

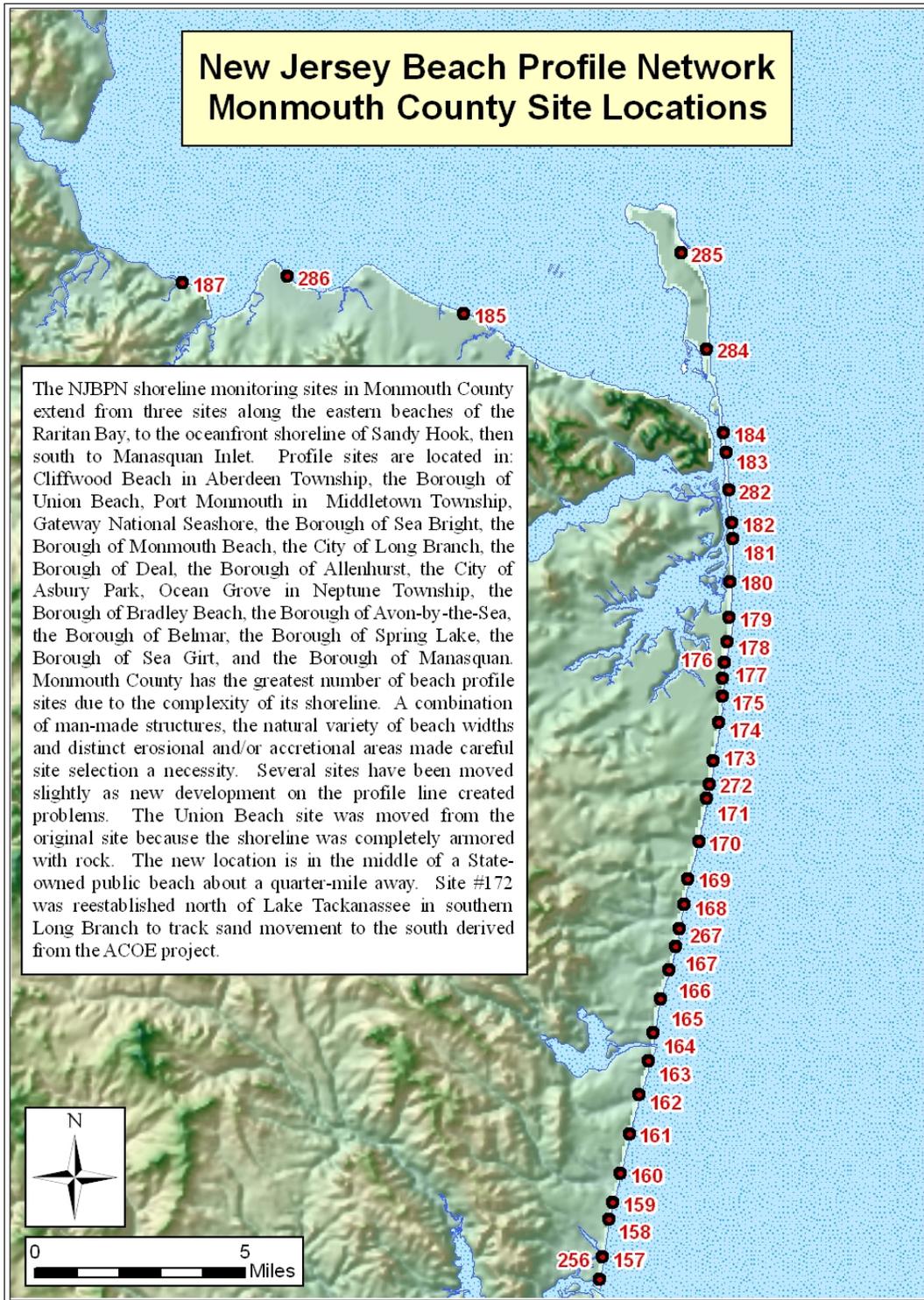


# New Jersey Beach Profile Network

## Monmouth County

Raritan Bay and Sandy Hook  
to Manasquan Inlet

**NJBPN Profile #'s  
187 - 256**



**Figure 1. Location map for the 36 NJBPN profiles in Monmouth County, NJ**

## MONMOUTH COUNTY - SUMMARY

Monmouth County contains 36 profile stations, making it the most densely surveyed county. There are three sites along the Raritan Bay shoreline and the complexity of coastal construction along the Atlantic shoreline demanded a greater number of profile stations to cover the variety of coastal shoreline features present in the county. The profile station pages each show a full page photograph from the fall of 2011, which is followed by four survey plots that show changes from Spring 2010 to Fall 2011. Last year a site was added to the Monmouth County database replacing Site 172, which was lost when a major project was built on the original site in southern Long Branch. The new site is located just north of Lake Tackanasse in Long Branch (Site 272). No trend analysis was performed on this location due to the limited set of data.

Monmouth County received the benefit of the largest, most expensive and most comprehensive beach nourishment project ever in the United States beginning in 1994. Completed by the New York District Army Corps of Engineers (ACOE) for \$210,000,000, this project continued in three phases until the year 2000. In all, 21 miles of the county shoreline were restored with a 100-foot wider berm and a dune system built in all locations where practical (a total of 6.1 million cubic yards of sand). The only gaps in the entire project where no sand was placed on the beaches were in the communities of Loch Arbor, Allenhurst, Deal and Elberon because these communities would/could not provide the necessary real estate easements from owners. This fact divides the restored shoreline into two filled segments: one from the Sandy Hook National Seashore south to the Long Branch/Elberon boundary; then no fill to the Asbury Park boundary; and the second segment from Asbury Park to the Manasquan Inlet. The National Park Service also piggybacked onto the Federal project operations and placed sand onto the erosional zone within the Sandy Hook Park boundary, thus adding to the length of the fill.

Maintenance fills have been completed following two strong storms in 1998, hot-spot erosion in Monmouth Beach in 1997 and 2002, and in southern Long Branch in March 2009. The southern Long Branch project extended south of West End Avenue and north toward Broadway Avenue. Funds in the amount of \$2,961,000, \$3,305,000 and \$1,316,000 were appropriated for Fiscal Years 2006, 2007 and 2008, respectively. This funding was used to design and construct approximately 2400 linear feet of beach re-nourishment in South Long Branch. Since completion in 2001, the southern segment (Asbury to Manasquan) has not required maintenance.

### **TREND ANALYSES:**

To celebrate the 25 years of surveying each site had the computations generated for the annual fall-to-fall changes in shoreline position and sand volume across the length of the survey and a set of graphs made to show the annual changes, then the cumulative summation of each year's gain or loss to generate trends similar to the select few done in 2010. The trend analysis extends back 17 years for those cross sections added when the program went to twice annually in 1994.

The sites within the Federal project's two zones of construction all show the scope of the project's impact on the shoreline and sand volume available to the site. Many sites, especially, between Asbury Park and Manasquan Inlet have trends in sand volume over 100% of the sand volume initially placed. While the trend is downward in Long Branch and Sea Bright, it must be remembered that those in opposition to this project earnestly predicted that "All the Sand would be GONE" in 3-5 years. The surveys support a far different result with sites like McCabe Avenue in Bradley Beach (103% of placed volume) and Brighton Avenue in Spring Lake (135% of placed volume 12 years after the project without any further maintenance. The maximum value is 325% of the placed volume remaining at 5<sup>th</sup> Avenue in Belmar due to the presence of the

Shark River jetty and a very low initial need for sand placed by the ACOE. The low for the retention occurred in Ocean Grove with 59% remaining 12 years later.

Site 179, Cottage Road, in Monmouth Beach has been an enigma due to persistent, rapid loss of sand deposits. Observations made the past two years may lead to possible reasons. There is a massive stone groin protecting the Monmouth Beach Club property positioned about 500 feet south of this site. In the absence of northeast storms the dominant littoral currents are directed to the north, so the sand moves north away from the groin and the Cottage Road site and is not being replaced by significant material traveling north around the groin. By the fall 2009 survey the site was devoid of sand, the dune was gone and the beach was wet at low tide, not far from the conditions existing here prior to the beach fill. Following the 2009-2010 winter storm season sand had reappeared as a dry beach fronting the rocks, a minimal, but significant improvement when compared to the fall 2009 survey situation. The littoral currents were reversed by the northeasters and were increased in magnitude during the storms. However, the groin protecting the Beach Club served to impound the sand and did not allow sediment to pass further south and the profile site beach accumulated sand during the period of severe weather. If this is the case, this location will be a perpetual “Hot Spot” for erosion.

The southern segment of the ACOE project weathered the 2009-2010 storm events very well. The beach at Site 167 in Asbury Park gained sand volume in 4 of 10 years which allowed the beach to maintain its appearance and storm resistance for a decade without need for maintenance. At Site 160, Salem Avenue in Spring Lake, sand volume increased for over a decade following the initial sand placement. Then, three years of continuous loss dragged the total volume below that placed by the ACOE. However, the site continues to maintain a healthy profile 13 years after the project was completed there.

This trend is true from Asbury Park south to Manasquan, NJ. Loss from the southern Monmouth County fill section that moved to the north has benefited Loch Arbor and the Borough of Allenhurst as sand slowly moved north around the northern Asbury Park groin into the short shoreline cell containing these two municipalities. An extensive groin complex built at the Allenhurst – Deal boundary prevents sand movement into the Borough of Deal. Likewise, 13 years of observations have shown that little sand has moved south into Elberon or Deal from Long Branch (Pullman Ave., Roosevelt Ave., and Darlington Ave. sites). The groins and shoreline armor stone remain the line of storm defense for this shoreline segment. Had the ACOE project been finished through this area, these groins would have retained much of the sand, but issues similar to that seen in Monmouth Beach (Site 179) could be expected around the largest of the rock groins along this shoreline. Though there was a substantial loss of sediment from the beaches of Monmouth County in the 2009-2010 winter storm season, the county remains over 13 million cy of sand above the amounts in the 1993 beaches (Figure 7). However, between 2010 and 2011 the storm trend reversed with Hurricane Irene and one significant northeast storm in late October 2011 yielding a small but hopeful positive sand volume increase (174,000 cubic yards). The CRC has computed a loss rate number for the 21 miles of ACOE managed beaches and without any further sand volume added, the emplaced fill will be 100% gone in 56 years by 2068. Examination of the sand transport rate into the National Seashore at Sandy Hook has shown that the entire sand volume loss between Elberon, Long Branch, Monmouth Beach and the park boundary with Sea Bright is seen as deposition between the park boundary and Gunnison Beach site (that DOES NOT count any of the sand north of Gunnison to the tip of the Sandy Hook spit). If the sand does leave the northern developed Monmouth County shoreline it will be located in the growth added to the National Seashore.

Thus far no significant funding has been appropriated to conduct maintenance beach nourishment projects for Monmouth County. The NY District ACOE pieced together the funding package to maintain the Long Branch segment in 2009. Suitable sand dredged from the maintained channel in the Shrewsbury River estuary was pumped across the barrier and seawall to add sand to the Monmouth Beach (55,000 cy) erosional hot spot (Site 179). No other beach restoration projects have been authorized by local municipal governments. Sea Girt commenced designing and building a dune system to augment the level of storm protection and prevent sand from blowing into Ocean Avenue. Thus far Belmar has not seen fit to build a dune system along its

oceanfront. The Ocean Grove and Bradley Beach dunes have done well with periodic maintenance tailored to reduce excess height development or encroachment into the parcels landward of the dune alignment.

The Raritan Bay shoreline continues to erode slowly at two of the three sites with no impact seen below a depth of 2 feet in the bay due to short-period, low-amplitude waves breaking on the shoreline. Monmouth County parks system is preparing to restore the scrap and rubble-core dune along the park shoreline at Site 185. The New York District ACOE has plans in various states of readiness for Port Monmouth, Leonardo (flooding), Union Beach, Highlands (flooding) and Keyport (flooding) shorelines and associated low-lying areas. These projects have been authorized by the WRDA of 2007. Most are in alternatives analysis up to the final Preconstruction, Engineering and Design (PED) phase leading to construction when funding is available. These five Raritan Bay projects have the majority of the funds slated for flood abatement and storm surge associated with strong northeast storms.

## Monmouth County, Beach Volume & Shoreline Position Changes Over 25 Years

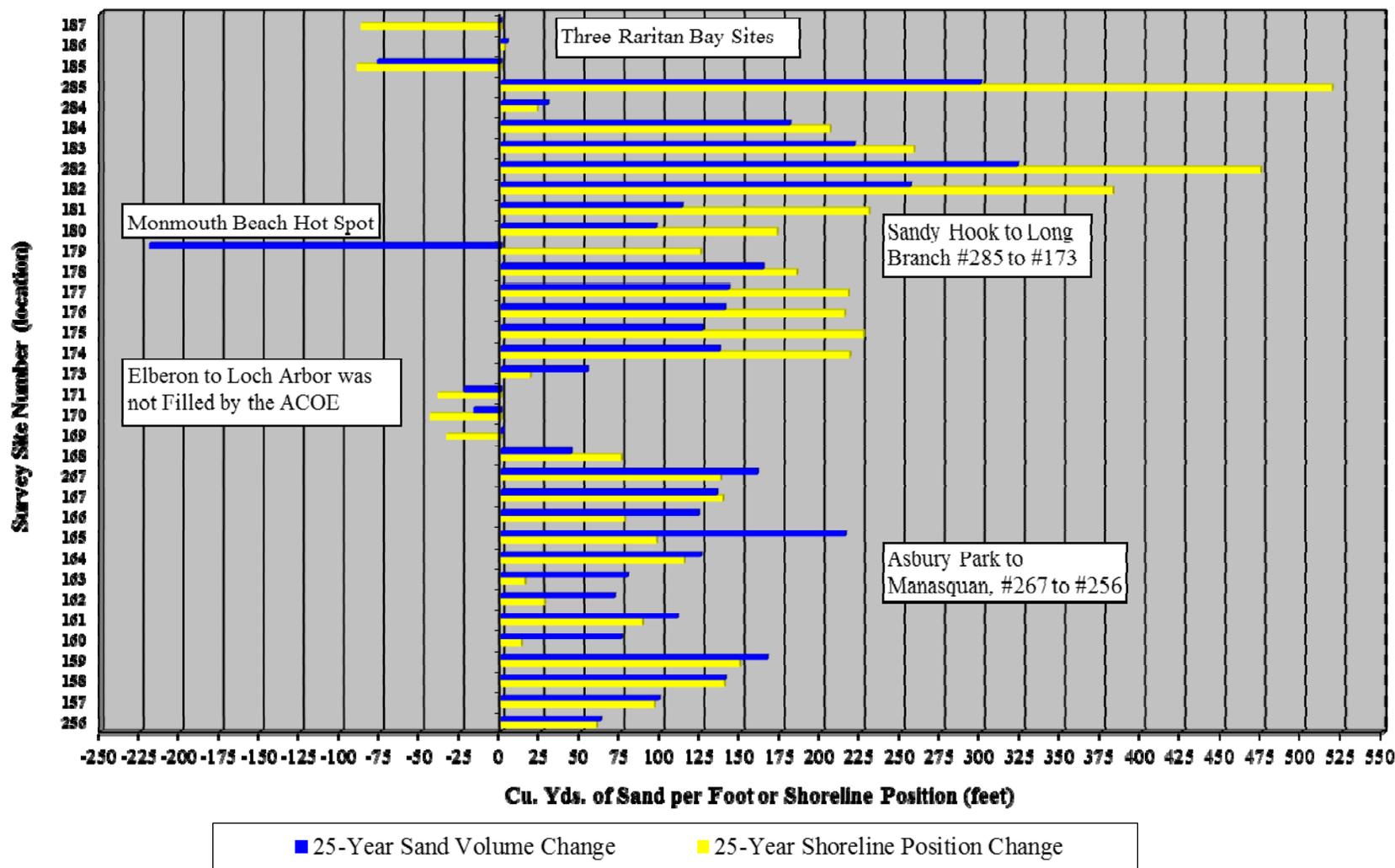


Figure 2. The graph above shows the 25-year changes in shoreline position and volume for all 36 of the Monmouth County survey sites. Many of the sites show the influence of the Federal beach nourishment project and subsequent maintenance fill that was added to several locations in response to the 1997 storm. Though there was a substantial loss of sand in the El Nino year of 2009 and 2010, the county remains in “good shape” for volume and shoreline position when compared to the 1986 conditions. Certainly, beach nourishment is credited for the successes in Monmouth County. Only a few locations suffer from erosion and those areas were either not included of the Federal project, or are adjacent to a coastal structure that blocks the littoral flow of sand.

