
385: Sandy Hook, North Beach	17.83	-0.17	29.54	46.53	17.60	28.85
285: Sandy Hook, Gunnison Beach	-1.34	-4.11	-13.70	-21.94	-5.56	-18.90
28401: Sandy Hook, Area F Rd.	-11.86	11.56	-9.29	-9.9	-0.52	2.45
284: Sandy Hook, Parking Lot E	25.54	-21.34	51.88	53.54	4.39	30.85
18401: Sandy Hook, Parking Lot C	-26.46	1.85	-27.50	-51.8	-24.43	-26.31
184: Sandy Hook, Highlands Beach	23.39	-4.63	-5.43	8.26	15.07	-14.41
183: Sea Bright, Via Ripa Street	-0.97	-17.20	29.96	10.62	-18.65	12.82
28202: Sea Bright, 300 Ocean Ave.	-37.55	-2.75	15.11	-24.75	-41.82	12.31
28201: Sea Bright, 436 Ocean Ave.	17.83	-4.17	3.89	17.79	13.42	0.01
282: Sea Bright, Shrewsbury Way	-15.95	-3.11	29.76	9.72	-18.95	25.38
18202: Sea Bright, 678 Ocean Ave.	-6.6	13.83	-0.76	8.61	9.16	13.44
18201: Sea Bright, 801 Ocean Ave.	16.75	6.24	-15.51	7.72	25.22	-9.02
182: Sea Bright, Public Beach Lot	-1.57	-9.95	8.97	-2.57	-11.69	-0.89
181: Sea Bright, Municipal Lot	-26.25	5.82	-17.00	-35.32	-20.44	-10.81
18003: Sea Bright, 1201 Ocean Ave	-6.25	-9.75	-6.77	-21.91	-16.03	-15.93
18002: Sea Bright, 15 Tradewinds Ln.	-13.94	5.64	-3.52	-11.79	-8.41	2.11
18001: Sea Bright, 1485 Ocean Ave.	-7.19	-11.31	9.15	-7.07	-18.49	-0.23
180: Sea Bright, Sunset Court	-2.62	-9.27	0.51	-11.66	-11.96	-8.99
17901: Monmouth Beach, 122 Ocean Ave.	16.39	3.97	-32.16	-10.29	20.88	-28.40
179: Monmouth Beach, Cottage Road	-43.59	-11.04	8.47	-37.22	-51.29	-2.11
17801: Monmouth Beach, 65 Ocean Ave.	-0.61	13.34	-9.89	2.78	12.68	3.65
178: Monmouth Beach, Monmouth Beach Club	10.46	-11.03	31.33	31.23	0.12	20.59
17701: Monmouth Beach, 9 Ocean Ave.	-8.37	4.49	3.17	-0.51	-3.9	8.20
177: Long Branch, Ocean Avenue	-30.99	-14.12	15.93	-28.85	-44.96	2.05
17601: Long Branch, 300 Ocean Ave North	-58.14	-6.95	9.05	-55.5	-64.55	2.37
176: Long Branch, Seven Presidents Park	5.40	6.13	-5.12	6.76	12.44	1.13
17501: Long Branch, Ocean Terr.	-1.77	10.83	9.53	19.97	10.51	20.14
175: Long Branch, Broadway Avenue	-24.88	32.54	1.55	9.21	7.65	34.09
17402: Long Branch, 45 Ocean Ave.	-1.23	7.90	-3.14	3.35	6.36	5.08
17401: Long Branch, N. Morris Ave.	-1.54	15.41	-14.70	-0.81	14.05	0.90
174: Long Branch, S. Morris Avenue	-2.90	3.85	-8.43	-7.90	0.57	-5.07
17303: Long Branch, 276 Ocean Ave.	-0.53	-35.78	18.31	-18.44	-36.73	-17.33
17302: Long Branch, 378 Ocean Ave.	-13.06	-10.41	28.66	6.87	-22	20.15
17301: Long Branch, Wooley Ct.	29.06	1.29	-22.91	8.81	30.48	-20.70
173: Long Branch, West End Avenue	-0.29	-51.55	14.78	-35.20	-48.85	-33.75
27201: Long Branch, 717 Ocean Ave.	10.2	-19.32	-21.82	-33.44	-12.37	-42.24
272: Long Branch, 805 Ocean Avenue	-1.51	-19.98	0.53	-20.78	-21.77	-19.42
17101: Long Branch, Plaza Ct.	-24.39	-47.31	-9.88	-80.18	-70.24	-55.67
171: Elberon, Pullman Avenue	-38.33	-33.26	17.89	-54.43	-72.31	-14.94
17005: Long Branch, 981 Ocean Ave.	-33.16	5.17	-27.42	-53.63	-27.95	-20.54
17004: Long Branch, 1115 Ocean Ave.	-20.12	39.75	-18.44	2.56	20.56	19.34
17003: Long Branch, Ocean Ct.	-5.93	5.08	-7.15	-7.49	-0.26	-5.81
17002: Long Branch, Garfield Rd.	-0.33	-13.10	-13.15	-25.42	-13.17	-24.62
17001: Deal, Jerome Ave.	-23.77	-4.80	34.71	2.3	-29.86	28.82
170: Deal, N. Roosevelt Avenue	-28.08	18.68	14.10	4.51	-9.69	32.30
16905: Deal, S. Roosevelt Ave.	13.21	-18.76	5.65	-0.97	-6.6	-13.50
16904: Deal, 71 Ocean Ave.	1.79	12.78	-18.31	-3.57	14.65	-5.92
16903: Deal, Ocean Ln.	-24.04	18.22	25.73	19.1	-6.2	43.81
16902: Deal, Brighton Ave.	-17.98	17.95	-8.75	-9.3	0.23	8.56
16901: Deal, Wallace Rd.	1.15	26.20	-11.37	14.25	26.84	13.15
169: Deal, Darlington Avenue	10.44	-12.92	-7.76	-10.06	-2.33	-20.56
16802: Deal, Monmouth Dr.	-19.45	0.07	-7.15	-26.49	-19.39	-7.06
16801: Deal, Neptune Ave.	-25.36	-8.62	47.98	13.87	-34.04	39.25