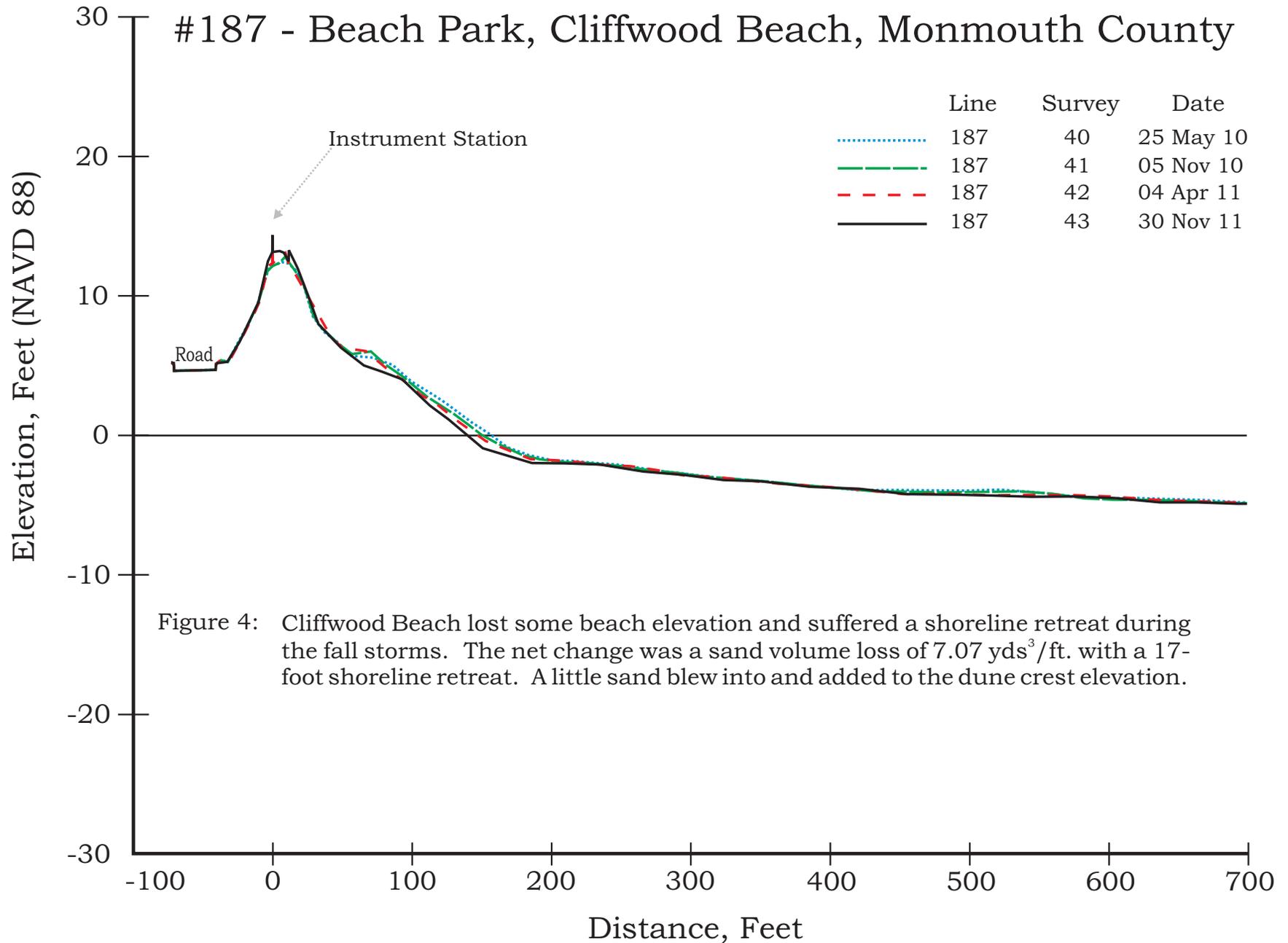
**Site 187, Cliffwood Beach – November 20, 2011**



**Figure 3: Shown above is the view looking northwest from the dune in Cliffwood Beach, NJ.**

# New Jersey Beach Profile Network

#187 - Beach Park, Cliffwood Beach, Monmouth County



## CLIFFWOOD BEACH – SITE 187

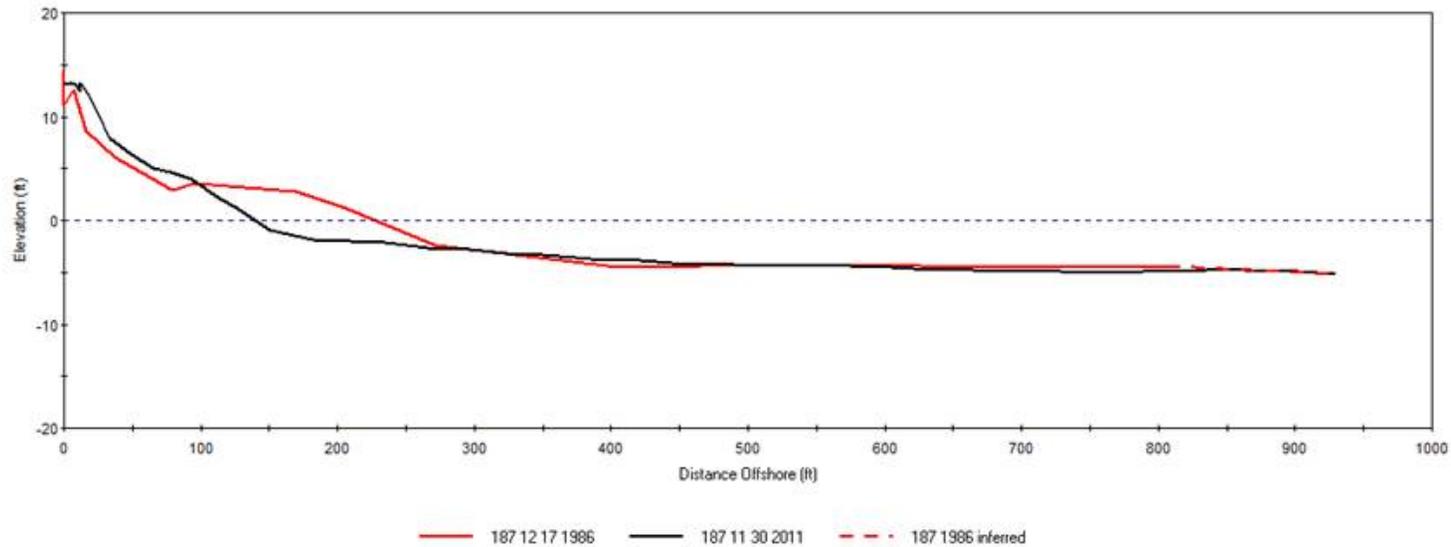
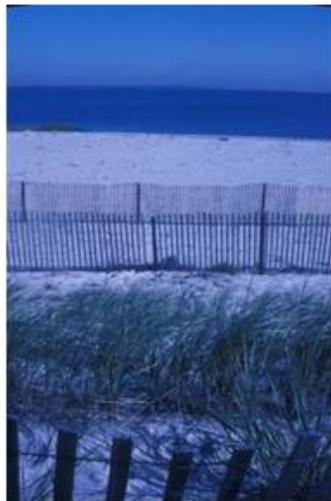


Figure 5. This site was selected to track shoreline changes on a natural beach along Raritan Bay. The site was stable for a long period, and has incurred steady losses since 1993. Berm sand has moved into the dune and the nearshore has remained relatively stable. (Left photo October 5, 1987 [view to the north]; right photo November 30, 2011 [view to the north]).



## 25-Year Coastal Changes at Site 187, Cliffwood Beach, Aberdeen, Monmouth Co.

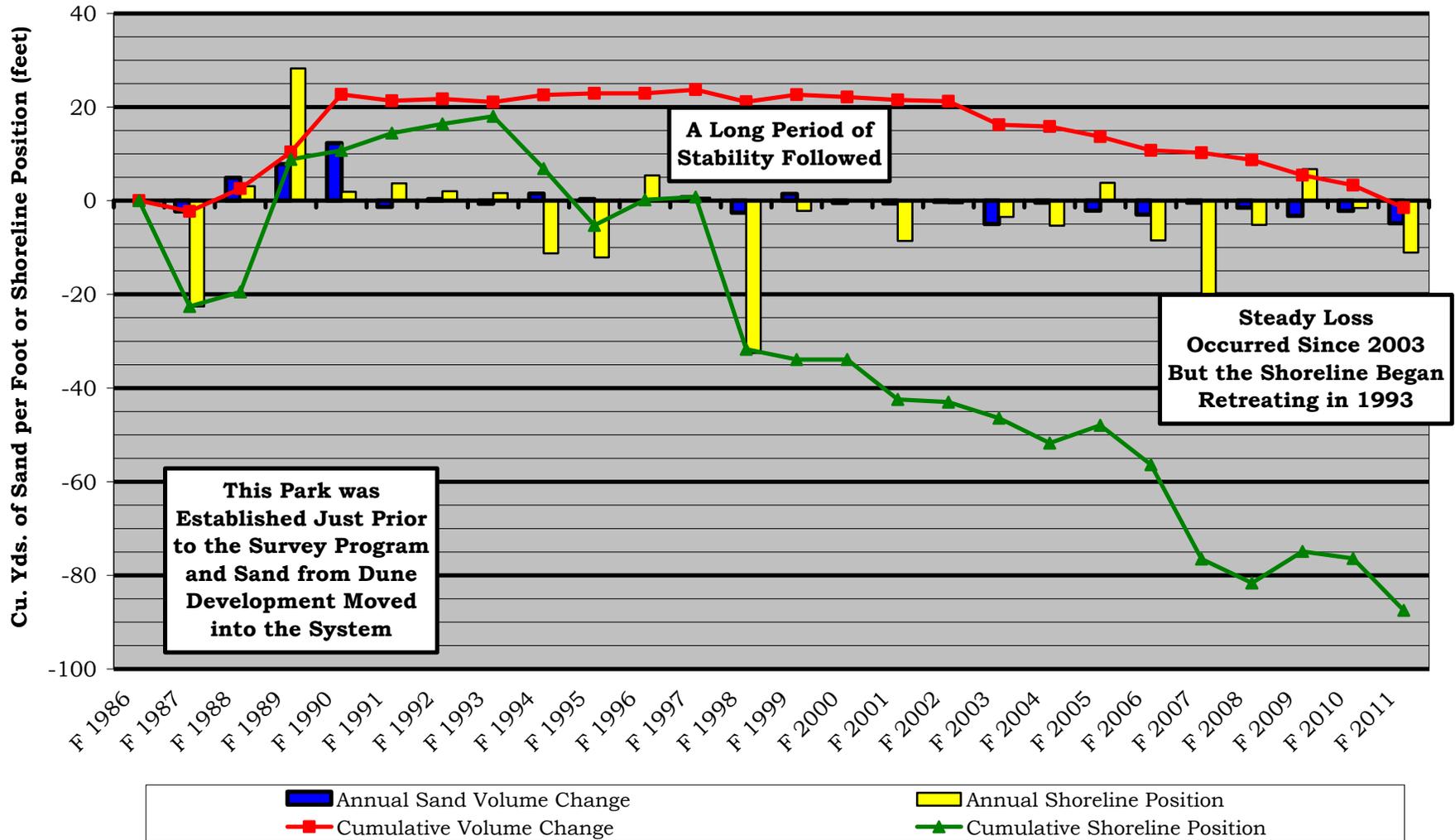


Figure 6. There are three sites along the eastern Raritan Bay shoreline in Monmouth County where Cliffwood Beach is the westernmost of the three. Located in a park created just before the establishment of the NJBPN program, the sand available in the system added to the beach/dune system during the three years following the initial pair of surveys. During the next 12 years the shoreline was stable in spite of northeast storms and other events. In 2003 a slow sand loss commenced that has reduced the sand volume to nearly that present in 1986.

**Site 186, Union Beach – September 9, 2008 (abandoned)**



**Figure 7: Shown above is the view looking northwest from on top of the revetment. This site was abandoned in 2008 and moved 1000 northwest of the location pictured below to be closer to the municipal bathing beach where survey data was much more useful.**

**A 2010-2011 cross-section analysis graphic was not completed for Site 186 because it was abandoned in 2008.**

## UNION BEACH – SITE 186 (abandoned)

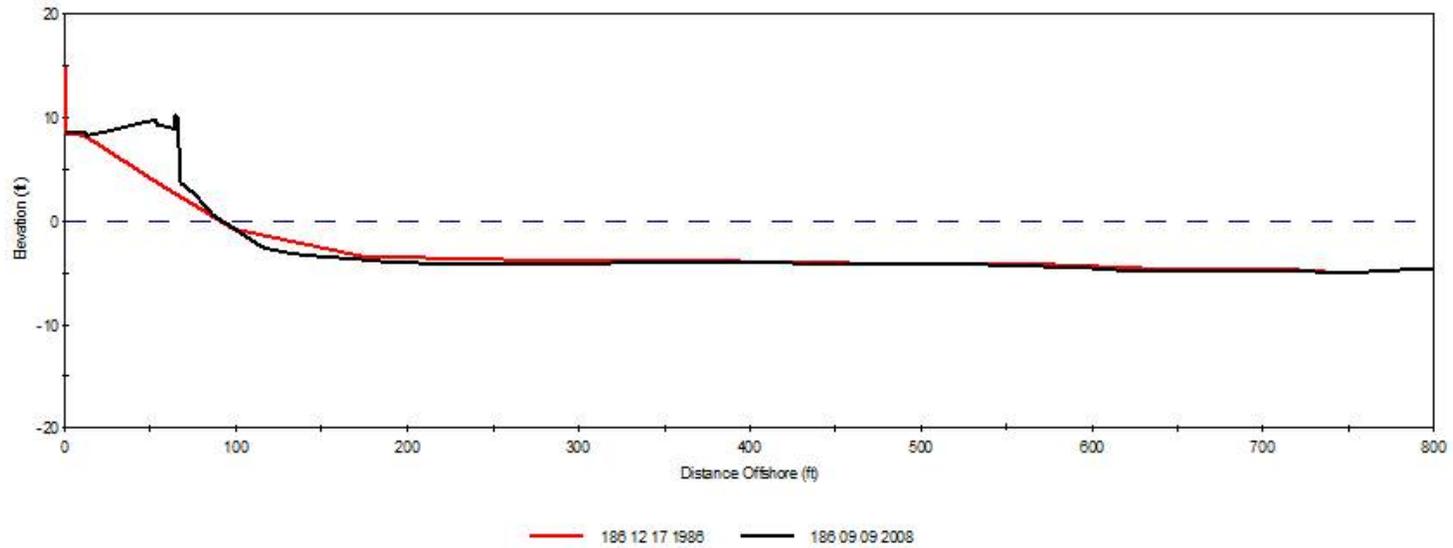


Figure 8. In 2009, the original profile location was abandoned and a new one was established about a quarter mile to the northwest along the shoreline to a public bathing beach. The new site is near the intersection of Beach and Front Streets in Union Beach. This site experienced very modest changes to the profile. (Left photo October 11, 1988 [view to the north]; right photo October 14, 1998 [view to the west]).



### 25-Year Coastal Changes at Site 186/286, Union Beach, Monmouth Co.

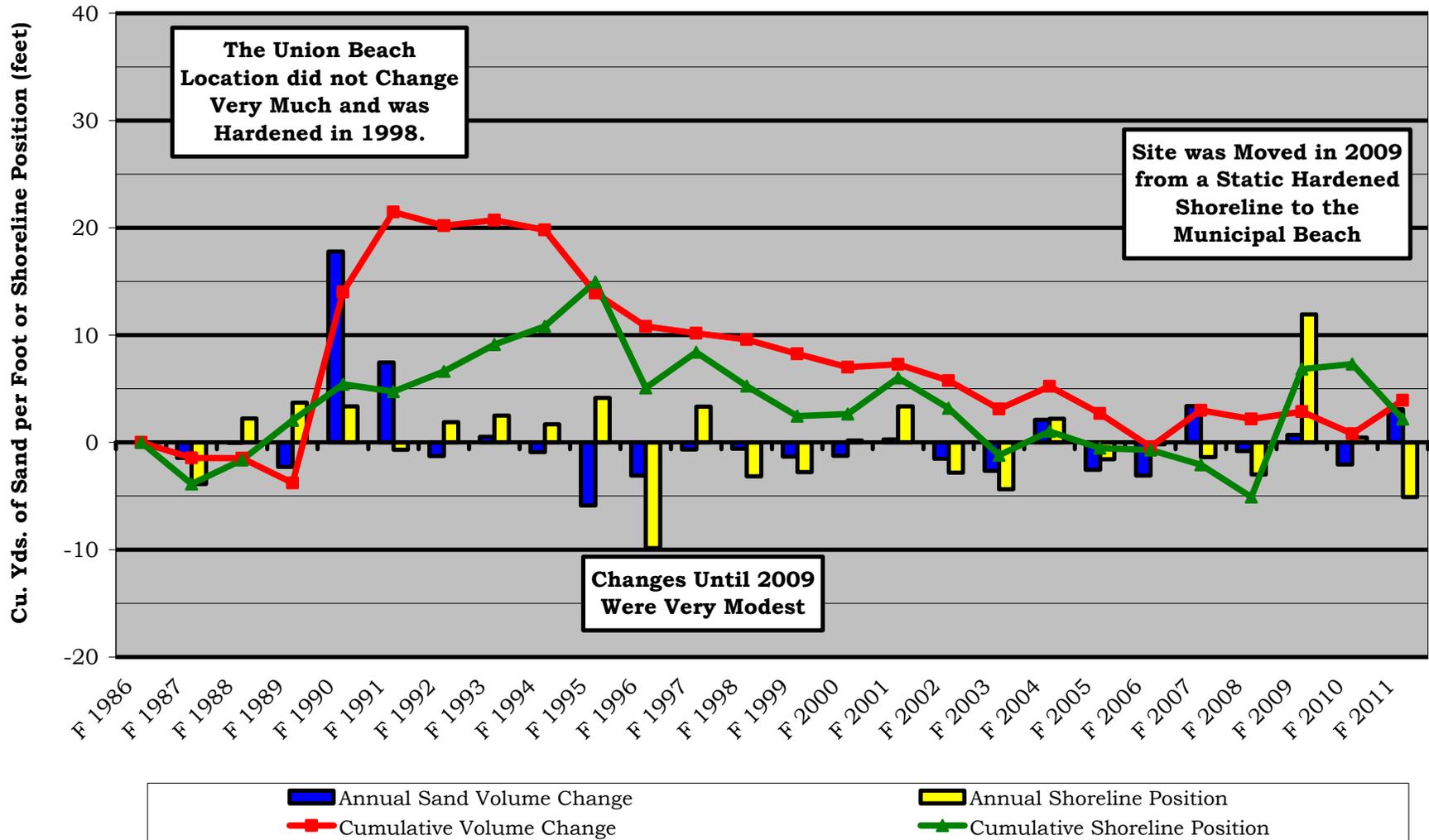


Figure 9. The rock revetment that was placed at Site 186 allowed the dry beach to remain rather stable over the period of study (prior to moving/abandoning the site). Low wave energy in Raritan Bay has allowed for little changes to the nearshore elevation.

**Site 286, Union Beach – November 30, 2011**



**Figure 10: Shown above is the view looking northwest from the bulkhead at the repositioned Union Beach survey location.**

# New Jersey Beach Profile Network

#286 - Beach Street, Union Beach, Monmouth County

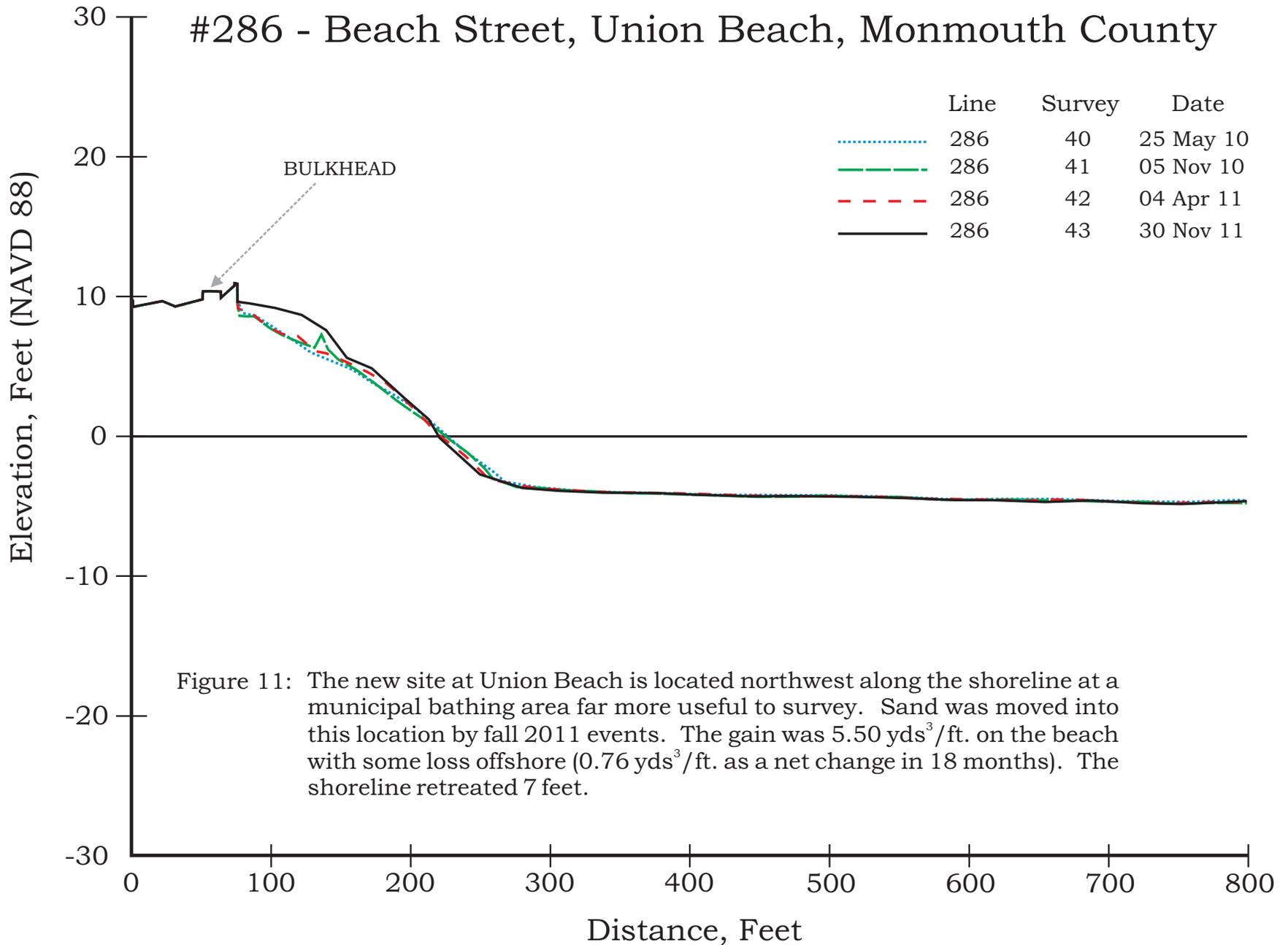


Figure 11: The new site at Union Beach is located northwest along the shoreline at a municipal bathing area far more useful to survey. Sand was moved into this location by fall 2011 events. The gain was 5.50 yds<sup>3</sup>/ft. on the beach with some loss offshore (0.76 yds<sup>3</sup>/ft. as a net change in 18 months). The shoreline retreated 7 feet.

## UNION BEACH – SITE 286



Figure 12. This site was established in 2009 after former Site 186 was abandoned. Site 186 was located southeast of this site. The new site is located at a public bathing beach near the intersection of Beach and Front Streets in Union Beach. (Top photo December 14, 2009 [view to the west]; bottom photo November 30, 2011, two years after the new site was established [view to the west]).



### 25-Year Coastal Changes at Site 186/286, Union Beach, Monmouth Co.

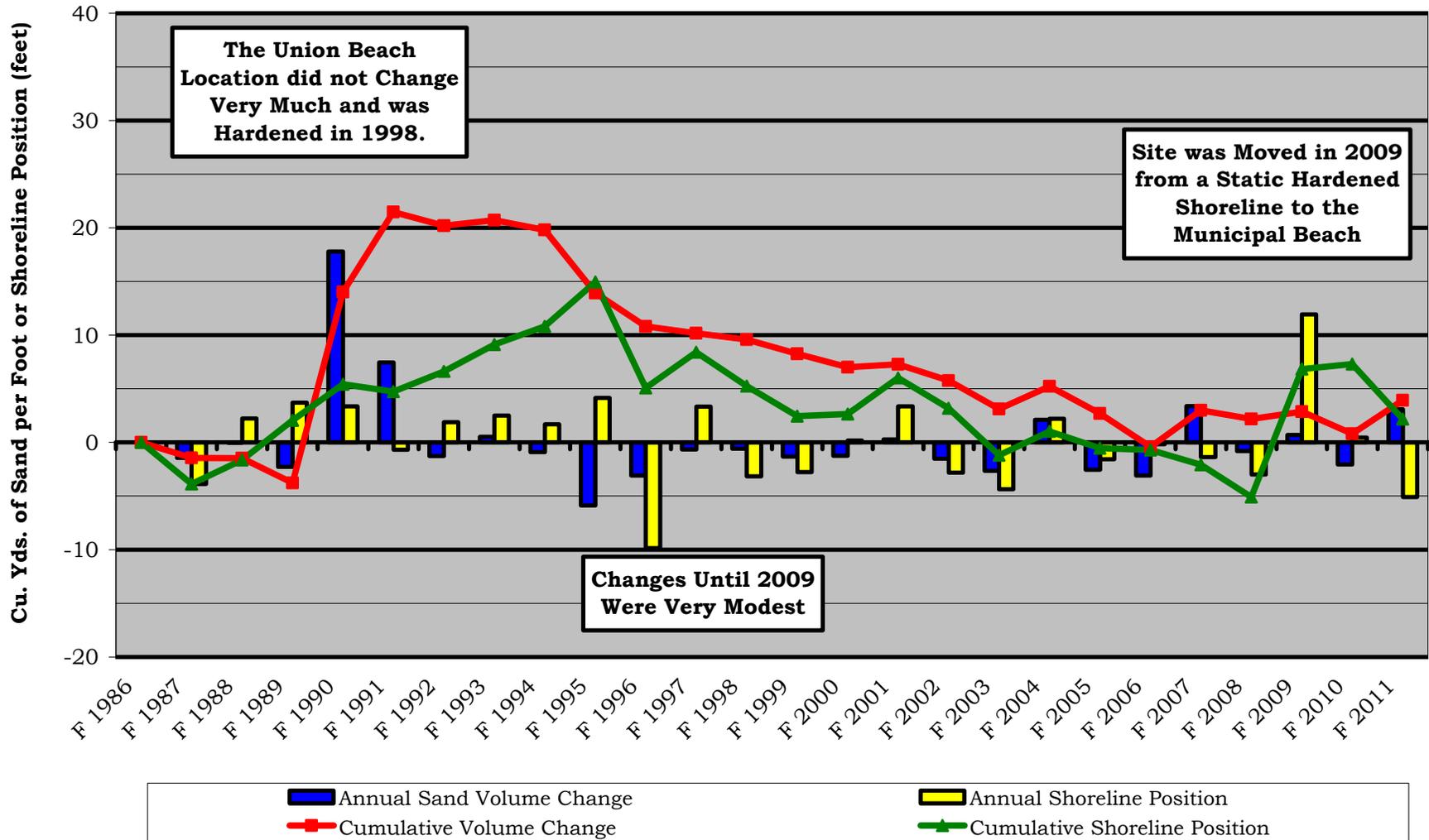


Figure 9. The rock revetment that was placed at Site 186 allowed the dry beach to remain rather stable over the period of study (prior to moving/abandoning the site). Low wave energy in Raritan Bay has allowed for little changes to the nearshore elevation.

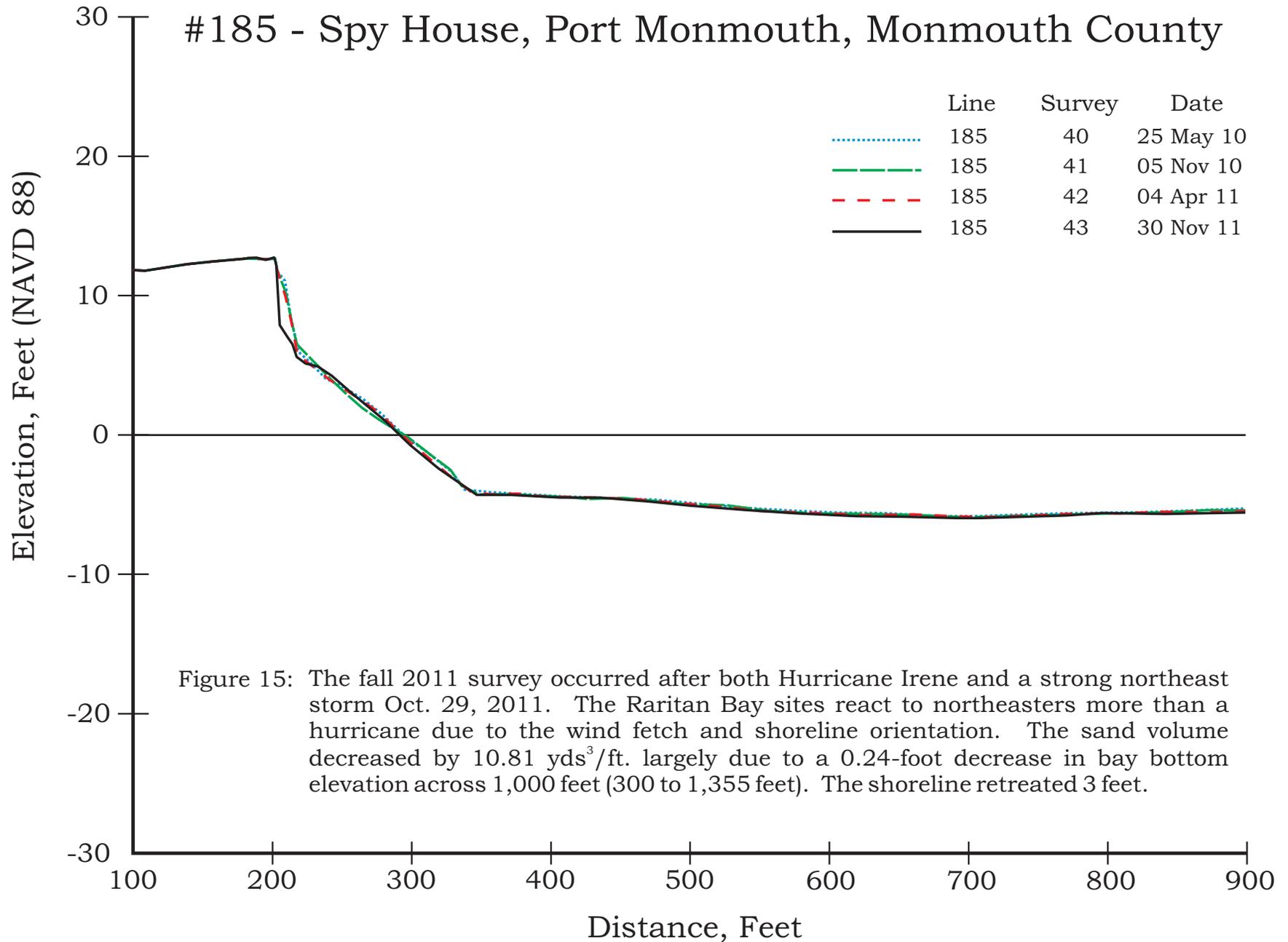
**Site 185, Spy House Museum– November 30, 2011**



**Figure 14: Shown above is the view looking southeast from on top of the scarp at the Spy House Museum in Port Monmouth, NJ.**

# New Jersey Beach Profile Network

#185 - Spy House, Port Monmouth, Monmouth County



## SPY HOUSE MUSEUM – SITE 185

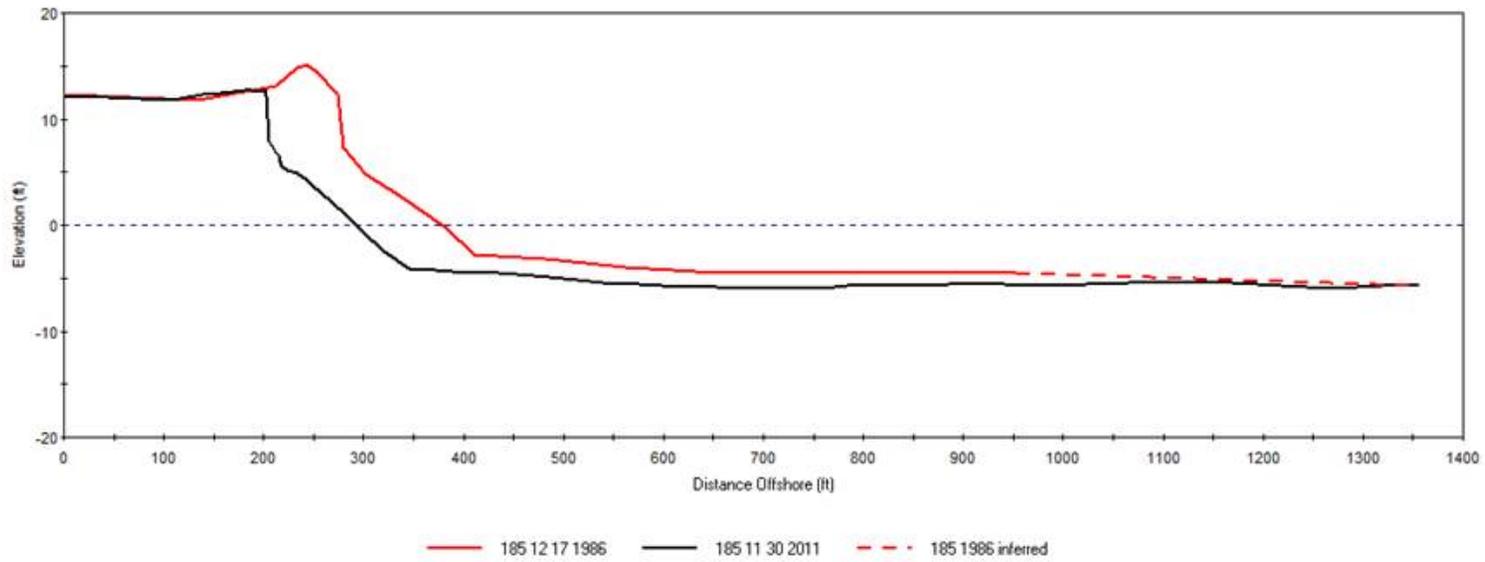


Figure 16. Though some recovery occurred in 1993, this site is in on a long-term erosional trend including the nearshore. (Left photo October 11, 1989 [view to the west]; right photo November 30, 2011 [view to the west]).



**25-Year Coastal Changes at Site 185, Spy House, Port Monmouth, Monmouth Co.**

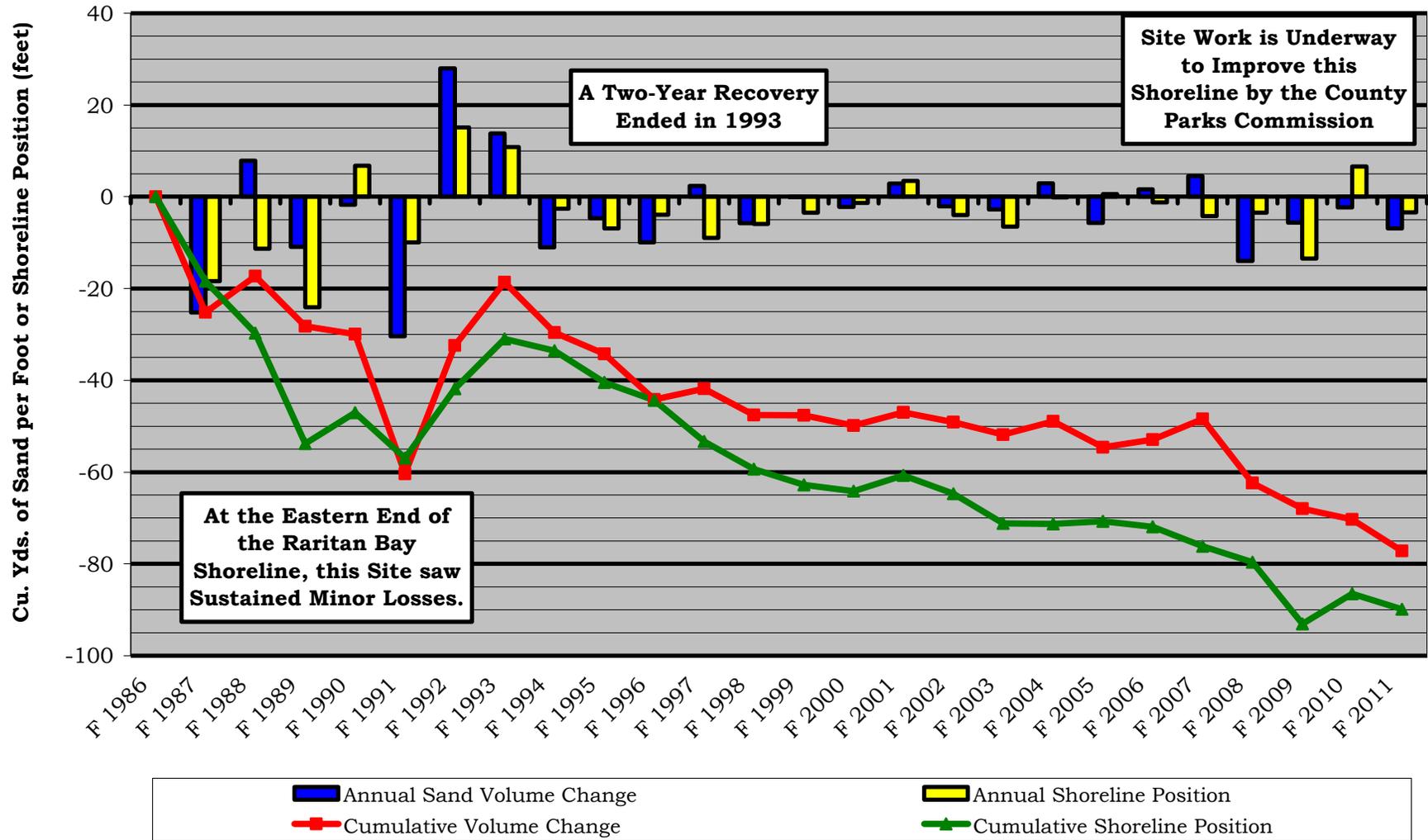


Figure 17. Large losses to the beach and dune occurred in 1989. A lack of adequate beach width inhibits dune and bluff stability here allowing this site to be susceptible to damages from northeast storm-generated waves.