168: Allenhurst, Corlies Avenue	25.34	4.81	-25.24	3.71	29.63	-20.69
26703: Loch Arbour, Euclid Ave.	58.24	-18.73	27.68	66.51	41.69	9.01
26702: Loch Arbour, Edgemont Ave.	-39.35	35.05	11.58	15.36	-0.3	53.38
26701: Asbury Park, 1740 Ocean Ave.	4.97	5.30	1.81	6.64	7.21	5.68
267: Asbury Park, Seventh Avenue	-21.85	-6.30	1.32	-31.75	-31.14	-5.30
16701: Asbury Park, Sunset Ave.	-37.89	3.23	-24.42	-58.4	-31.98	-21.58
167: Asbury Park, Third Avenue	0.61	7.98	-3.43	4.66	8.76	4.02
16602: Asbury Park, Asbury Ave.	-0.77	-3.19	37.71	33.12	-3.52	33.83
16601: Ocean Grove, Spray Ave.	-9.91	14.10	-3.85	-0.73	3.81	9.37
166: Ocean Grove, Ocean Pathway	10.78	-6.82	0.00	4.34	4.54	-6.91
16502: Ocean Grove, Broadway	10.28	-7.78	7.27	9.62	2.31	-0.97
16501: Bradley Beach, Cliff Ave.	33.03	-6.74	22.76	53.2	32.18	14.79
165: Bradley Beach, McCabe Avenue	3.44	-5.77	-3.43	-0.33	-1.74	-8.24
16402: Bradley Beach, 4th Ave.	0.19	10.33	-11.19	0.71	10.52	0.95
16401: Bradley Beach, 2nd Ave.	2.96	-16.93	20.59	5.8	-14.39	3.08
164: Avon-By-The-Sea, Sylvania Avenue	2.33	1.12	6.99	3.12	-7.17	10.75
16303: Avon-By-The-Sea, Garfield Ave.	-7.13	2.01	6.66	3.04	-4.14	11.21
16302: Avon-By-The-Sea, Washington Ave.	-49.3	-8.84	-5.36	-53.3	-51.89	-13.30
16301: Belmar, 2nd Ave.	40.33	17.71	-16.14	42.18	58.07	1.86
163: Belmar, 5 th Avenue	3.94	-17.52	28.48	14.15	-15.00	11.19
16202: Belmar, 8th Ave.	-11.35	32.48	5.11	30.44	24.61	42.72
16201: Belmar, 14th Ave.	-15.45	-4.73	27.46	2.06	-24.38	21.58
162: Belmar, 18 th Avenue	6.55	-8.49	-1.47	-2.32	-1.34	-9.10
16104: Belmar, North Blvd.	37.62	-29.59	9.44	18.22	5.48	-20.00
16103: Spring Lake, Remsen Ave.	-1.39	-2.64	6.19	2.88	-4.5	3.36
16102: Spring Lake, Lorraine Ave.	14.9	2.95	-23.85	-5.92	17.57	-20.98
16101: Spring Lake, Tuttle Ave.	-9.91	-5.86	20.36	3.97	-16.29	14.39
161: Spring Lake, Brighton Avenue	13.61	-8.81	1.93	7.50	3.93	-6.59
16004: Spring Lake, Madison Ave.	-21.44	4.10	4.16	-12.33	-17.87	7.95
16003: Spring Lake, Morris Ave.	-5.01	22.20	-19.16	-2.52	17.06	2.40
16002: Spring Lake, Mercer Ave.	15.04	1.14	-7.13	8.52	15.78	-5.99
16001: Spring Lake, Essex Ave.	-11.55	11.88	12.75	12.71	-0.59	24.67
160: Spring Lake, Salem Avenue	1.47	-14.03	-4.10	-16.41	-12.48	-18.07
15902: Spring Lake, Union Ave.	-15.64	10.00	-8.94	-15.59	-3.68	-0.64
15901: Spring Lake, Brown Ave.	-13.42	-27.92	10.63	-30.3	-40.38	-17.55
159: Sea Girt, New York Avenue	-6.38	3.32	-8.60	-11.63	-3.03	-4.82
15801: Sea Girt , Crescent Park	15.05	3.75	-18.75	0.07	18.8	-15.08
158: Sea Girt, Trenton Avenue	0.00	-19.06	29.66	11.12	-18.73	11.18
15703: Sea Girt, Seaside Pl.	-25.42	31.83	-6.62	-1.07	5.2	22.29
15702: Sea Girt, NGTC - North	-13.35	-3.34	1.42	-15.23	-16.73	-1.87
15701: Sea Girt, NGTC - South	19.78	-25.96	10.22	3.3	-6.76	-16.25
157: Manasquan, Riddle Way	30.08	-15.86	16.04	27.29	11.42	-0.66
25602: Manasquan, Main St.	-4.59	11.18	-5.14	2.18	7.28	6.42
25601: Manasquan, Brielle Rd.	14.9	11.75	-22.82	3.19	26.13	-13.81
256: Manasquan, Pompano Avenue	-3.05	-5.29	10.55	3.72	-7.33	5.49
15601: Manasquan, Riverside Dr.	-71.07	-8.82	41.99	-36.15	-77.64	33.47
	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
Seabright sites	-5.87	-3.18	1.64	-6.66	-8.93	-1.65
Long Branch sites	-10.72	-6.19	-1.80	-18.23	-16.63	-7.74
New Deal sites	-11.21	4.88	7.48	0.36	-6.64	11.89
AVERAGE for ALL SITES	-4.33	-1.63	2.77	-3.02	-5.91	1.18
Average for the oceanfront beaches	-4.44	-1.61	2.83	-3.05	-6.00	1.27
Phase II sites	-0.65	-0.67	3.50	2.38	-1.33	2.97

TABLE 5						
MOMOUTH COUNTY						
SEASONAL; OVERALL; ANNUAL SPRING & FALL SHORELINE CHANGES						
	Survey & Time Period					
	Seasonal			Overall	Annual Spring & Fall	
	56 - 57	57 - 58	58 - 59	56 - 59	56 - 58	57 - 59
PROFILE SITE LOCATION	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
	Shoreline Change (feet)					
187: Cliffwood Beach, Beach Park	-10.0	-5.8	-4.8	-20.5	-15.8	-10.5
286: Union Beach, Beach Street	-4.3	-3.0	-3.3	-10.5	-7.3	-6.3
185: Port Monmouth, Spy House	-1.8	1.0	0.3	-0.4	-0.8	1.3
385: Sandy Hook, North Beach	26.3	11.8	28.3	66.3	38.0	40.0
285: Sandy Hook, Gunnison Beach	-43.8	-3.0	-46.5	-93.3	-46.8	-49.5
28401: Sandy Hook, Area F Rd.	-32.3	6.3	22.3	-3.8	-26.0	28.5
284: Sandy Hook, Parking Lot E	-6.3	-9.5	24.8	9.0	-15.8	15.3
18401: Sandy Hook, Parking Lot C	-14.5	3.0	-43.5	-55.0	-11.5	-40.5
184: Sandy Hook, Highlands Beach	-5.3	2.5	-48.5	-51.3	-2.8	-46.0
183: Sea Bright, Via Ripa Street	-42.8	-16.5	62.5	3.3	-59.3	46.0
28202: Sea Bright, 300 Ocean Ave.	-38.3	-23.3	20.8	-40.8	-61.5	-2.5
28201: Sea Bright, 436 Ocean Ave.	32.0	-35.0	4.4	1.4	-3.0	-30.6
282: Sea Bright, Shrewsbury Way	-67.8	-15.0	1.0	-81.8	-82.8	-14.0
18202: Sea Bright, 678 Ocean Ave.	-24.0	-5.0	-54.5	-83.5	-29.0	-59.5
18201: Sea Bright, 801 Ocean Ave.	3.3	-40.3	0.0	-37.0	-37.0	-40.3
182: Sea Bright, Public Beach Lot	15.3	-101.8	79.8	-6.8	-86.5	-22.0
181: Sea Bright, Municipal Lot	-43.8	-6.8	33.3	-17.3	-50.5	26.5
18003: Sea Bright, 1201 Ocean Ave	-30.0	9.0	0.8	-20.3	-21.0	9.8
18002: Sea Bright, 15 Tradewinds Ln.	-35.5	2.0	48.5	15.0	-33.5	50.5
18001: Sea Bright, 1485 Ocean Ave.	-9.5	2.5	23.0	16.0	-7.0	25.5
180: Sea Bright, Sunset Court	-14.5	-5.8	36.0	15.8	-20.3	30.3
17901: Monmouth Beach, 122 Ocean Ave.	26.3	36.5	-50.8	12.0	62.8	-14.3
179: Monmouth Beach, Cottage Road	-35.3	19.8	6.0	-9.5	-15.5	25.8
17801: Monmouth Beach, 65 Ocean Ave.	10.8	-3.8	-21.3	-14.3	7.0	-25.0
178: Monmouth Beach, Monmouth Beach Club	-18.0	9.5	48.3	39.8	-8.5	57.8
17701: Monmouth Beach, 9 Ocean Ave.	-26.3	12.5	-5.3	-19.0	-13.8	7.3
177: Long Branch, Ocean Avenue	-25.3	-31.0	5.3	-51.0	-56.3	-25.8
17601: Long Branch, 300 Ocean Ave North	-60.3	-35.8	33.3	-62.8	-96.0	-2.5
176: Long Branch, Seven Presidents Park	24.0	5.0	-17.5	11.5	29.0	-12.5
17501: Long Branch, Ocean Terr.	6.8	-3.0	2.8	6.5	3.8	-0.3
175: Long Branch, Broadway Avenue	-22.0	10.0	12.8	0.8	-12.0	22.8
17402: Long Branch, 45 Ocean Ave.	1.3	2.3	1.3	4.8	3.5	3.5
17401: Long Branch, N. Morris Ave.	12.3	11.8	-17.8	6.3	24.0	-6.0
174: Long Branch, S. Morris Avenue	3.0	3.3	-23.5	-17.3	6.3	-20.3
17303: Long Branch, 276 Ocean Ave.	-7.8	-39.3	-8.8	-55.8	-47.0	-48.0
17302: Long Branch, 378 Ocean Ave.	-9.8	0.0	24.5	14.8	-9.8	24.5
17301: Long Branch, Wooley Ct.	34.3	10.0	-30.8	13.5	44.3	-20.8
173: Long Branch, West End Avenue	-17.5	-57.3	3.5	-71.3	-74.8	-53.8
27201: Long Branch, 717 Ocean Ave.	-18.3	-5.0	-26.0	-49.3	-23.3	-31.0
272: Long Branch, 805 Ocean Avenue	-14.5	-22.0	-6.0	-42.5	-36.5	-28.0
17101: Long Branch, Plaza Ct.	-18.8	-60.3	-30.5	-109.5	-79.0	-90.8
171: Elberon, Pullman Avenue	-47.8	-35.3	5.5	-77.5	-83.0	-29.8
17005: Long Branch, 981 Ocean Ave.	-52.5	12.3	-0.1	-40.3	-40.3	12.2
17004: Long Branch, 1115 Ocean Ave.	2.3	17.3	-14.3	5.3	19.5	3.0
17003: Long Branch, Ocean Ct.	-7.3	18.3	-22.8	-11.8	11.0	-4.5
17002: Long Branch, Garfield Rd.	5.3	-11.8	-14.8	-21.3	-6.5	-26.5
17001: Deal, Jerome Ave.	-20.5	-15.0	26.5	-9.0	-35.5	11.5
170: Deal, N. Roosevelt Avenue	-34.5	2.8	-2.8	-34.5	-31.8	0.0
16905: Deal, S. Roosevelt Ave.	-0.3	-20.3	-11.5	-32.0	-20.5	-31.8
16904: Deal, 71 Ocean Ave.	-8.0	-12.0	2.5	-17.5	-20.0	-9.5
16903: Deal, Ocean Ln.	2.5	-2.0	8.8	9.3	0.5	6.8
16902: Deal, Brighton Ave.	3.3	-9.8	-15.5	-22.0	-6.5	-25.3
16901: Deal, Wallace Rd.	3.5	-12.0	4.0	-4.5	-8.5	-8.0
169: Deal, Darlington Avenue	7.8	-9.8	-29.0	-31.0	-2.0	-38.8
16802: Deal, Monmouth Dr.	-12.5	-11.5	-15.0	-39.0	-24.0	-26.5
16801: Deal, Neptune Ave.	-29.8	-0.8	14.3	-16.3	-30.5	13.5