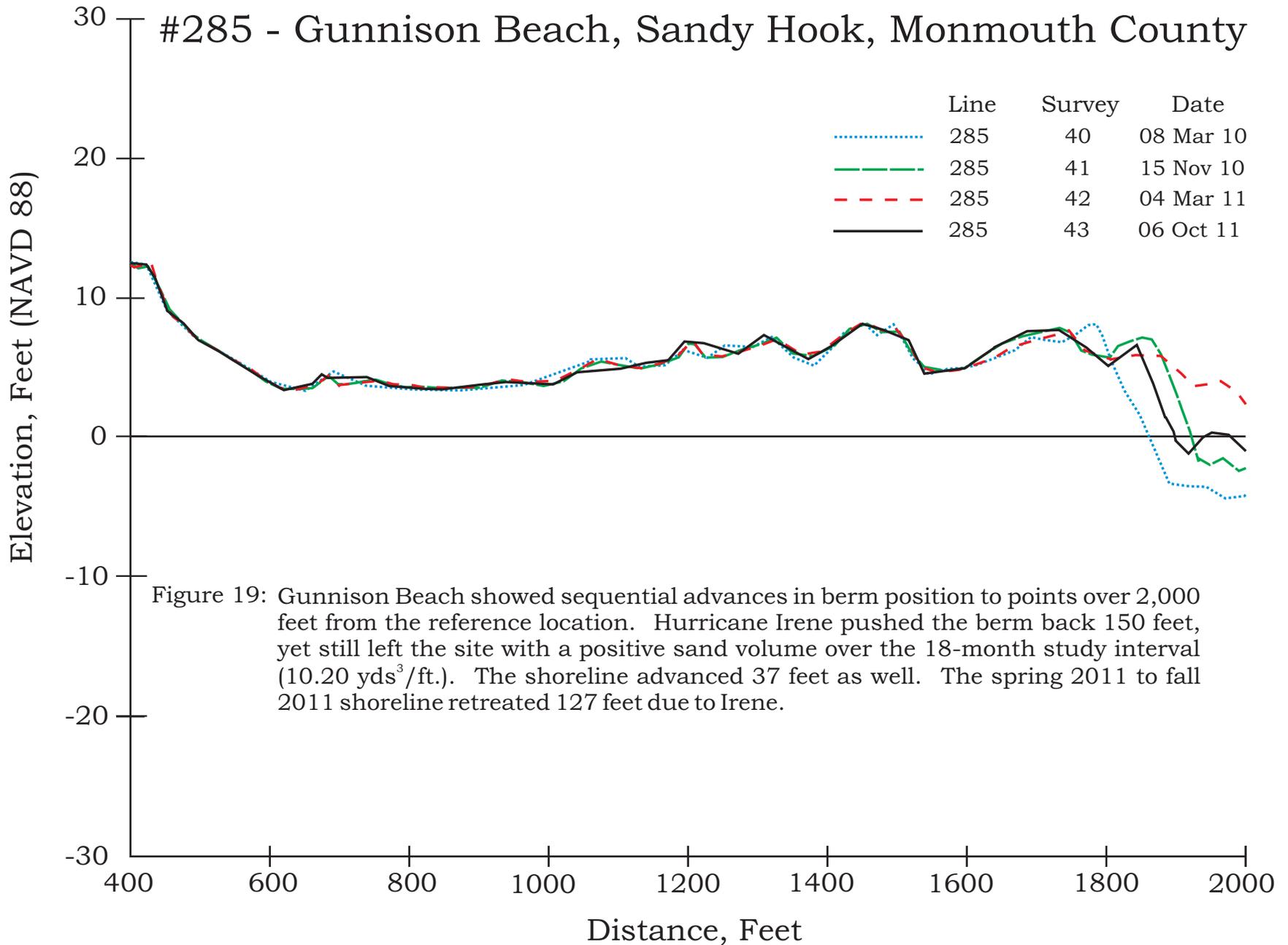
**Site 285, Sandy Hook National Seashore – October 6, 2011**



**Figure 18: Shown above is the view looking north from the wrack line at Gunnison Beach, in Sandy Hook National Seashore, NJ.**

# New Jersey Beach Profile Network

#285 - Gunnison Beach, Sandy Hook, Monmouth County



## SANDY HOOK NATIONAL SEASHORE – SITE 285

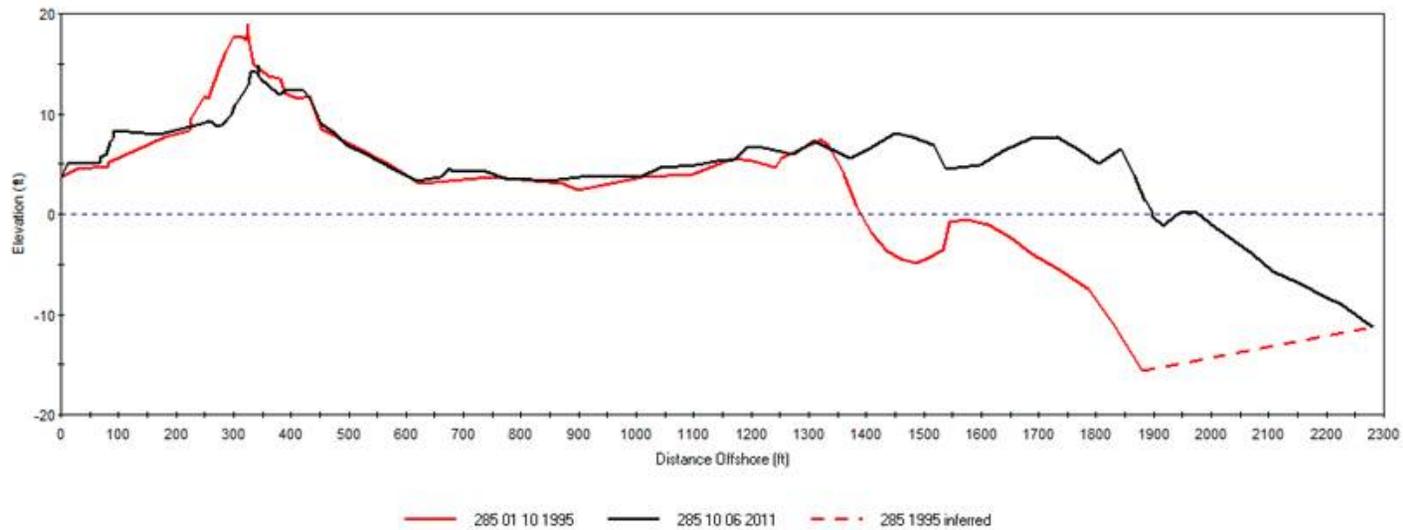


Figure 20. This site has continually gained sand with the exception of the time period from 1995 to 2001 where some of the dune material was redistributed onto the berm. (Left photo January 10, 1995 [view to the southeast]; right photo October 6, 2011 [view to the southeast]).



### 17-Year Coastal Changes at Site 285, Gunnison Beach, Sandy Hook, Monmouth Co.

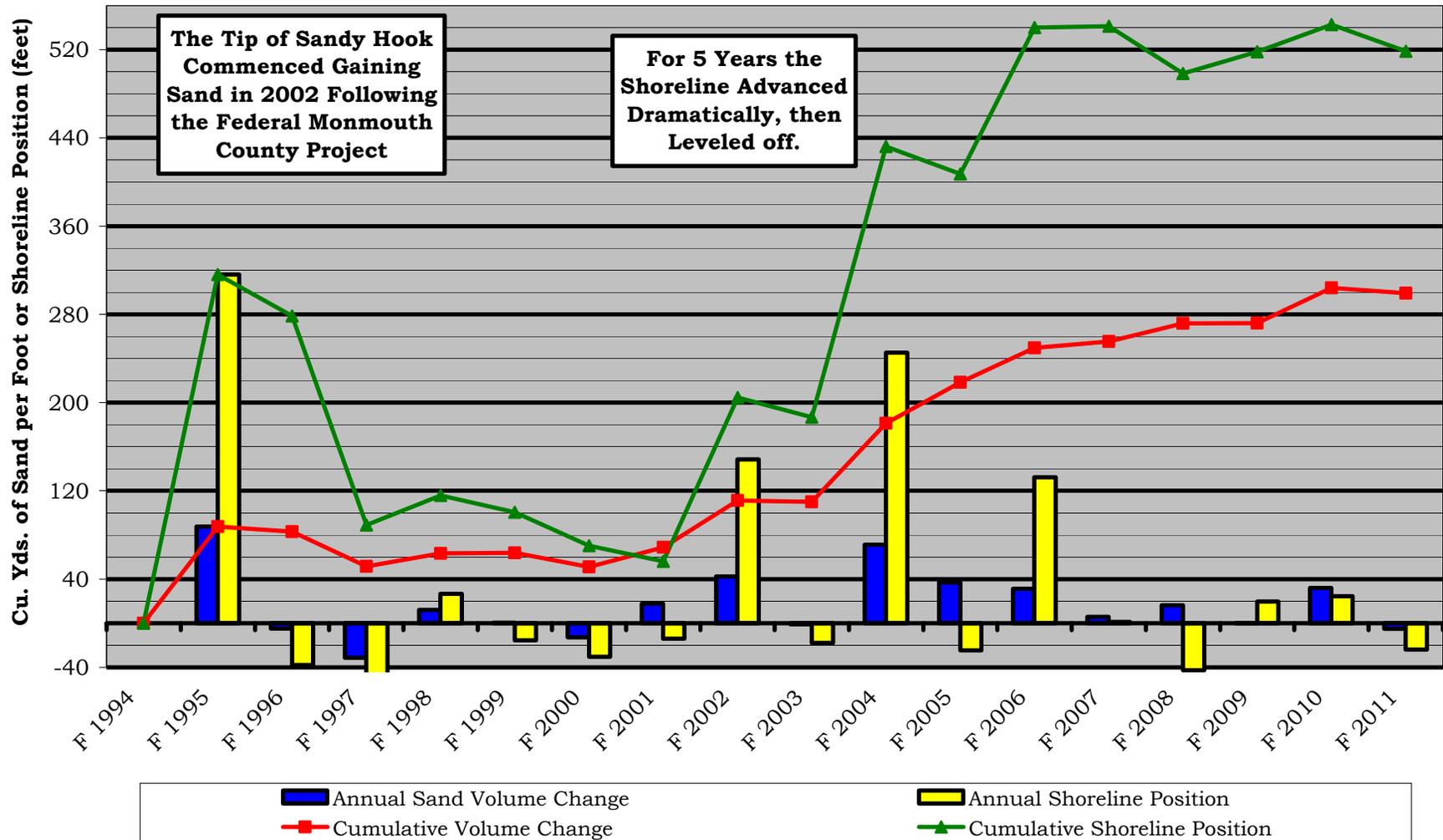


Figure 21. This shoreline has been accretional since the NY District Corps of Engineers completed its beach restoration in Monmouth County in 1999. Sand moves north along the Sandy Hook shoreline adding to the northern spit that curves into New York Harbor. The average sand volume increase between the two profile sites in the park (5.18 yds<sup>3</sup>/ft.) multiplied by the distance in feet between the two sites provides a total accretional volume of sand nearly equal to the loss volume experienced along the 21 miles of nourishment project shoreline (2,554,464 cubic yards).

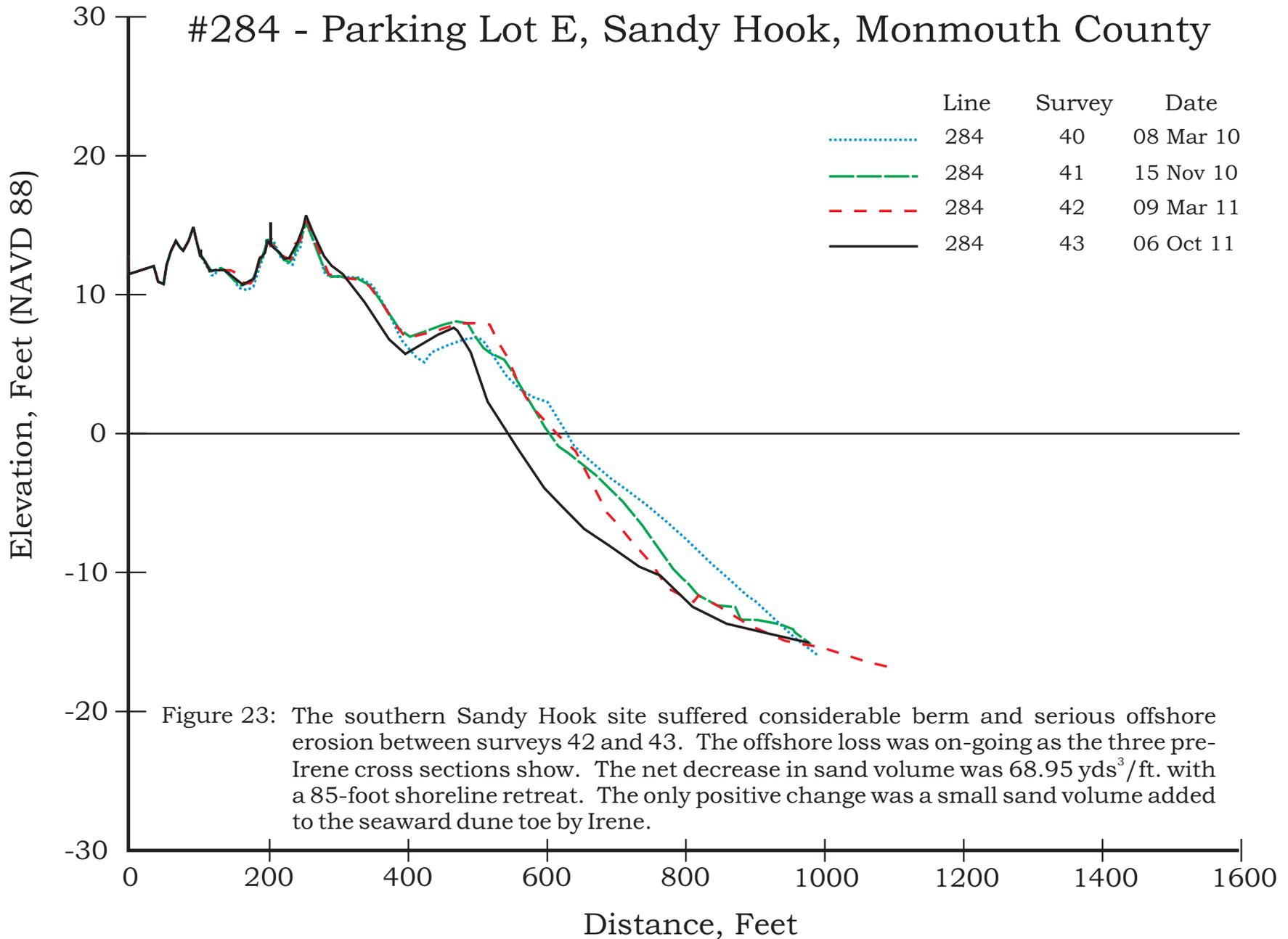
**Site 284, Sandy Hook National Seashore Parking Lot E – October 6, 2011**



**Figure 22. Shown above is the view looking south from the berm near parking lot E in Sandy Hook National Seashore, NJ.**

# New Jersey Beach Profile Network

#284 - Parking Lot E, Sandy Hook, Monmouth County



## SANDY HOOK NATIONAL SEASHORE, PARKING LOT E – SITE 284

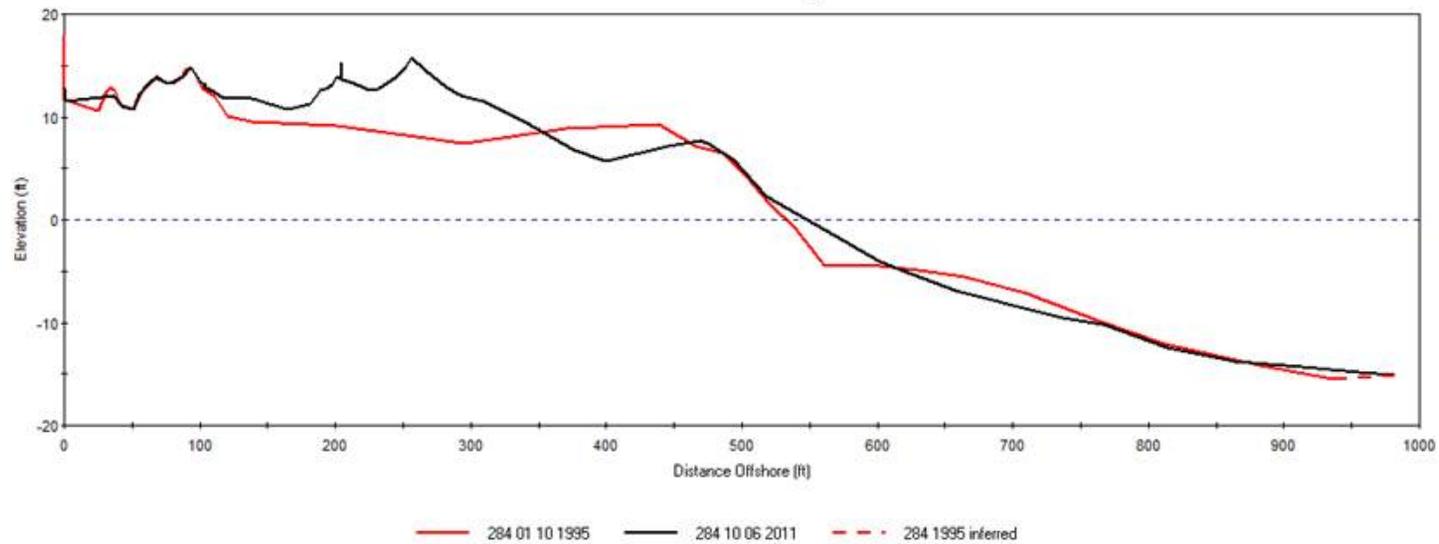


Figure 24. Sand dunes have developed on the former berm following the Monmouth County Federal beach nourishment project. Sand was placed at this location through a cooperative effort between the USACE and US Park Service in 2002. (Left photo January 10, 1995 [view to the southeast]; right photo October 6, 2011 [view to the south]).



### 17-Year Coastal Changes at Site 284, Parking Lot E, Sandy Hook, Monmouth Co.

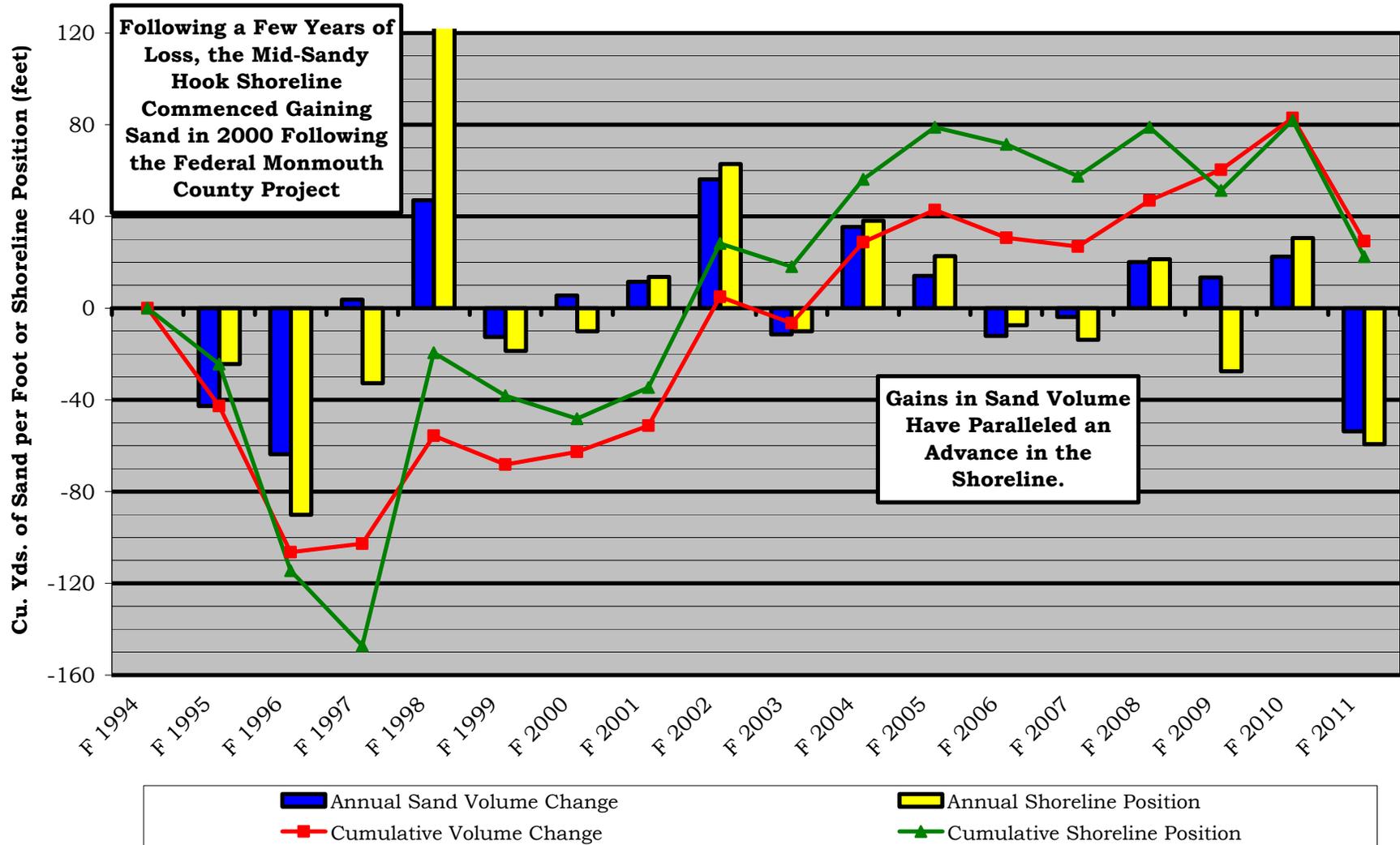


Figure 25. This profile is positioned nearly half way between the park entrance site (#184) and Gunnison Beach (#285). Shoreline retreat was recorded between 1994 and 1997 and indicates that the Federal beach nourishment project sand did not immediately appear along this portion of the Atlantic shoreline. By 1998, an advance of over 100 feet was attributed to sand that had moved northward from the Sea Bright section of the Federal project.

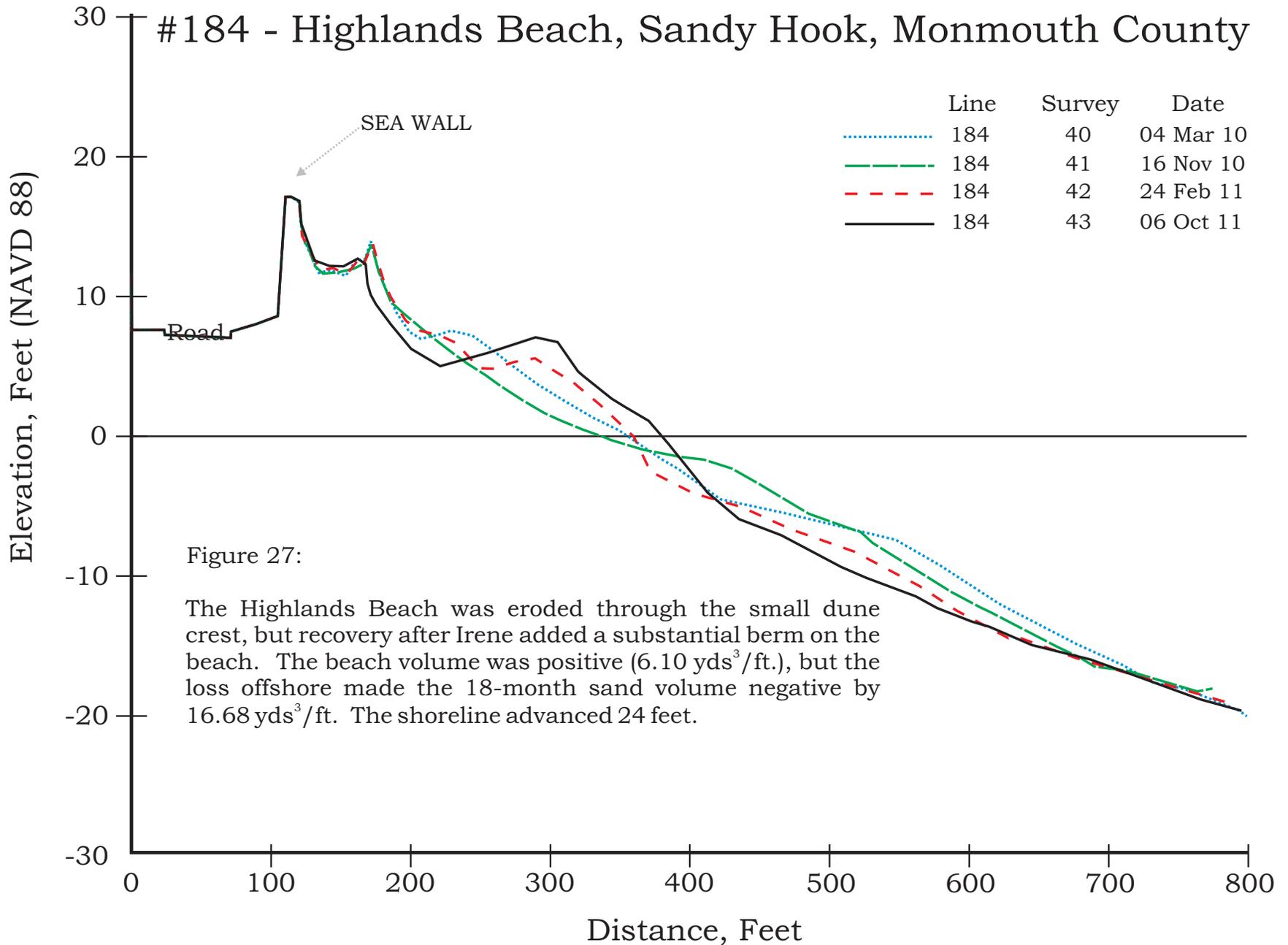
**Site 184, Sandy Hook National Seashore Highlands Beach – October 6, 2011**



**Figure 26. Shown above is the view looking south from the berm at Highlands Beach in Sandy Hook National Seashore, NJ.**

# New Jersey Beach Profile Network

#184 - Highlands Beach, Sandy Hook, Monmouth County



## SANDY HOOK, HIGHLANDS BEACH – SITE 184

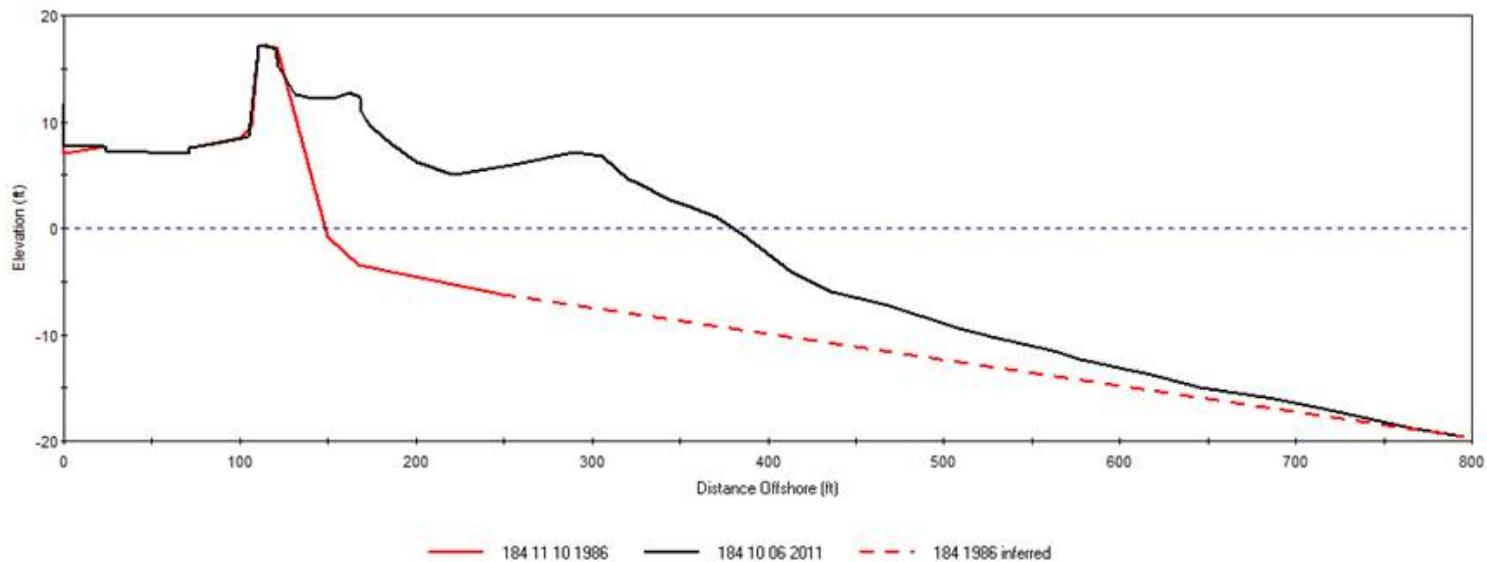


Figure 28. This site has gained in volume and the shoreline has significantly advanced seaward since the Monmouth County 1996 Federal beach nourishment project was constructed and follow-up 2002 maintenance fill. (Left photo October 5, 1987 [view to the north]; right photo October 6, 2011 [view to the north]).



## 25-Year Coastal Changes at Site 184, Highlands Beach, Sandy Hook, Monmouth Co.

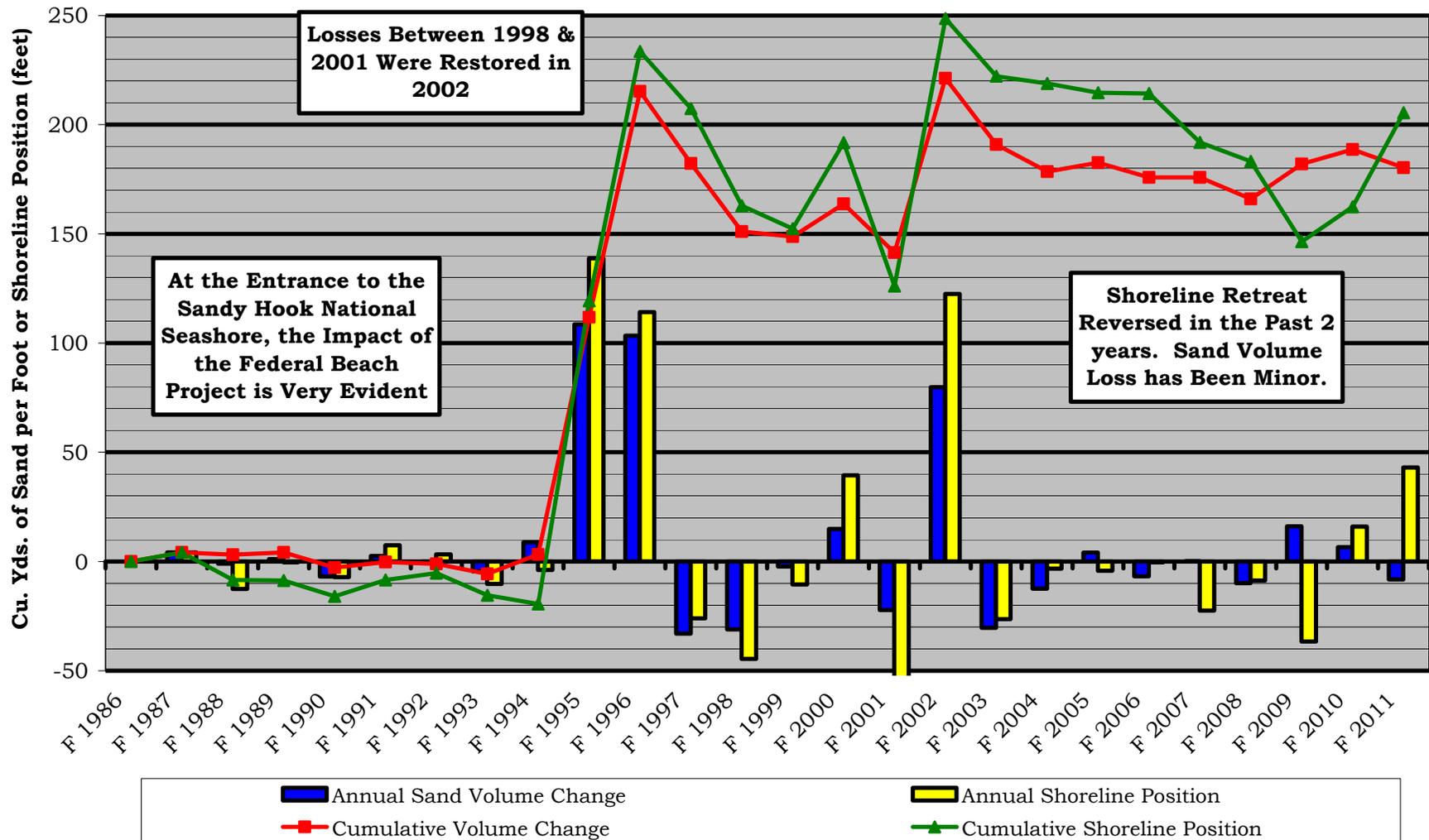


Figure 29. During the early surveys, there was no dry beach at this location. Dramatic changes began in 1995 when sand began to accumulate along the rocks and by 1996, the shoreline advanced seaward by 253 feet with the help of sand placement from an offshore source. Losses following the beach fills are attributed to sand moving northward and depositing in other sections of the Sandy Hook shoreline.

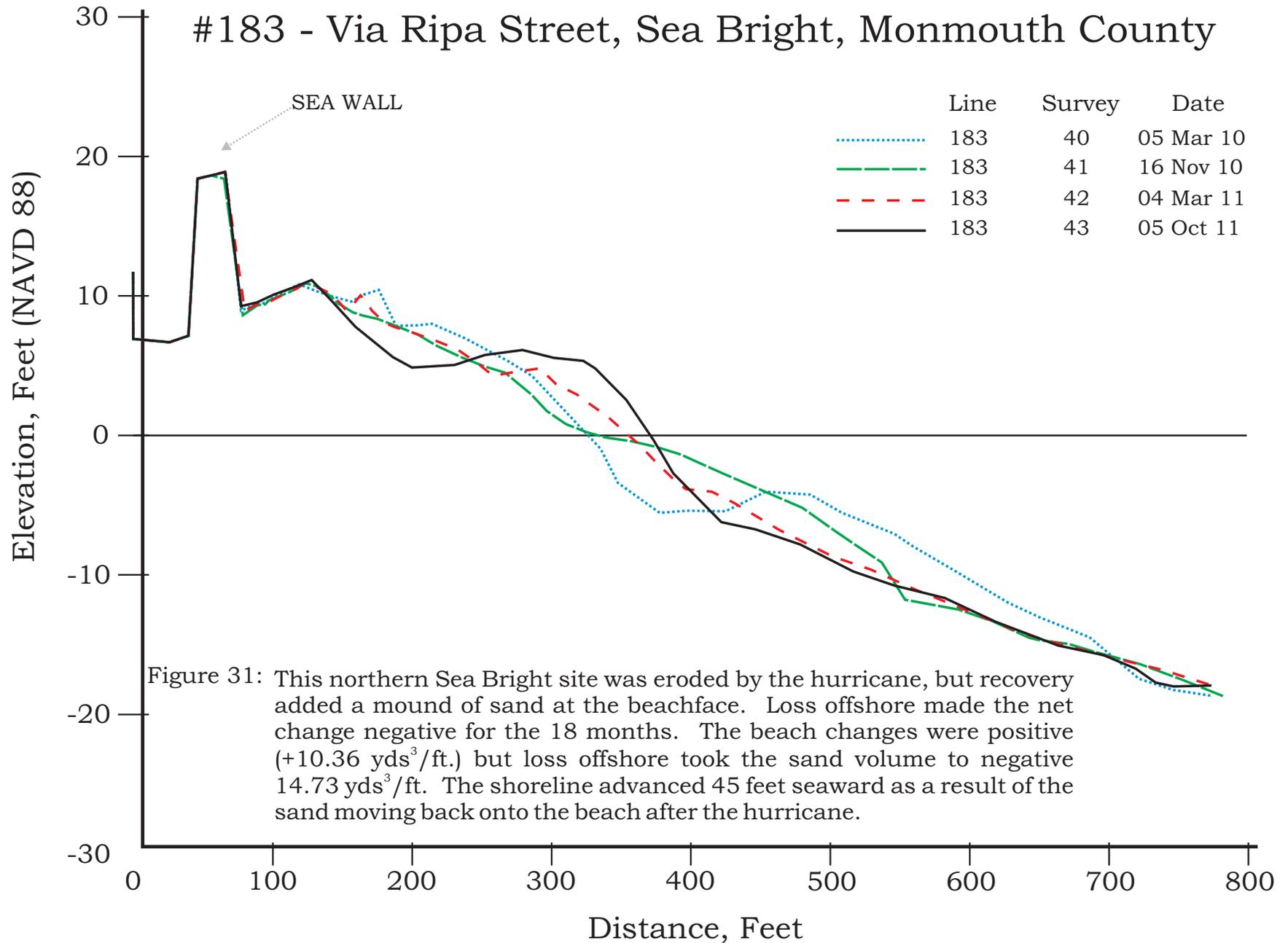
Site 183, Via Ripa Street, Sea Bright – October 6, 2011



Figure 30. Shown above is the view looking northeast from the dune at Via Ripa Street in Sea Bright, NJ.

# New Jersey Beach Profile Network

#183 - Via Ripa Street, Sea Bright, Monmouth County



### VIA RIPA STREET, SEA BRIGHT- SITE 183

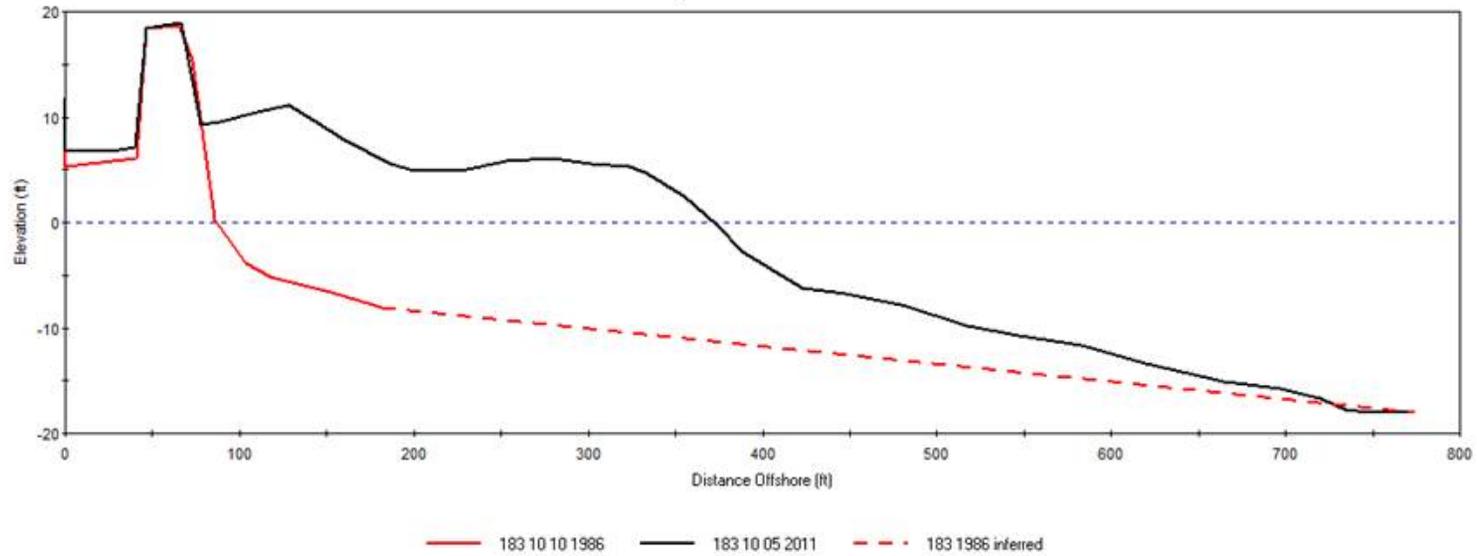


Figure 32. This site is located within the Monmouth County Federal beach nourishment project and has experienced only moderate sand losses since the 2002 maintenance fill. (Left photo October 10, 1986 [view to the north]; right photo October 3, 2011 [view to the north]).