168: Allenhurst, Corlies Avenue	31.8	12.3	-52.3	-8.3	44.0	-40.0
26703: Loch Arbour, Euclid Ave.	42.5	-9.8	34.3	67.0	32.8	24.5
26702: Loch Arbour, Edgemont Ave.	0.8	-24.3	61.0	37.5	-23.5	36.8
26701: Asbury Park, 1740 Ocean Ave.	55.3	-46.8	-9.5	-1.0	8.5	-56.3
267: Asbury Park, Seventh Avenue	-11.0	-17.5	-0.3	-28.8	-28.5	-17.8
16701: Asbury Park, Sunset Ave.	-61.8	15.8	-17.0	-63.0	-46.0	-1.3
167: Asbury Park, Third Avenue	19.3	-25.0	-3.3	-9.0	-5.8	-28.3
16602: Asbury Park, Asbury Ave.	-26.8	6.5	44.0	23.8	-20.3	50.5
16601: Ocean Grove, Spray Ave.	-22.8	11.5	-8.8	-20.0	-11.3	2.8
166: Ocean Grove, Ocean Pathway	0.0	-10.3	-1.0	-11.3	-10.3	-11.3
16502: Ocean Grove, Broadway	-14.5	-1.8	35.5	19.3	-16.3	33.8
16501: Bradley Beach, Cliff Ave.	7.0	-8.5	11.0	9.5	-1.5	2.5
165: Bradley Beach, McCabe Avenue	4.0	-11.3	-7.3	-14.5	-7.3	-18.5
16402: Bradley Beach, 4th Ave.	14.0	1.8	-21.5	-5.8	15.8	-19.8
16401: Bradley Beach, 2nd Ave.	-21.3	-26.5	-6.5	-54.3	-47.8	-33.0
164: Avon-By-The-Sea, Sylvania Avenue	2.3	-60.8	41.0	-17.5	-58.5	-19.8
16303: Avon-By-The-Sea, Garfield Ave.	6.0	-33.0	27.5	0.5	-27.0	-5.5
16302: Avon-By-The-Sea, Washington Ave.	-71.5	-10.0	-4.0	-85.5	-81.5	-14.0
16301: Belmar, 2nd Ave.	34.8	16.8	-24.8	26.8	51.5	-8.0
163: Belmar, 5 th Avenue	-0.8	-24.8	34.3	8.8	-25.5	9.5
16202: Belmar, 8th Ave.	-1.0	2.8	40.3	42.0	1.8	43.0
16201: Belmar, 14th Ave.	-15.5	2.8	11.5	-1.3	-12.8	14.3
162: Belmar, 18 th Avenue	-5.3	2.8	-9.0	-11.5	-2.5	-6.3
16104: Belmar, North Blvd.	49.3	-49.0	5.0	5.3	0.3	-44.0
16103: Spring Lake, Remsen Ave.	2.3	-13.3	5.5	-5.5	-11.0	-7.8
16102: Spring Lake, Lorraine Ave.	16.8	-4.0	-10.3	2.5	12.8	-14.3
16101: Spring Lake, Tuttle Ave.	10.5	-19.3	17.8	9.0	-8.8	-1.5
161: Spring Lake, Brighton Avenue	36.5	-27.3	-0.3	9.0	9.3	-27.5
16004: Spring Lake, Madison Ave.	2.5	-10.8	14.3	6.0	-8.3	3.5
16003: Spring Lake, Morris Ave.	4.8	7.8	-9.3	3.3	12.5	-1.5
16002: Spring Lake, Mercer Ave.	31.8	-15.0	0.5	17.3	16.8	-14.5
16001: Spring Lake, Essex Ave.	2.3	-12.3	17.8	7.8	-10.0	5.5
160: Spring Lake, Salem Avenue	6.3	-35.5	0.3	-29.0	-29.3	-35.3
15902: Spring Lake, Union Ave.	-15.0	-5.5	3.0	-17.5	-20.5	-2.5
15901: Spring Lake, Brown Ave.	-18.0	-1.0	20.3	1.3	-19.0	19.3
159: Sea Girt, New York Avenue	-6.3	8.5	-30.3	-28.0	2.3	-21.8
15801: Sea Girt , Crescent Park	17.3	4.5	-25.3	-3.5	21.8	-20.8
158: Sea Girt, Trenton Avenue	-0.5	-18.5	18.0	-1.0	-19.0	-0.5
15703: Sea Girt, Seaside Pl.	-14.3	8.0	1.5	-4.8	-6.3	9.5
15702: Sea Girt, NGTC - North	-22.0	-2.3	14.5	-9.8	-24.3	12.3
15701: Sea Girt, NGTC - South	12.1	-27.0	9.8	-5.2	-14.9	-17.3
157: Manasquan, Riddle Way	13.0	-0.5	10.5	23.0	12.5	10.0
25602: Manasquan, Main St.	-14.5	-10.8	12.5	-12.8	-25.3	1.8
25601: Manasquan, Brielle Rd.	2.3	22.0	-30.0	-5.8	24.3	-8.0
256: Manasquan, Pompano Avenue	-19.5	-13.3	30.5	-2.3	-32.8	17.3
15601: Manasquan, Riverside Dr.	-74.8	-17.0	57.8	-34.0	-91.8	40.8
	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
Seabright sites	-18.0	-11.8	10.8	-19.0	-29.8	-1.0
Long Branch sites	-10.6	-10.5	-6.2	-27.3	-21.2	-16.7
New Deal sites	-8.9	-9.0	-1.8	-19.7	-17.9	-10.8
AVERAGE for ALL SITES	-6.9	-9.1	3.2	-12.8	-16.0	-5.9
Average for the oceanfront beaches	-6.94	-9.29	3.40	-12.82	-16.22	-5.89
Phase II sites	-0.3	-10.2	6.7	-3.7	-10.4	-3.5

**TABLE 6
OCEAN COUNTY**

SEASONAL; OVERALL; ANNUAL SPRING & FALL BEACH VOLUME CHANGES

	Survey & Time Period					
	Seasonal			Overall	Annual Spring & Fall	
	56 - 57	57 - 58	58 - 59	56 - 59	56 - 58	57 - 59
PROFILE SITE LOCATION	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
	Volume Change (cubic yards per foot)					
156: Point Pleasant, Water Street	-14.78	48.55	-24.32	9.71	32.99	24.16
155: Point Pleasant, Maryland Avenue	32.04	17.52	125.05	172.20	49.66	143.94
154: Bay Head, Johnson Avenue	1.84	57.65	129.45	181.29	59.09	188.55
153: Mantoloking, 1117 Ocean Avenue	-4.08	-6.85	3.94	-5.57	-10.24	-2.81
152: Brick Township, Public Beach #3	181.12	2.43	8.23	193.18	186.35	10.66
151: Normandy Beach, 1 st Avenue	217.52	-13.87	0.83	199.24	203.42	-13.38
150: Lavallette, White Avenue	22.61	155.64	-12.45	167.69	177.92	144.36
149: Ortley Beach, 8 th Avenue	225.49	-4.23	-12.01	208.77	222.77	-15.09
248: Seaside Heights, Franklin Avenue	25.57	179.08	7.47	210.54	204.54	185.12
148: Seaside Park, 4 th Avenue	25.27	57.28	13.39	95.65	82.14	70.18
347: Midway Beach, 6 th Lane	-1.77	67.82	22.28	87.64	65.94	89.07
247: Island Beach State Park, Gillikin Access	32.34	3.85	7.14	44.46	36.42	10.89
246: Island Beach State Park, Parking Lot A7	30.66	-21.29	19.47	31.13	12.39	-1.84
146: Island Beach State Park, South End	-6.77	23.62	-15.78	0.31	16.27	7.83
245: Barnegat Light, 10 th Street	7.33	-18.23	-62.09	-74.86	-10.27	-84.64
145: Barnegat Light, 26 th Street	1.52	3.78	19.40	21.31	4.84	20.76
144: Loveladies, La Baia Street	-8.69	no data	no data	29.53	no data	37.93
143: Harvey Cedars, 73 rd Street	86.95	-23.63	1.94	64.12	63.29	-22.52
142: Harvey Cedars, Tranquility Drive	49.81	46.36	-82.27	10.00	95.67	-39.70
241: Surf City, 20 th Street	80.92	-13.36	-9.69	57.24	66.11	-22.66
141: Ship Bottom, 8 th Street	14.87	-9.01	16.46	20.56	4.85	7.65
140: Long Beach Township, 32 nd Street	61.70	-17.83	4.66	48.99	42.61	-12.83
139: Long Beach Township, 81 st Street	-13.32	19.02	1.64	6.79	3.48	20.78
138: Long Beach Township, Old Whaling Rd.	7.58	3.79	4.88	19.20	14.04	9.09
137: Beach Haven, Taylor Avenue	-1.52	-17.89	-5.93	-25.80	-19.68	-23.55
136: Beach Haven, Dolphin Avenue	-58.69	-2.06	-13.35	-74.24	-60.77	-15.49
135: Long Beach Township, Webster Ave.	-2.87	25.69	-2.62	18.08	17.22	24.69
234: Long Beach Township, Natural Area	-74.41	-92.67	25.41	-141.55	-167.37	-67.37
	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
AVERAGE COUNTY SURVEY	32.79	17.45	6.34	56.27	51.62	24.06

TABLE 7						
OCEAN COUNTY						
SEASONAL; OVERALL; ANNUAL SPRING & FALL SHORELINE CHANGES						
	Survey & Time Period					
	Seasonal			Overall	Annual Spring & Fall	
	56 - 57	57 - 58	58 - 59	56 - 59	56 - 58	57 - 59
PROFILE SITE LOCATION	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
	Shoreline Change (feet)					
156: Point Pleasant, Water Street	2.0	37.5	-20.3	19.3	39.5	17.3
155: Point Pleasant, Maryland Avenue	25.3	-8.5	171.8	188.5	16.8	163.3
154: Bay Head, Johnson Avenue	-29.5	132.5	73.0	176.0	103.0	205.5
153: Mantoloking, 1117 Ocean Avenue	10.8	8.5	-16.3	3.0	19.3	-7.8
152: Brick Township, Public Beach #3	193.3	-17.3	13.9	189.9	176.0	-3.4
151: Normandy Beach, 1 st Avenue	213.3	-6.3	-32.0	175.0	207.0	-38.3
150: Lavallette, White Avenue	4.8	239.0	-58.3	185.5	243.8	180.8
149: Ortley Beach, 8 th Avenue	211.0	-35.3	-16.3	159.5	175.8	-51.5
248: Seaside Heights, Franklin Avenue	-12.3	228.8	5.8	222.3	216.5	234.5
148: Seaside Park, 4 th Avenue	43.0	94.5	-15.8	121.8	137.5	78.8
347: Midway Beach, 6 th Lane	-8.3	102.3	-6.5	87.5	94.0	95.8
247: Island Beach State Park, Gillikin Access	51.5	-11.3	25.0	65.3	40.3	13.8
246: Island Beach State Park, Parking Lot A7	26.8	-12.3	3.5	18.0	14.5	-8.8
146: Island Beach State Park, South End	24.0	18.0	-35.3	6.8	42.0	-17.3
245: Barnegat Light, 10 th Street	17.8	-25.3	-59.0	-66.5	-7.5	-84.3
145: Barnegat Light, 26 th Street	-40.5	1.5	-12.5	-51.5	-39.0	-11.0
144: Loveladies, La Baia Street	-4.0	no data	no data	25.5	no data	29.5
143: Harvey Cedars, 73 rd Street	206.8	-98.3	-13.3	95.3	108.5	-111.5
142: Harvey Cedars, Tranquility Drive	127.3	-27.5	-90.5	9.3	99.8	-118.0
241: Surf City, 20 th Street	129.3	-32.8	-22.0	74.5	96.5	-54.8
141: Ship Bottom, 8 th Street	-9.8	21.8	9.3	21.3	12.0	31.0
140: Long Beach Township, 32 nd Street	74.0	-26.5	-0.3	47.3	47.5	-26.8
139: Long Beach Township, 81 st Street	-21.5	17.8	-4.9	-8.7	-3.8	12.8
138: Long Beach Township, Old Whaling Rd.	-15.3	9.8	5.0	-0.5	-5.5	14.8
137: Beach Haven, Taylor Avenue	-12.3	-15.0	-9.8	-37.0	-27.3	-24.8
136: Beach Haven, Dolphin Avenue	-94.0	12.3	-30.8	-112.5	-81.8	-18.5
135: Long Beach Township, Webster Ave.	-22.0	52.5	-15.5	15.0	30.5	37.0
234: Long Beach Township, Natural Area	-118.8	-229.5	-23.3	-371.5	-348.3	-252.8
	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
AVERAGE COUNTY SURVEY	34.73	15.96	-6.49	44.93	52.13	10.19