**25-Year Coastal Changes at Site 183, Via Ripa, Sea Bright, Monmouth Co.**

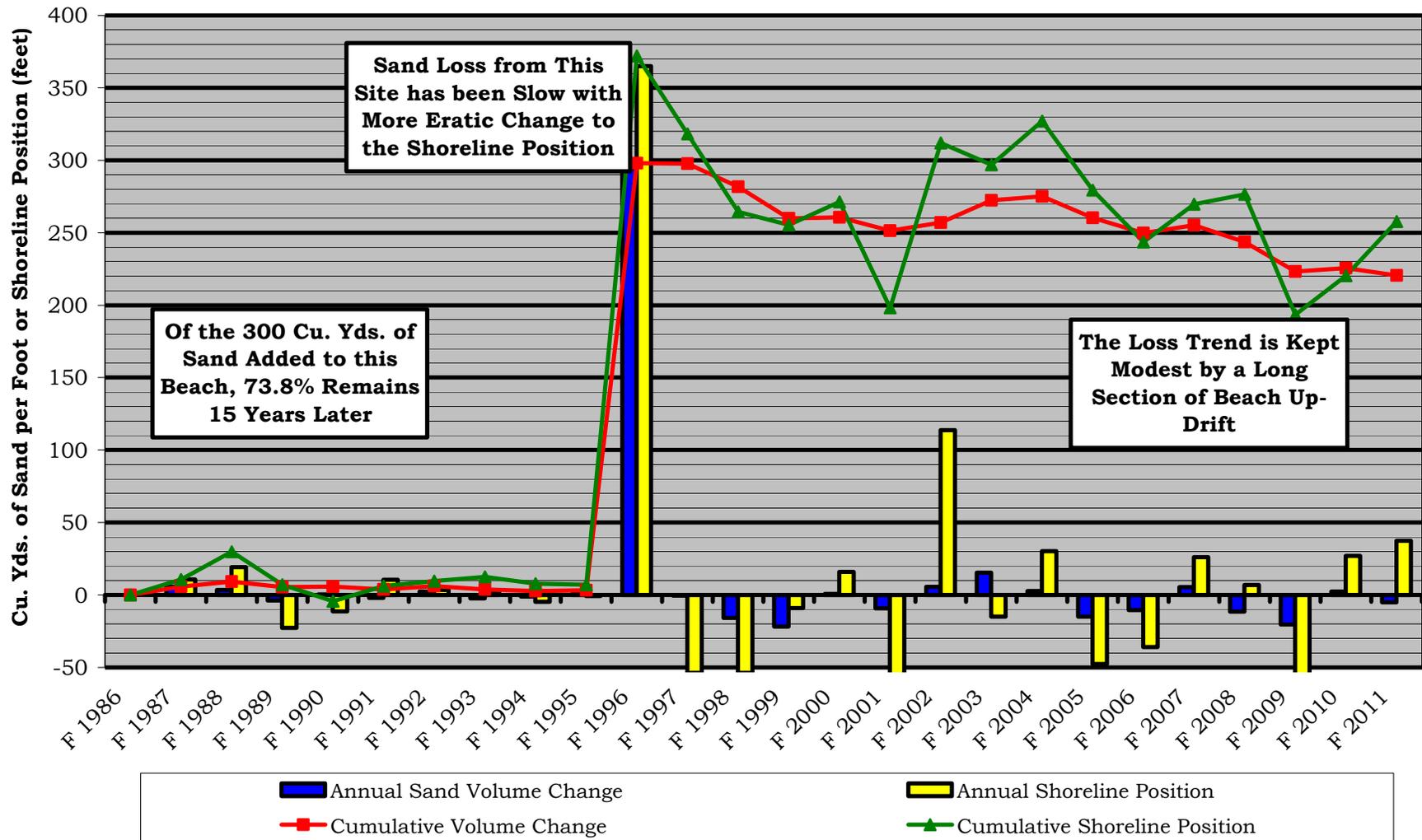


Figure 33. The first surveys recorded a dry beach only during the lowest of tides at this site, with little variation in shoreline movement followed until the Federal beach nourishment project commenced in 1995.

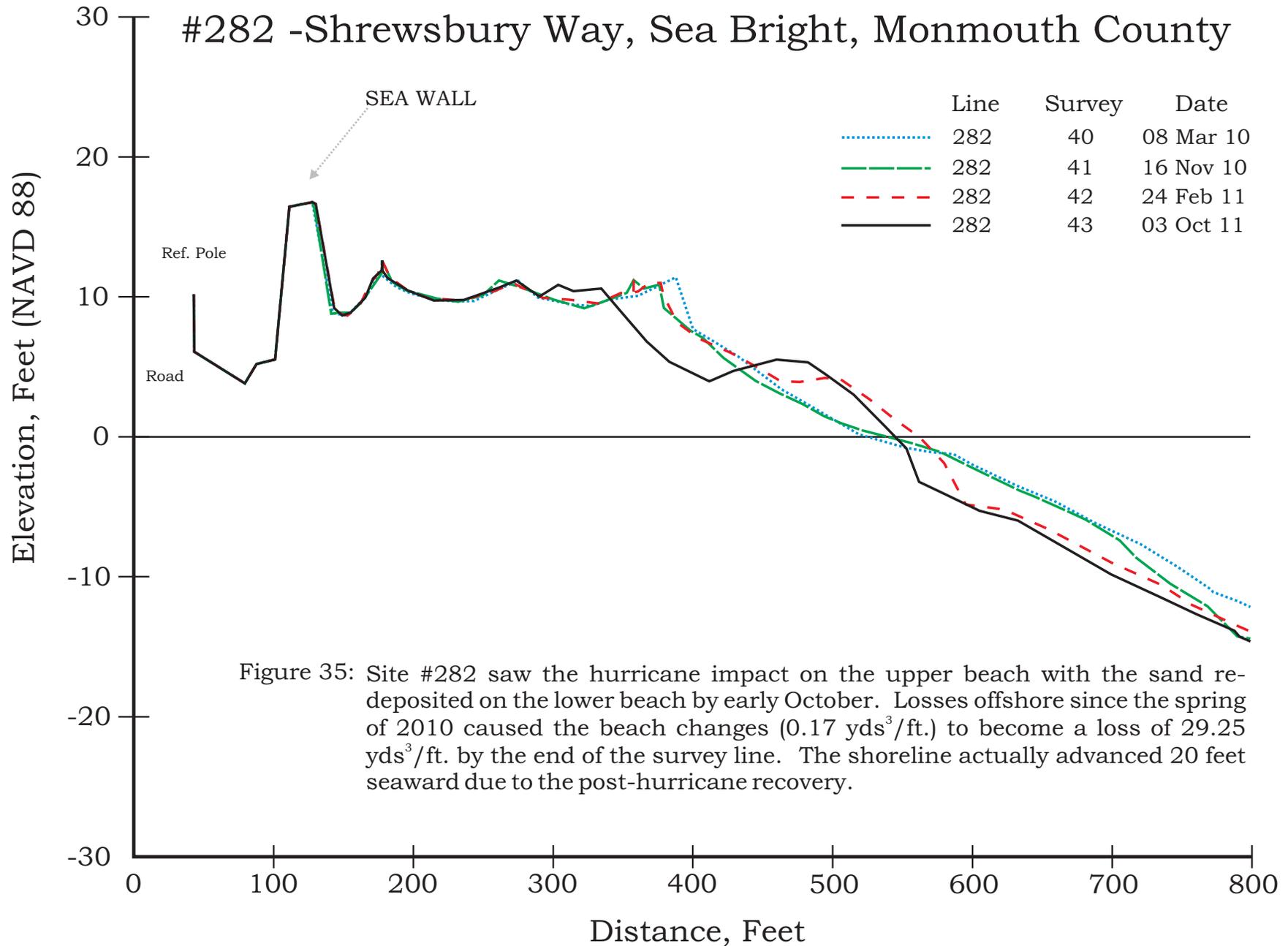
**Site 282, Shrewsbury Way, Sea Bright – October 3, 2011**



**Figure 34. Shown above is the view looking south from the dune toe at Shrewsbury Way in Sea Bright, NJ.**

# New Jersey Beach Profile Network

## #282 - Shrewsbury Way, Sea Bright, Monmouth County



## SHREWSBURY WAY, SEA BRIGHT- SITE 282

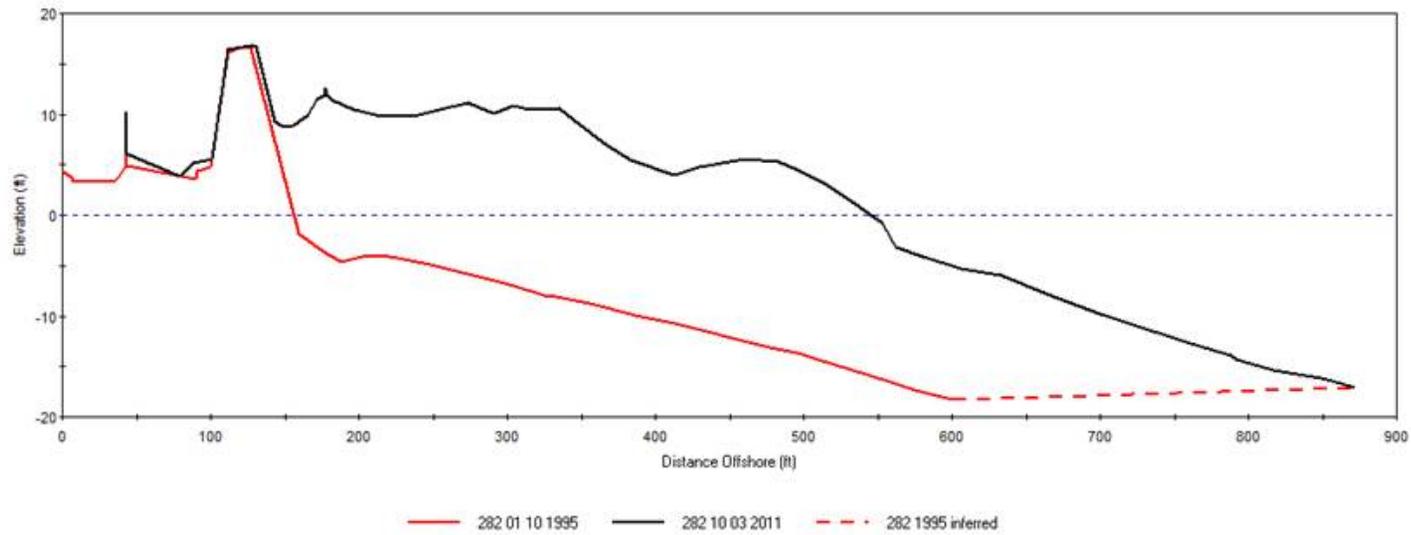


Figure 36. There was no beach during the initial survey at this location. The 1996 Monmouth County Federal beach nourishment project added over 273 cy/ft and advanced the shoreline 471 feet. Since then, this site has remained relatively stable. (Left photo November 2, 1995 [view to the north]; right photo October 3, 2011 [view to the north]).



**17-Year Coastal Changes at Site 282, Shrewsbury Way, Sea Bright, Monmouth Co.**

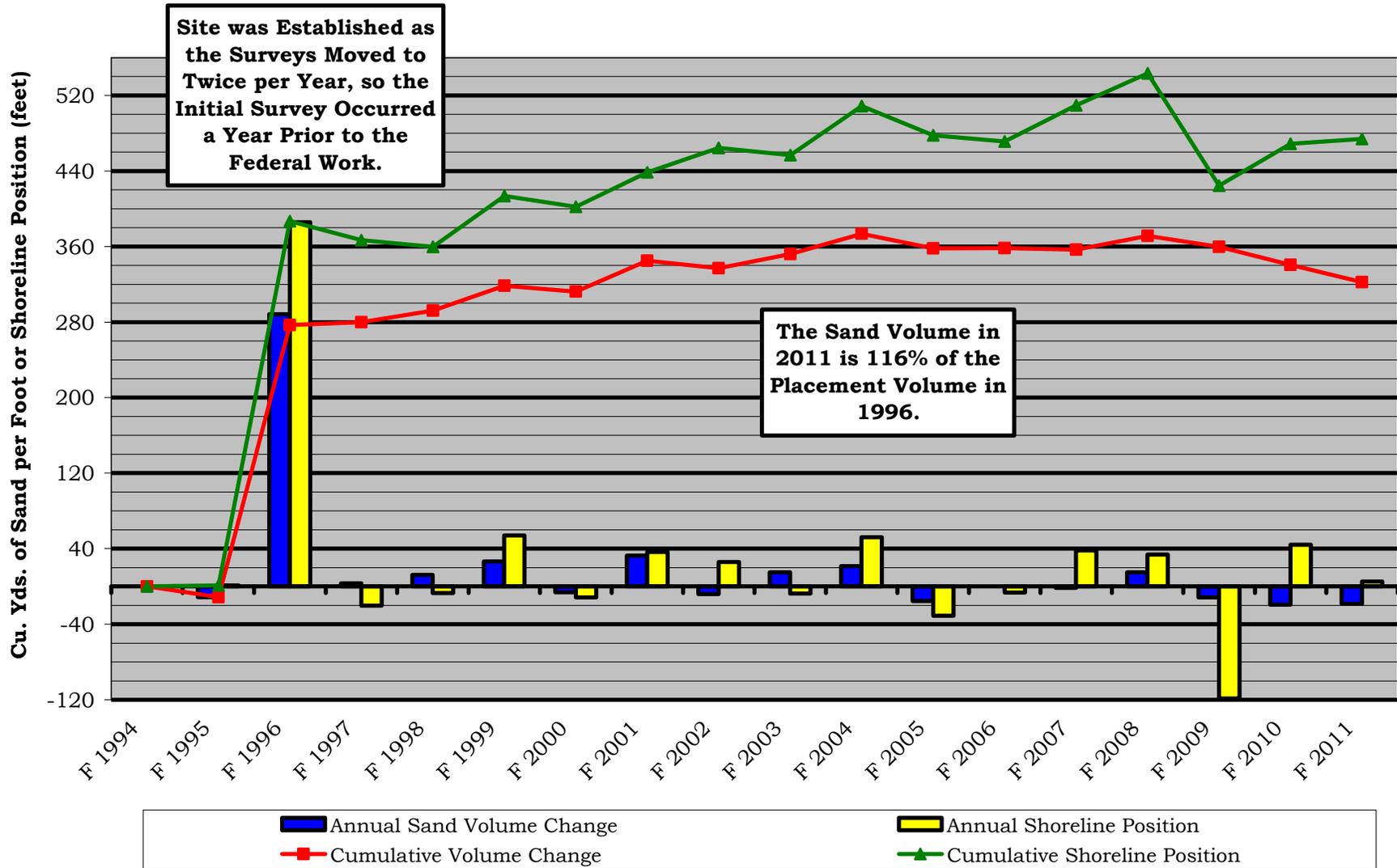


Figure 37. This site was added in 1994 as a result of the State’s purchase of this segment of the Sea Bright shoreline for public use. Prior to the Federal project, there was no beach at the seawall. Sand also has moved north to this site as the Federal project adjusted through time.

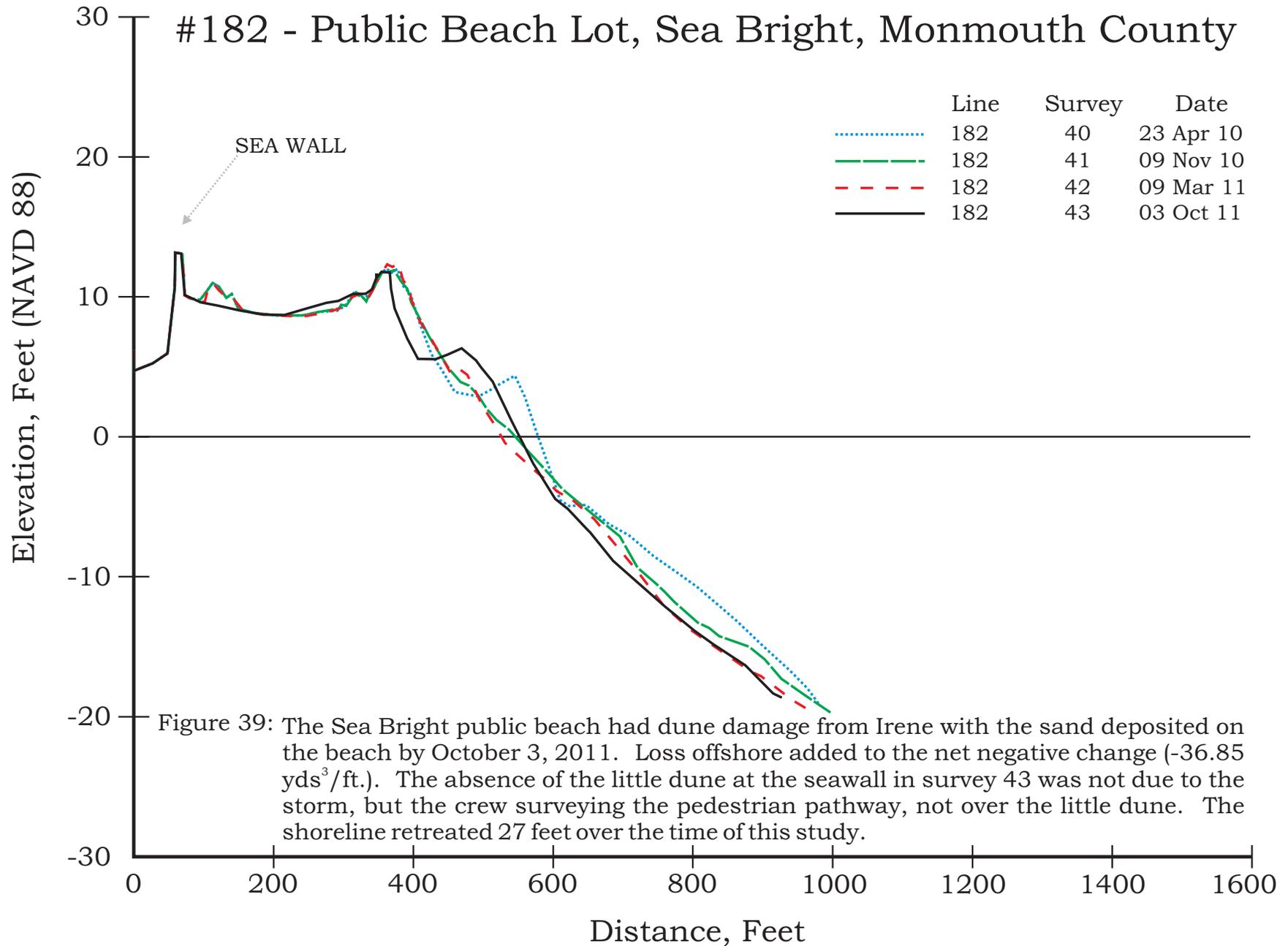
**Site 182, Public Beach, Sea Bright – October 3, 2011**