TABLE 10
CAPE MAY COUNTY

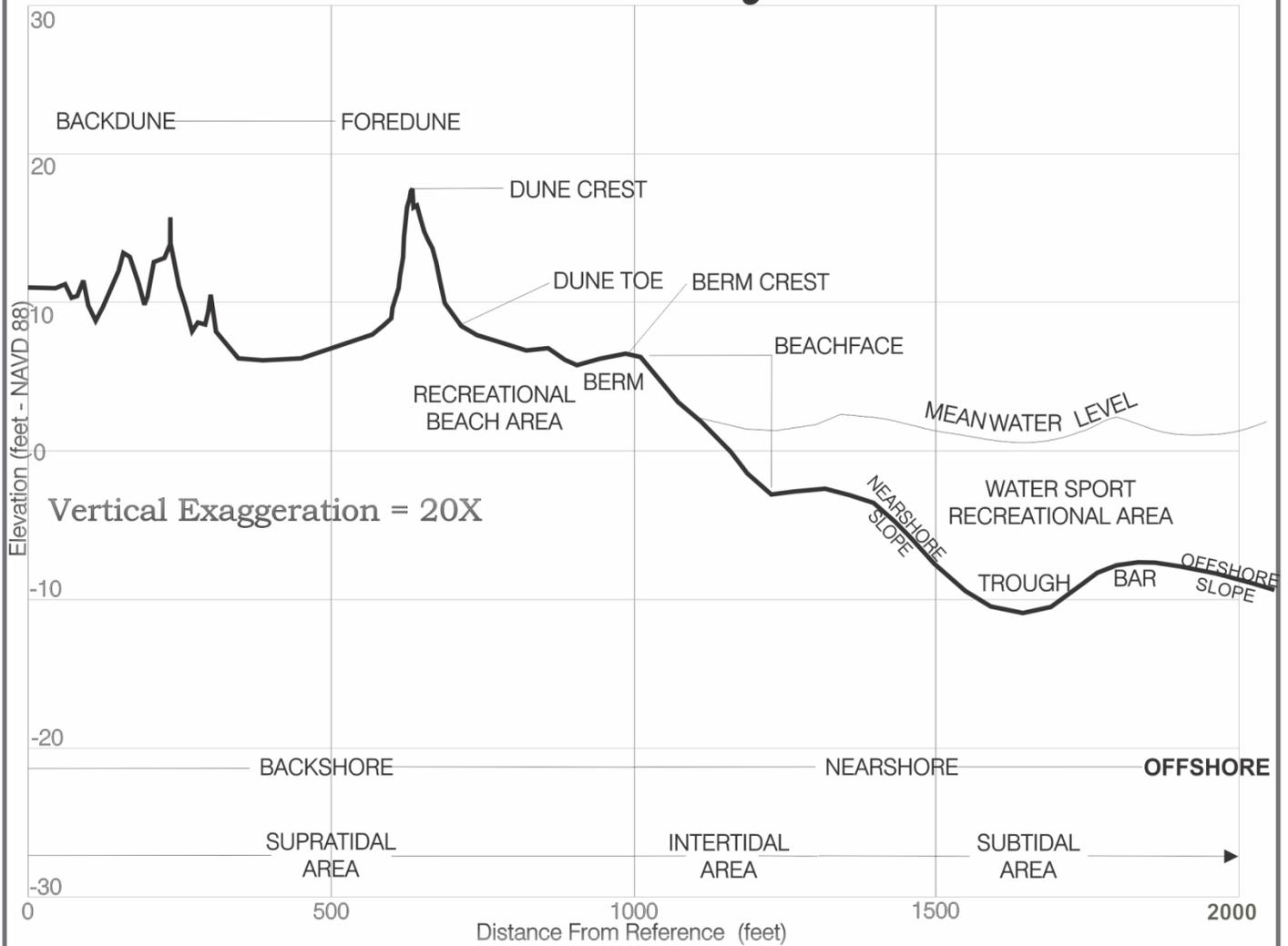
SEASONAL; OVERALL; ANNUAL SPRING & FALL SAND VOLUME CHANGES

	Survey & Time Period					
	Seasonal			Overall	Annual Spring & Fall	
	56 - 57	57 - 58	58 - 59	56 - 59	56 - 58	57 - 59
	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
PROFILE SITE LOCATION	Volume Change (cubic yards per foot)					
225: Ocean City, Gardens Road	-15.78	-18.20	8.81	-33.08	-36.60	-10.32
125: Ocean City, 6 th Street	-44.78	-16.14	-34.80	-95.73	-61.23	-50.95
124: Ocean City, 20 th Street	18.75	-10.13	14.56	23.03	8.49	4.42
223: Ocean City, 34 th Street	-10.44	-5.76	12.99	-2.73	-20.64	10.11
122: Ocean City, 56 th Street	-21.10	-11.62	12.69	-14.44	-28.85	-1.96
222: Ocean City, 59 th Street	-39.37	3.86	-24.11	-58.80	-35.45	-18.84
221: Ocean City, Corson's Inlet Park	-39.16	-11.04	37.48	-13.76	-50.22	26.15
121: Strathmere, Williams Road	-106.05	-73.20	16.09	-164.84	-180.43	-57.01
120: Sea Isle City, 1 st Street	-19.97	7.72	12.81	-1.76	-13.57	20.58
119: Sea Isle City, 25 th Street	11.90	-26.52	29.25	15.01	-14.26	2.50
118: Sea Isle City, 57 th Street	12.46	-0.23	-8.26	4.83	11.67	-8.33
117: Sea Isle City, 80 th Street	-11.56	2.03	-7.87	-17.70	-9.25	-5.16
216: Avalon, 9 th Street	-9.60	-23.04	-31.72	-63.43	-35.11	-54.93
116: Avalon, 23 rd Street	-5.01	-39.72	-5.68	-36.45	-43.93	-41.64
115: Avalon, 35 th Street	-7.78	-8.34	18.63	3.46	-15.91	10.65
114: Avalon, 70 th Street	12.26	7.20	1.59	21.02	19.40	8.90
113: Stone Harbor, 90 th Street	0.36	-5.38	11.42	4.62	-4.44	4.13
212: Stone Harbor, South End	-5.32	2.56	-10.21	-12.78	-2.73	-7.56
111: North Wildwood, 15 th Avenue	-12.98	-25.81	-18.51	-61.72	-42.76	-44.26
110: Wildwood, Cresse Avenue	29.97	-3.48	2.45	26.56	23.99	-0.35
109: Lower Township, Raleigh Ave.	-11.46	19.31	16.31	27.63	8.45	37.67
208: Lower Township, Cape May NWR	0.01	25.76	1.17	22.19	22.14	28.09
108: Cape May City, Cape May Beach Club	-7.75	-8.57	8.50	-7.97	-16.60	-0.27
107: Cape May, Baltimore Ave.	-11.27	2.05	2.20	-6.11	-8.45	3.99
206: Cape May, Broadway Ave.	18.51	6.73	-16.66	7.70	24.77	-9.98
105: Cape May, Nature Conservancy	-18.12	-21.21	-3.46	-43.93	-40.42	-24.25
104: Cape May Point, Lake Drive	4.11	2.84	9.74	12.22	6.88	8.46
103: Lower Township, Higbee Beach	0.00	0.83	-4.61	-3.72	0.80	-3.65
102: North Cape May, Whittier Ave.	5.57	0.26	0.66	6.42	5.89	0.81
201: Lower Township, Pacific Avenue	-2.20	1.07	3.18	2.07	-1.06	4.23
100: Middle Township, Reeds Beach	-3.38	1.93	0.85	-0.56	-1.40	2.75
	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
AVERAGE for EACH SURVEY	-9.33	-7.23	1.79	-14.93	-17.12	-5.36
Average for oceanfront beaches	-11.28	-8.89	1.76	-18.43	-20.84	-6.87

TABLE 11						
CAPE MAY COUNTY						
SEASONAL; OVERALL; ANNUAL SPRING & FALL SHORELINE CHANGES						
	Survey & Time Period					
	Seasonal			Overall	Annual Spring & Fall	
	56 - 57	57 - 58	58 - 59	56 - 59	56 - 58	57 - 59
PROFILE SITE LOCATION	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
	Shoreline Change (feet)					
225: Ocean City, Gardens Road	-35.0	-40.3	29.3	-46.0	-75.3	-11.0
125: Ocean City, 6 th Street	-26.0	-26.8	-14.5	-67.3	-52.8	-41.3
124: Ocean City, 20 th Street	-21.3	47.8	52.8	79.3	26.6	100.6
223: Ocean City, 34 th Street	-32.5	-13.5	19.3	-28.8	-46.0	5.8
122: Ocean City, 56 th Street	-27.3	-46.5	-58.0	-131.7	-73.7	-104.5
222: Ocean City, 59 th Street	-33.8	-28.5	-125.3	-187.5	-62.3	-153.8
221: Ocean City, Corson's Inlet Park	-107.8	-46.0	77.8	-76.0	-153.8	31.8
121: Strathmere, Williams Road	-295.5	-84.8	9.5	-370.8	-380.3	-75.3
120: Sea Isle City, 1 st Street	11.8	-3.5	2.3	10.5	8.3	-1.3
119: Sea Isle City, 25 th Street	41.5	-69.1	6.8	-20.9	-27.6	-62.4
118: Sea Isle City, 57 th Street	-29.5	-48.5	-10.8	-88.8	-78.0	-59.3
117: Sea Isle City, 80 th Street	-29.0	13.5	24.3	8.8	-15.5	37.8
216: Avalon, 9 th Street	17.5	-45.0	-55.0	-82.5	-27.5	-100.0
116: Avalon, 23 rd Street	-20.3	-51.3	-43.5	-115.0	-71.5	-94.8
115: Avalon, 35 th Street	-39.5	51.0	-58.3	-46.8	11.5	-7.3
114: Avalon, 70 th Street	13.8	-1.8	10.3	22.3	12.0	8.5
113: Stone Harbor, 90 th Street	0.3	-26.0	-1.8	-27.5	-25.8	-27.8
212: Stone Harbor, South End	33.3	4.5	15.0	52.8	37.8	19.5
111: North Wildwood, 15 th Avenue	23.5	-10.7	-33.5	-20.7	12.8	-44.2
110: Wildwood, Cresse Avenue	43.5	-31.8	-14.0	-2.3	11.8	-45.8
109: Lower Township, Raleigh Ave.	25.5	26.5	31.7	83.7	52.0	58.2
208: Lower Township, Cape May NWR	13.0	20.8	-9.5	24.3	33.8	11.3
108: Cape May City, Cape May Beach Club	-17.3	-7.0	24.3	0.0	-24.3	17.3
107: Cape May, Baltimore Ave.	-13.0	16.3	-4.0	-0.8	3.3	12.3
206: Cape May, Broadway Ave.	39.0	12.0	-41.9	9.2	51.0	-29.9
105: Cape May, Nature Conservancy	-45.3	6.5	-10.8	-49.5	-38.8	-4.3
104: Cape May Point, Lake Drive	-5.8	-4.3	10.5	0.5	-10.0	6.3
103: Lower Township, Higbee Beach	0.3	11.5	-10.5	1.3	11.8	1.0
102: North Cape May, Whittier Ave.	18.0	-3.0	6.0	21.0	15.0	3.0
201: Lower Township, Pacific Avenue	0.3	3.0	0.5	3.8	3.3	3.5
100: Middle Township, Reeds Beach	-1.3	-0.5	2.5	0.8	-1.8	2.0
	S18-F18	F18-S19	S19-F19	S18-F19	S18-S19	F18-F19
AVERAGE for EACH SURVEY	-16.09	-12.10	-5.44	-33.70	-28.19	-17.54
Average for oceanfront beaches	▲ -19.63	▲ -14.69	▲ -6.83	▲ -41.23	▲ -34.32	▲ -21.52
Average for bayshore beaches	▲ 4.31	▲ 2.75	▲ -0.38	▲ 6.69	▲ 7.06	▲ 2.38

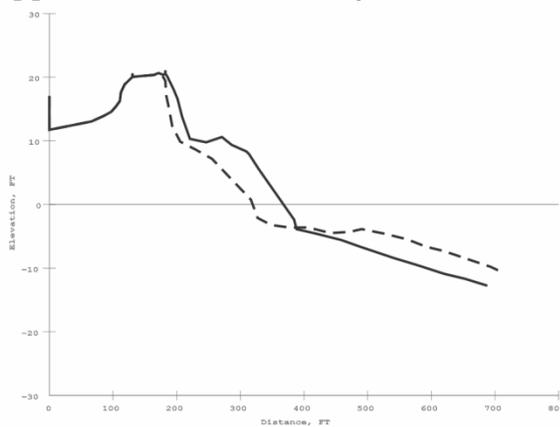


Typical Beach Profiles in New Jersey



Above is a typical beach profile with major features and zones labeled. No beach will show every aspect of this diagram at all times, but it illustrates all important features that appear on the New Jersey shoreline..

Seasonal Variations



The pair of profiles to the left show typical seasonal beach profile changes. The dashed line profile develops during a winter season, where wave conditions move material offshore. The solid line profile is generated during a summer season, where wave conditions move sand onshore, building a well developed berm and wider beach and adding to the dune. The winter wave conditions shift this beach material to the offshore region of the profile.



Coastal Research Center Glossary of Coastal Terms



Accretion - The addition of material to the beach cross section by natural processes.

Aeolian Accretion - Sand accumulation that results from wind driven processes.

Backshore - The area of the beach profile landward of the berm and seaward of upland dunes or bluffs.

Beachface - Also known as foreshore. The area of the beach exposed to regular wave action.

Berm - The nearly horizontal portion of the beach formed at the high water line as waves deposit material. A beach may have no berm or multiple berms depending on wave conditions.

Bulkhead - A structure that is built to retain or prevent the slumping of "earth" at the water's edge due to currents or wave action. Bulkheads are typically made of wood, steel, or plastic.

Cross-shore Transport - The transfer of sand perpendicular to the shoreline, or along the profile. A bar migrating onto the beach is an example of cross-shore transport.

Current - The flow of water in a channel or at the shoreline.