**Figure 38.** Shown above is the view looking north from the berm at the public beach in Sea Bright, NJ.

# New Jersey Beach Profile Network

#182 - Public Beach Lot, Sea Bright, Monmouth County



## PUBLIC BEACH, SEA BRIGHT- SITE 182

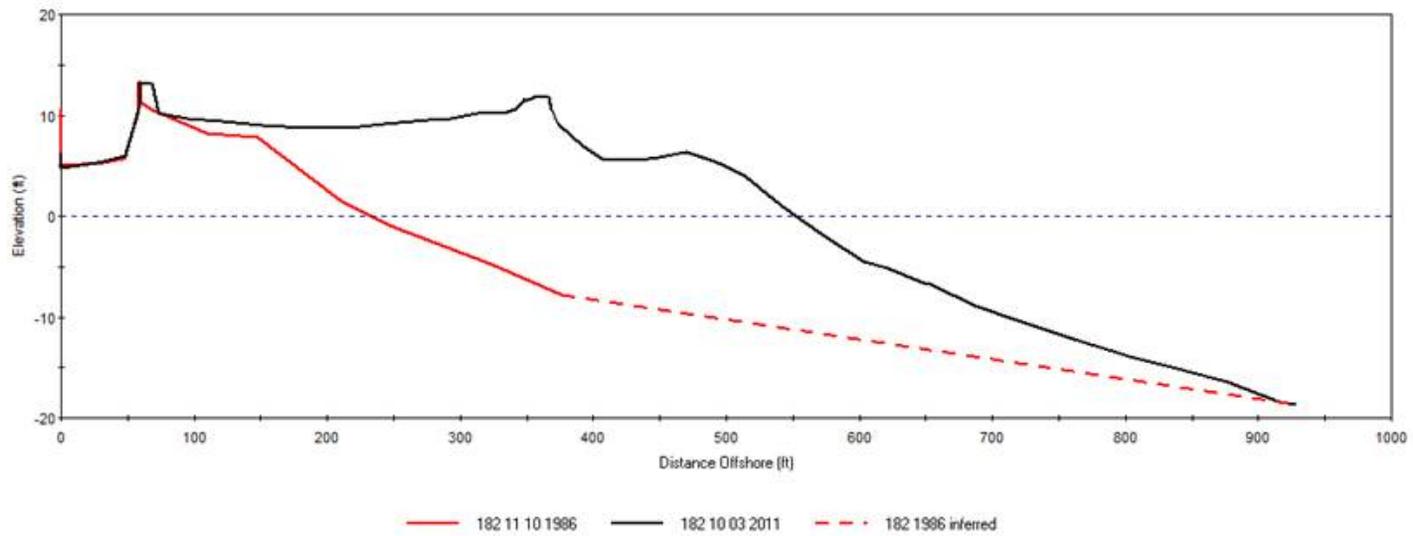
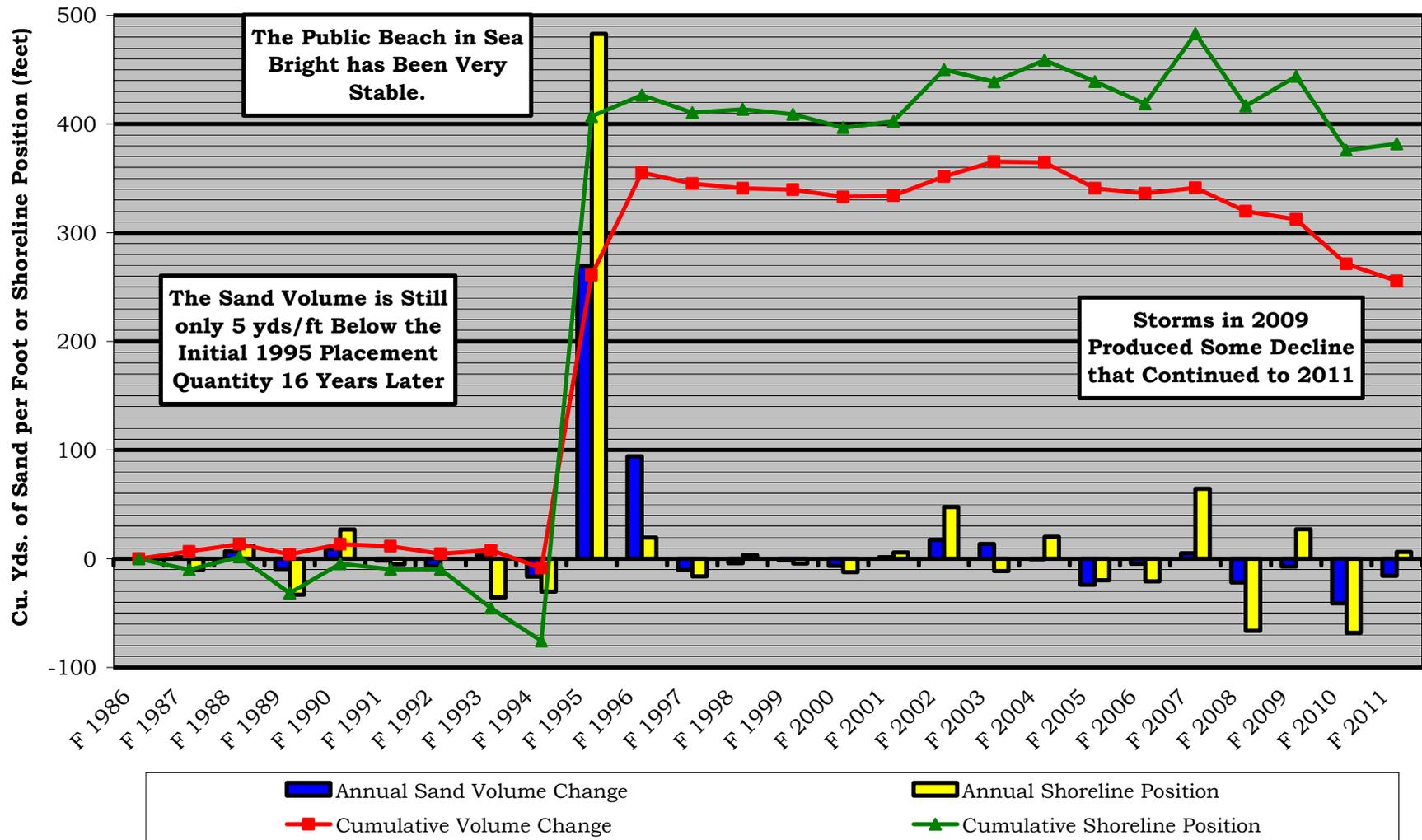


Figure 40. This site is located between two groins and had a dry beach when it was established in 1986. The 1996 Federal beach nourishment project added over 305 cy/ft to this site. Since that time, the beach and nearshore have had minimal sand losses. (Left photo October 11, 1988 [view to the north]; right photo October 3, 2011 [view to the north]).



**25-Year Coastal Changes at Site 182, Public Beach Lot, Sea Bright, Monmouth Co.**



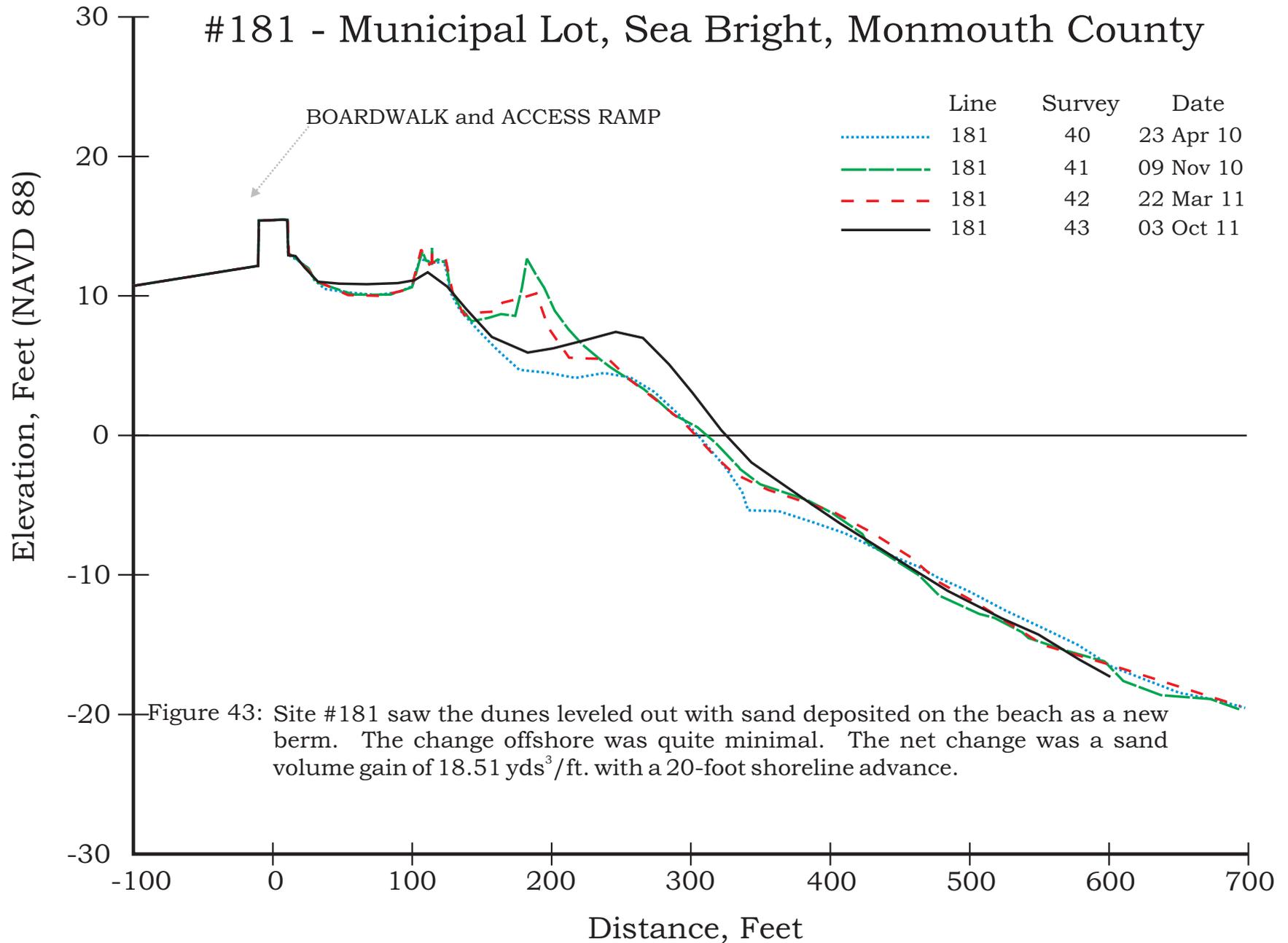
**Figure 41. Due to the Federal beach nourishment project, dunes have thrived where none existed prior to the project. Sand was added to this site in the 2002 maintenance fill. Losses have been minor since the project was completed.**



Figure 42. Shown above is the view looking south from the dune at the municipal beach in Sea Bright, NJ.

# New Jersey Beach Profile Network

#181 - Municipal Lot, Sea Bright, Monmouth County



## MUNICIPAL BEACH, SEA BRIGHT- SITE 181

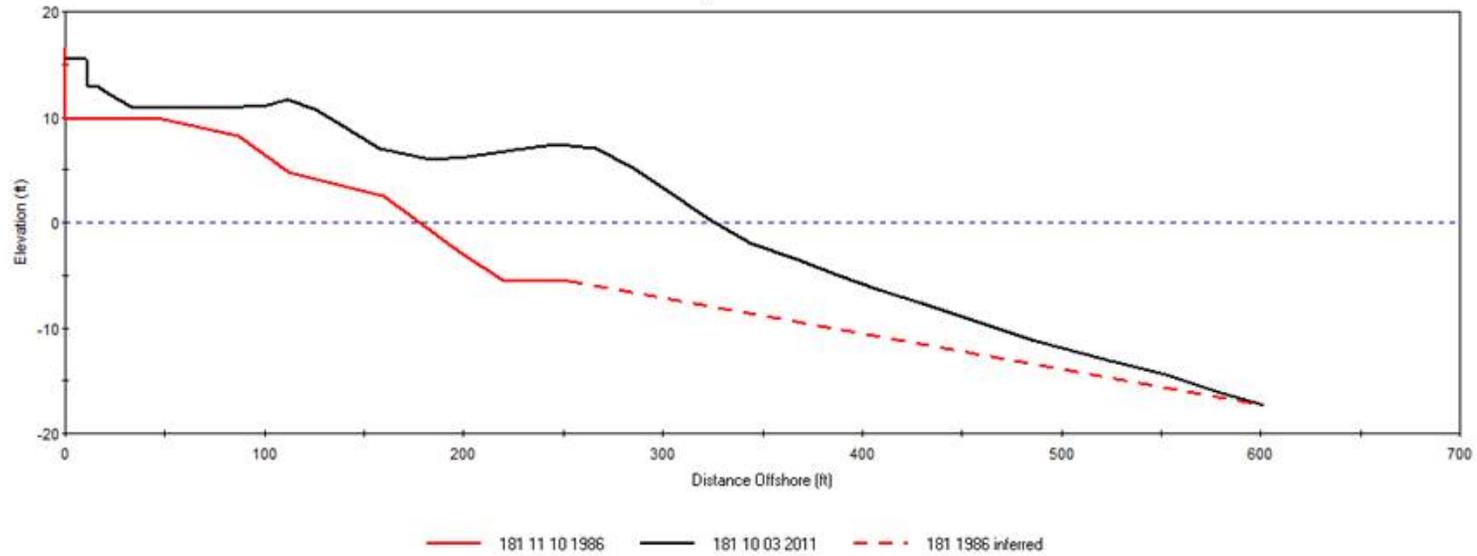


Figure 44. The present dune crest is in the same location as the 1986 berm crest. This site received sand during the Monmouth County Federal beach nourishment project and 2002 maintenance fill. (Left photo October 12, 1988 [view to the east]; right photo October 3, 2011 [view to the north]).



### 25-Year Coastal Changes at Site 181, Municipal Beach, Sea Bright, Monmouth Co.

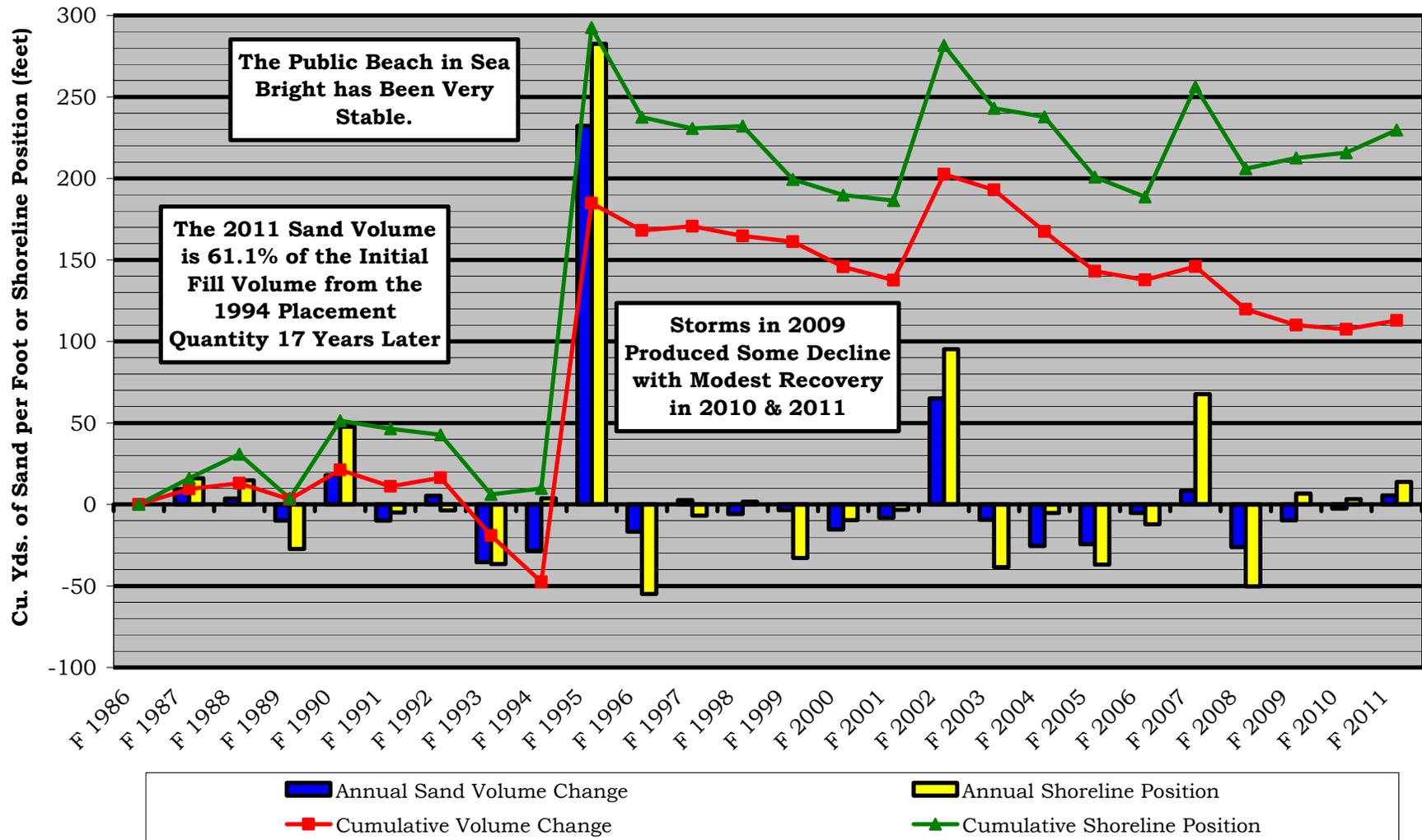


Figure 45. This site was added in order to show the retention rates of the northern Sea Bright beaches for the Federal project sand deposits. Placed in 1995, the shoreline lost material, but was restored in 2002 to levels exceeding the initial deposit. Seven of the past eight years saw loss rates that have nearly reduced the 200 yds<sup>3</sup>/ft. to half that amount. Sand lost from Sea Bright ends up in Sandy Hook adding to the National Seashore beach.