Downdrift - The direction of movement of sediment parallel to the coastline.

Datum - A reference level from which elevations are measured.

Dry Beach - The area of beach between the water and dune toe that is commonly used for recreation. Also referred to as recreational beach.

Dune - Unconsolidated hills or mounds of sand. Dunes are the result of aeolian processes and may have vegetation ranging from sparse to dense. Vegetation greatly stabilizes a dune.

Eddy - A circular current developed within or adjacent to the main current.

Erosion - The removal of material either vertically or horizontally by natural processes.

Foredune - The most seaward of the dune ridges along the profile.

Geotube - A geo-textile fabric installation filled with sand, typically used to retain material or to dissipate wave energy.

Groin - A shore-perpendicular erosion control structure, usually made of wood or rock. This structure acts to slow the process of littoral transport.

Hurricane - A tropical cyclone in the Northern Hemisphere, with sustained winds over 74 mph.

Jetty - A shore-perpendicular erosion control structure similar to a groin, however it is used to control the movement of sand at an inlet or channel.

Littoral Current - Current that moves parallel to shore, that results from the approach of waves not being perpendicular to the shoreline.

Littoral Drift - Also known as longshore transport. Movement of material parallel to the shoreline resulting from waves arriving at the shore at any angle not 90 degrees to the shore.



Coastal Research Center Glossary of Coastal Terms



Longshore Transport - Also known as littoral drift. Movement of sand parallel to the coastline resulting from wave generated littoral currents.

NAVD - (the datum of 1988) New elevation reference developed to replace the 1929 engineering datum.

NGVD - (the datum of 1929) An elevation reference developed from a specific model of the Earth's surface.

Onshore - In the direction of the shoreline; landward.

Offshore - In the direction opposite of the shoreline; seaward.

Neap Tide - A tide reduced in total elevation ranges due to the orbital positions of the sun and moon. Neap tides occur at first and last quarter moon stages.

Nearshore - Region of beach profile extending from the berm seaward in the direction of the offshore.

Northeaster - Dominant type of coastal winter storm event experienced in New Jersey, with winds from the northeast that exceed 30 mph.

Revetment - Cover of stone placed on or along a shoreline to protect a slope or shore structure.

Ridge - A low elevation, shore-parallel continuous mound of sand, generated by wave action.

Riprap - Line of rocks placed randomly along a slope or structure for protection.

Runnel - A continuous area of lower elevation than, but parallel to and adjacent to, a ridge(s).

Scarp - A near vertical feature generated by erosion of material from the lower portion of a slope or bluff.

Scour - Underwater removal of material through currents and/or wave action.

Seawall - Hard structure that separates the land and water.

Shoreline - The narrow area of land in contact with the water. When referring to a profile plot, the point where the profile crosses the line representing the datum.

Spring Tide - Tide with the highest elevation ranges due to the orbital positions of the sun and moon. Spring tides occur at new or full moon stages.

Swale - A long, narrow, generally shallow depression between ridges.

Swash - The area of beachface exposed to breaking wave energy as waves come ashore at the beach.

Storm Surge - The abnormal rise in local sea level that accompanies a hurricane or other major storm event.

Updrift - In the direction opposite of the dominant direction of movement of sand driven by waves.

Wrack - Debris deposited on the beach by wave action.

References: A.G.I., U.S.A.C.O.E., N.O.A.A., F.E.M.A., N.J.D.E.P.

BIBLIOGRAPHY

- 1981, New Jersey Shore Protection Plan: New Jersey Department of Environmental Protection, Division of Coastal Resources, CN 401, Trenton NJ 08625, vols 1-3
- 1985, Guidelines and Recommendations for Coastal Dune Restoration and Creation Projects. Bureau of Planning and Project Review, NJDEP, CN 401, Trenton, NJ 12p.
- 1986, Final Report for 1986 on New Jersey Beach Profiles Network: A Series of FEMA Monitoring Survey Stations. Contract #23059 NJDEP Coastal Resources Division.
- 1986, Beach Profiles Network for New Jersey, A Station Location Reference. Contract #23059 NJDEP Coastal Resources Division, Trenton, NJ 08625
- 1986, New Jersey Beach Profiles Network. Profile Photograph Reference. Contract #23059 NJDEP Coastal Resources Division, Trenton, NJ 08625
- 1987, New Jersey Beach Profile Network. Profile Photograph Reference. Contract #29059 NJDEP Coastal Resources Division, Trenton, NJ 08625
- 1992, New Jersey Beach Profile Network. Profile Monument Location Reference. Contract #29405 NJDEP, Division of Coastal Planning and Policy, Trenton, NJ 08625
- 1992, The New Jersey Beach Profile Network (NJ BPN), Reach Specific Analysis Following Six Years of Study on the New Jersey Oceanfront Coastline. Contract #29405 NJDEP, Division of Coastal Planning and Policy, Trenton, NJ 08625
- 1992, The New Jersey Beach Profile Network (NJ BPN), Reach Specific Analysis Following Six Years of Study on the New Jersey Oceanfront Coastline. Contract #29405 NJDEP, Division of Coastal Planning and Policy, Trenton, NJ 08625
- 1998, Villas and Vicinity, NJ Interim Feasibility Study – Final Feasibility Report and Environmental Assessment, United States Army Corps of Engineers Philadelphia District, Philadelphia, Pa 19107-3391
- Farrell, S.C., Meggison, A., Lyons, T., Hafner, S., Boyer, S., and Sullivan, B., 1992, The New Jersey Beach Profiles Network; Analysis of the Shoreline Changes in NJ Coastal Reaches 1 through 15, NJ Dept of Environmental Protection (NJ DEP), Trenton, NJ 08625, Contract #29338, 136p.
- Farrell, S.C., Hafner, S., Speer, B., and Lepp, T., 1997, The New Jersey Beach Profiles Network; Analysis of the Shoreline Changes in NJ Coastal Reaches 1 through 15, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 263p.
- Farrell S., 1995, Beach Nourishment at Avalon, New Jersey: A Comparison of Fill Performance with and without Submerged Breakwaters, in, Proceedings of the 8th National Conference on Beach Preservation Technology, Florida Shore and Beach Preservation Association, 864 East Park Ave., Tallahassee, Florida, Lawrence Tait, ed.
- Fisher, J., 1967, Origin of Barrier Chain Shorelines: Middle Atlantic Bight, Geological Society of America Annual Program, P 66-67.

Nordstrom, K., Fisher, S., Burr, M., Frankel, E., Buckalew, T., and Kucma, G., 1977, Coastal Geomorphology of New Jersey, Volumes I and II. Tech Report 77-1, Center for Coastal and Environmental Studies, Rutgers University, New Brunswick, NJ.

Uptegrove, J., Mullikin, L., Waldner, J., Sheridan, R., Hall, D., Gilroy, J., and Farrell, S., 1994, Characterization of Offshore Sediments in Federal Waters as Potential Sources of Beach Replenishment Sand - Phase 1. Technical Report NJ Geological Survey, Trenton NJ. 150p.

Farrell, S.C., Hafner, S., Speer, B., Lepp, T., Ebersold, S., 1998, The New Jersey Beach Network; Analysis of the Shoreline Changes in NJ Coastal Reaches 1 through 15, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 263p

Farrell, S.C., Hafner, S., Speer, B., Lepp, T., Ebersold, S., Constantino, C., 1999, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Fall of 1997 Through Spring of 1998, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 197p

Ciorra, Anthony, Project Manager, U.S. Army Corps of Engineers, New York District, 26 Federal Plaza, New York, NY 10278, web: <http://www.nan.usace.army.mil>

Farrell, S.C., Hafner, S., Constantino, C., Policarpo, J., Bogle, B., and Linzner, E., 2000, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Fall of 1998 Through Spring of 2000, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 178p.

Farrell, S.C., Hafner, S., Constantino, C., Robine, C., Bogle, and, B. Linzner, E., 2001, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Fall of 1999 Through Spring of 2001, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 183p.

Farrell, S.C., Hafner, S., Constantino, C., Robine, C., Lees, B., Finley M. and Linzner, E., 2002, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Fall of 1998 Through Spring of 2000, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 178p.

Farrell, S.C., Hafner, S., Constantino, C., Robine, C., Lees, B., Finley M. and Linzner, E., 2003, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Spring of 2002 Through Fall of 2003, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 218p.

Farrell, S.C., Hafner, S., Constantino, C., Robine, C., Lees, B., Finley M. and Linzner, E., 2004, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Spring 2003 Through Fall of 2004, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 205p.

Farrell, S.C., 2006, Twenty Years of Coastal Monitoring Along the New Jersey Shoreline; 50th Annual Meeting of the American Shore & Beach Preservation Association, Long Branch, NJ, October 2006

Farrell, S. C., Hafner, S., Robine, C., Howard, S., Smith. B., Gruver, M. 2007, The New Jersey Beach Network; Twenty Years of Coastal Monitoring Along the New Jersey Shoreline; NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 354p.

Farrell, S. C., Hafner, S., Robine, C., Howard, S., Smith. B., Gruver, M. 2008, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Spring of 2007 Through Fall of 2008, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 243p.

Farrell, S. C., Hafner, S., Robine, C., Howard, S., Smith, B., 2009, Beach Nourishment in New Jersey and the Effectiveness of Shoreline Monitoring over 23 years, North East Beach Preservation Association Conference, Sept. 21 to 23, 2009, Woods Hole Massachusetts.

Farrell, S. C., Hafner, S., Robine, C., Howard, S., Smith, B., Gruver, M., Barone, D., Mc Kenna, K., 2010, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Spring of 2009 Through Fall of 2010, NJ Dept of Environmental Protection (NJDEP), Trenton, NJ 08625, 273p.

Farrell, S.C., Hafner, S., Howard, B.S., Barone, D.A., McKenna, K.K., Robine, C., Koch, R., Smith, B., Gruver, M., Flynn, M.J., and Tracey, C., 2012, Shoreline Changes in New Jersey Coastal Reaches One through Fifteen Raritan Bay to Delaware Bay-A Review of 25 Years-1986 to 2012: New Jersey Beach Profile Network 2011 Annual Report to the New Jersey Department of Environmental Protection, Division of Construction and Engineering, <http://intraweb.stockton.edu/eyos/page.cfm?siteID=149&pageID=151>. 289p.

Coastal Research Center, Impact of Hurricane Sandy on the NJBPN sites along the Coast of New Jersey Following the October 29-30, 2012 Storm, 2012, published in five Regional Reports to the Bureau of Coastal Engineering, NJ Dept of Environmental Protection (NJDEP), Toms River, NJ 08735, 188p. Also available on www.stockton.edu/crc

Farrell, S. C., Hafner, S., Robine, C., Howard, S., Smith, B., Flynn, M., Barone, D., Mc Kenna, K., 2013, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Spring 2012 Through Fall 2013, NJ Dept. of Environmental Protection (NJDEP), Bureau of Coastal Engineering Toms River, NJ 08753, 169p.

Farrell, S. C., Hafner, S., Robine, C., Howard, S., Smith, B., M., Barone, D., Mc Kenna, K., 2014, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Spring 2013 Through Fall 2014, NJ Dept. of Environmental Protection (NJDEP), Bureau of Coastal Engineering Toms River, NJ 08753, 162p.

Howard, B.S., Barone, D.A., and McKenna, K.K., 2015, State Channel Maintenance Capacity: Evaluation of Dredged Holes, Final Report to the New Jersey Department of Transportation Bureau of Research Project No. 2013-10, Coastal Research Center, Stockton University, Port Republic, NJ. 67p.

Barone, D., McKenna, K.K., Farrell, S., C., 2014, Hurricane Sandy: Beach-Dune Performance at New Jersey Beach Profile Network Sites, Shore and Beach, vol. 82, no. 4, pp. 13-22.

Farrell, S., C., 2016, Managing NJ Coastal Zone Storm Effects as They Alter the Developed Environment We Love; 2016, Society of Ecological Restoration, Mid-Atlantic Chapter Conference, Sea View, Galloway, NJ.

Farrell, S. C., McKenna, K.K., Hafner, S., Robine, C., Smith, B., DiCosmo, N., Gruver, M., Ferencz, A., Tracey, C., Pimpinelli, H., 2016, The New Jersey Beach Network; Annual Report on Monitoring New Jersey Beaches Spring 2014 Through Fall 2015, NJ Dept. of Environmental Protection (NJDEP), Bureau of Coastal Engineering Toms River, NJ 08753, 166p.

McKenna, K.K., Farrell, S.C., and Gebert, J.A., 2016, Hurricane Sandy: Beach-dune recovery at New Jersey Beach Profile Network (NJBPN) sites, Shore & Beach, vol. 84, no. 3, pp. 5-17.

Barone, D.A., McKenna, K.K., Farrell, S.C., 2014, Hurricane Sandy: Beach-dune performance at New Jersey Beach Profile Network sites, Shore and Beach, vol. 82, no. 4, pp. 13-22.

US Army Corps of Engineers, 2016, New Jersey Shore Protection, Manasquan Inlet to Barnegat Inlet Coastal Storm Damage Reduction Project, Philadelphia District Project Fact Sheet,

<http://www.nap.usace.army.mil/Missions/Factsheets/Fact-Sheet-Article-View/Article/490786/new-jersey-shore-protection-manasquan-inlet-to-barnegat-inlet-nj/> (accessed May 2017).

Farrell, S. C., McKenna, K.K., Hafner, S., Smith, B., Robine, C., Pimpinelli, H., DiCosmo, N., Tracey, C., Beal, I., Ferencz, A., Gruver, M., and Suran, M., 2017, The New Jersey Beach Network; Report on Monitoring New Jersey Beaches An Analysis of Thirty Years of Sand Redistribution and Shoreline Changes in New Jersey's Four Coastal Counties, Raritan Bay, the Atlantic Ocean Coast, and Delaware Bay, Fall 1986 Through Fall 2016, NJ Dept. of Environmental Protection (NJDEP), Bureau of Coastal Engineering Toms River, NJ 08753, 689p.

Farrell, S. C., McKenna, K.K., Hafner, S., Smith, B., Robine, C., Pimpinelli, H., C., Beal, I., Ferencz, A., Gruver, M., and Suran, M., 2018, The New Jersey Beach Network; Report on Monitoring New Jersey Beaches An Analysis of Sand Redistribution and Shoreline Changes in New Jersey's Four Coastal Counties, Raritan Bay, the Atlantic Ocean Coast, and Delaware Bay, Spring 2016 Through Fall 2017, NJ Dept. of Environmental Protection (NJDEP), Bureau of Coastal Engineering Toms River, NJ 08753, 389p.

Farrell, S. C., McKenna, K.K., Hafner, S., Smith, B., Robine, C., Pimpinelli, H., Ferencz, A., and Suran, M., 2017, The New Jersey Beach Network; Report on Monitoring New Jersey Beaches An Analysis of Sand Redistribution and Shoreline Changes in New Jersey's Four Coastal Counties, Raritan Bay, the Atlantic Ocean Coast, and Delaware Bay, Spring 2017 Through Fall 2018, NJ Dept. of Environmental Protection (NJDEP), Bureau of Coastal Engineering Toms River, NJ 08753, 393p.