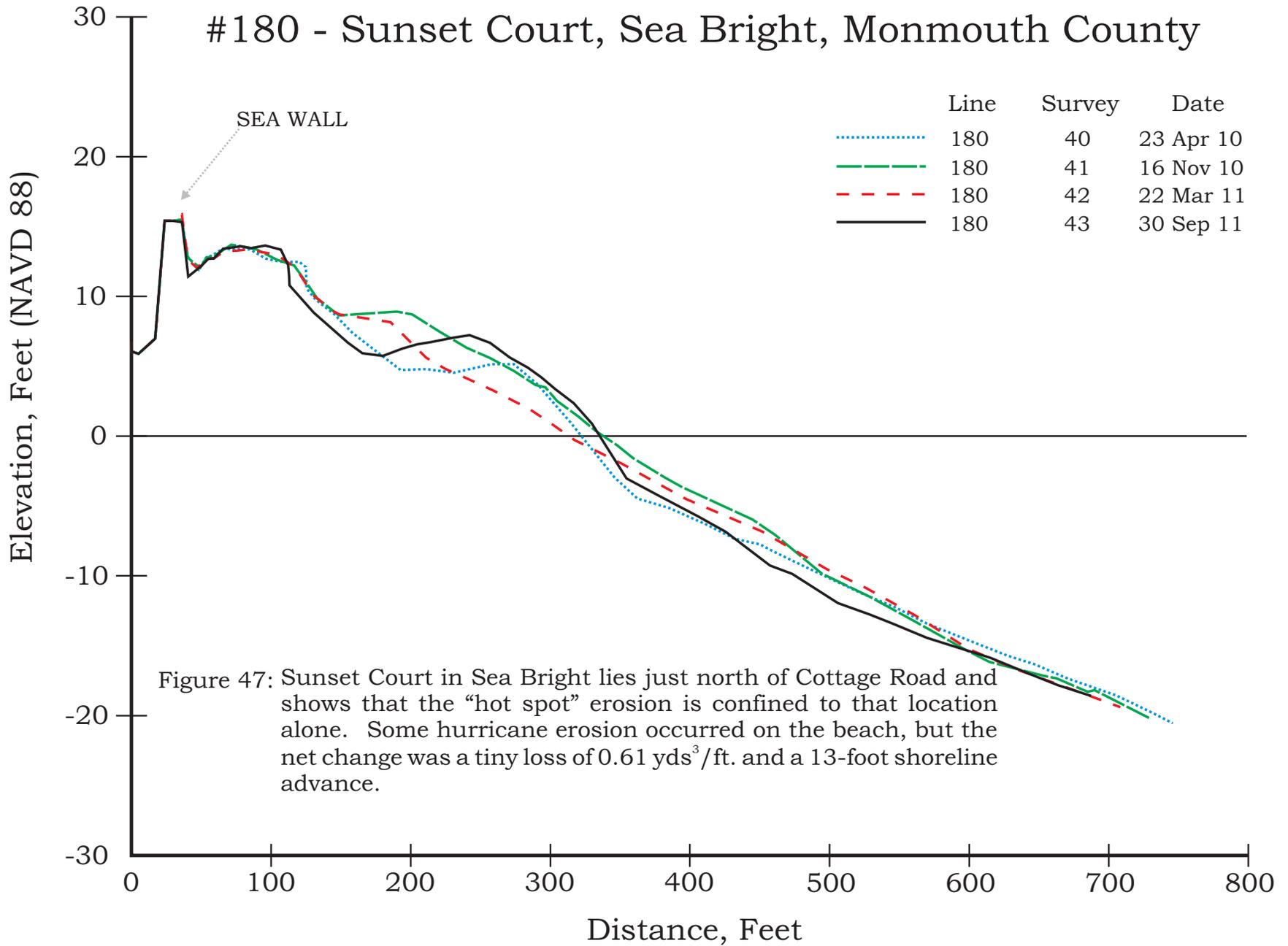
Site 180, Sunset Court, Sea Bright – October 3, 2011



Figure 46. Shown above is the view looking north from the berm at Sunset Court in Sea Bright, NJ.

# New Jersey Beach Profile Network

#180 - Sunset Court, Sea Bright, Monmouth County



## SUNSET COURT, SEA BRIGHT- SITE 180

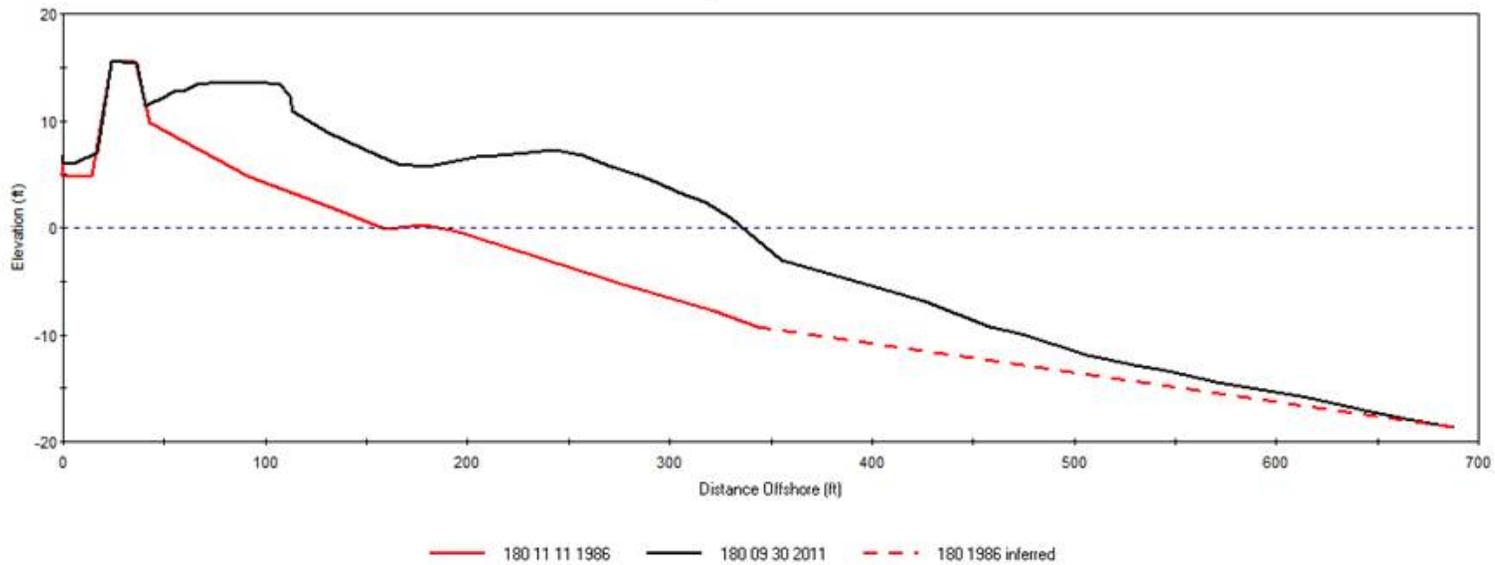
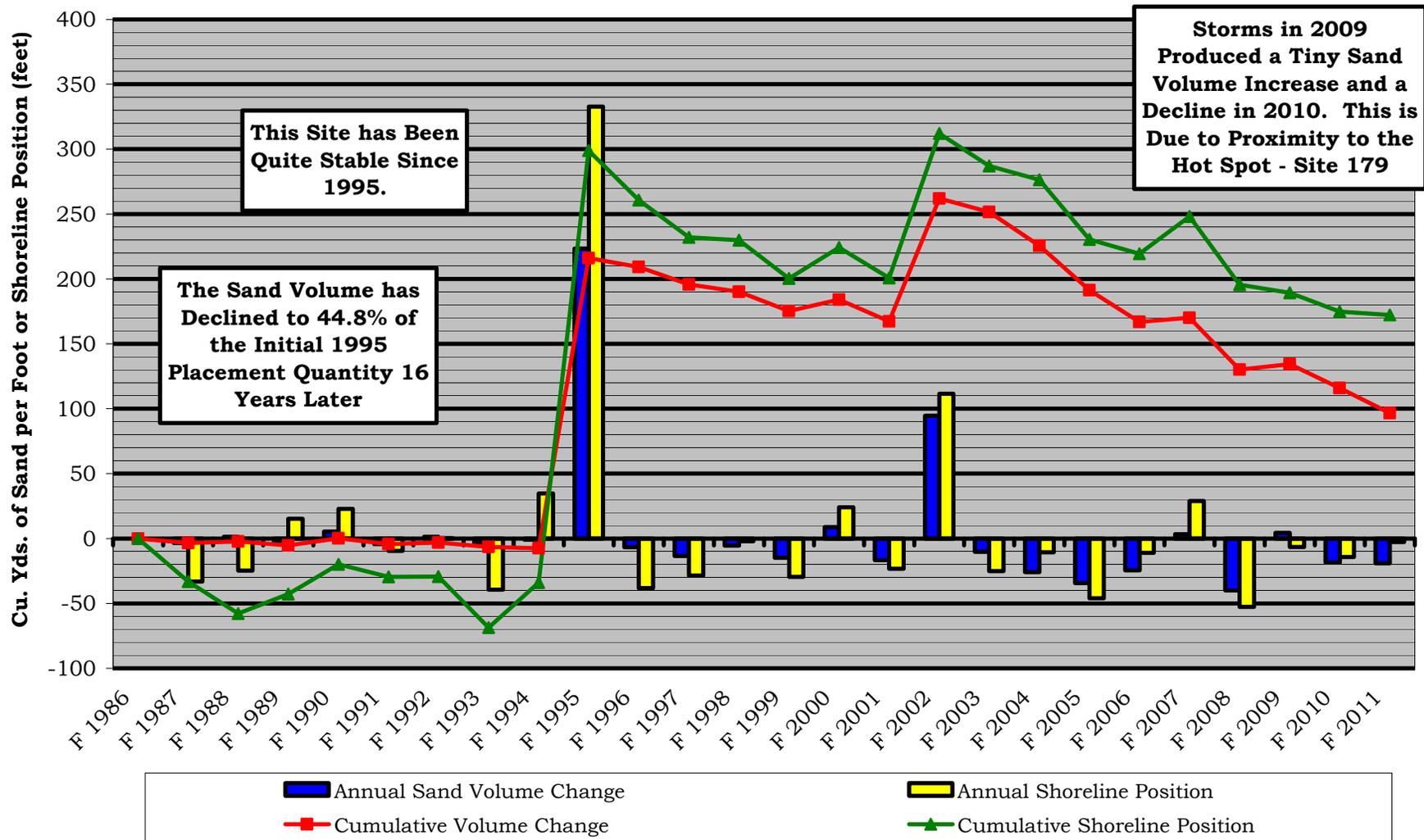


Figure 48. A wide dune field established at this site following the 1995 Monmouth County Federal beach nourishment project. Maintenance sand was added in 2002. Since that time, there has been a gradual loss of sand and shoreline retreat. (Left photo October 7, 1987 [view to the north]; right photo September 30, 2011 [view to the north]).

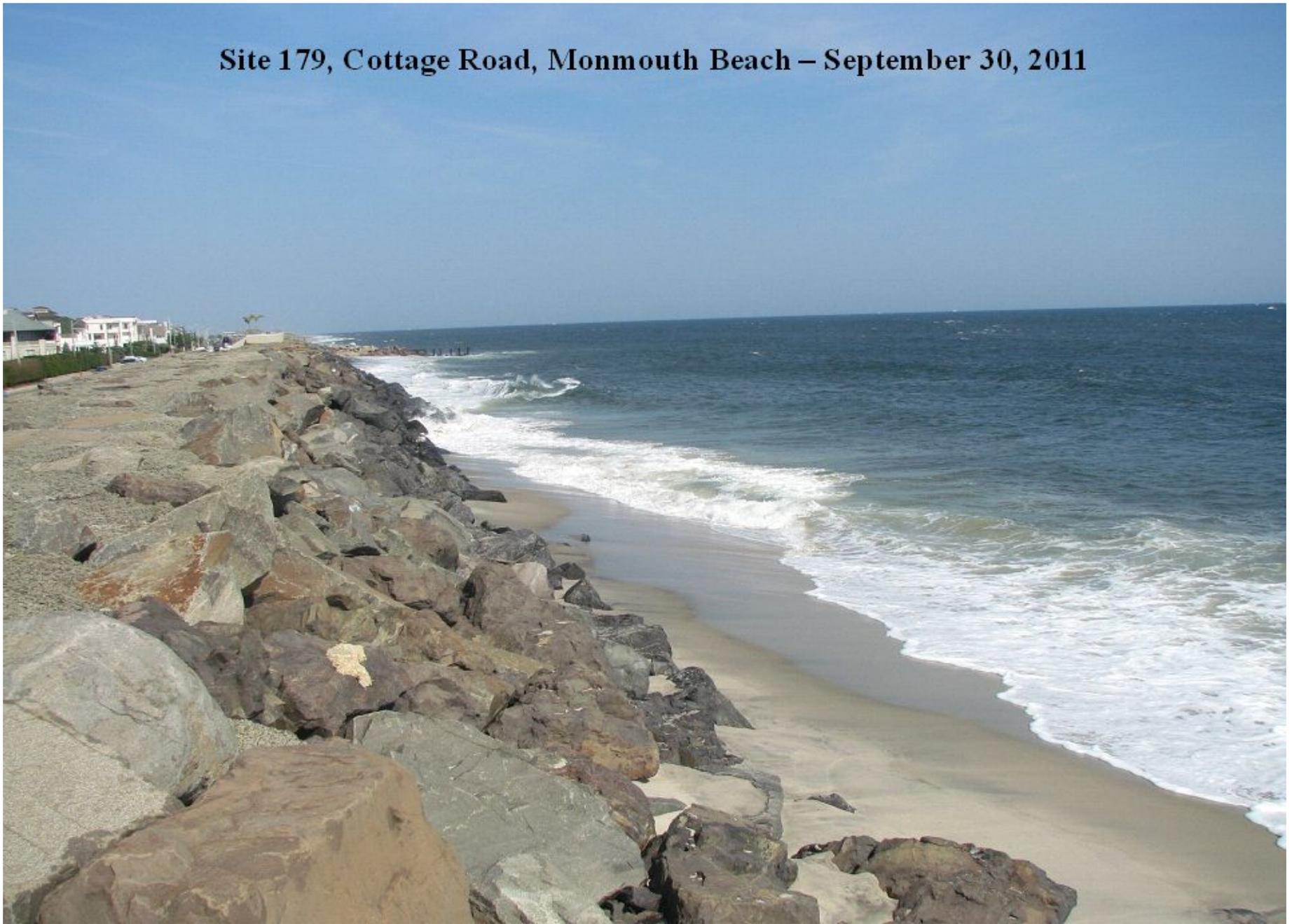


**25-Year Coastal Changes at Site 180, Sunset Court, Sea Bright, Monmouth Co.**



**Figure 49. Prior to the Federal beach nourishment project and maintenance fill, this beach at this site was very narrow and susceptible to storm damages. The site has lost volume since the Federal projects as sand moves northward during project adjustment.**

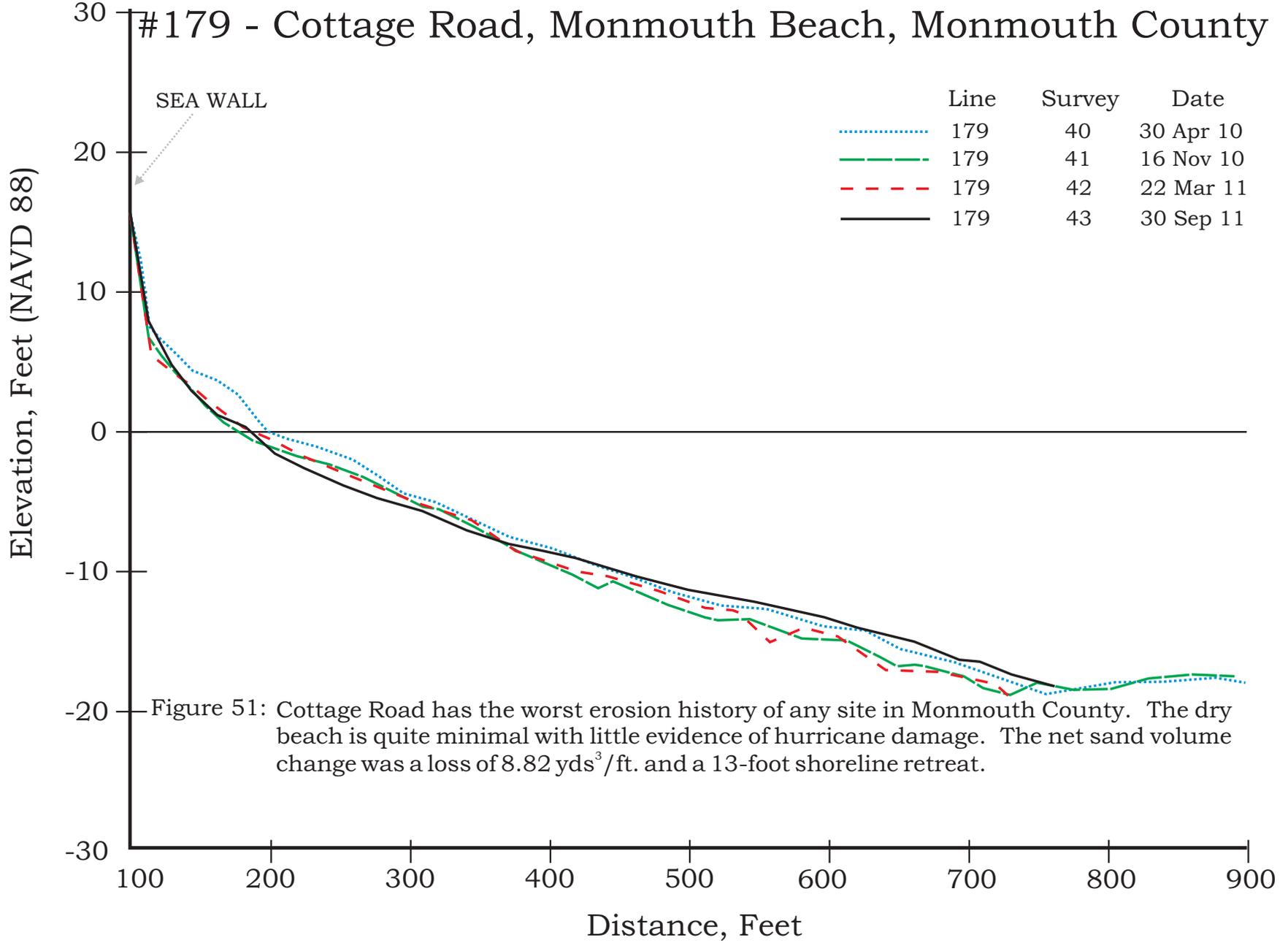
**Site 179, Cottage Road, Monmouth Beach – September 30, 2011**



**Figure 50: Shown above is the view looking north from the seaward top of the seawall at Cottage Road in Monmouth Beach, NJ.**

# New Jersey Beach Profile Network

#179 - Cottage Road, Monmouth Beach, Monmouth County



## COTTAGE ROAD, MONMOUTH BEACH- SITE 179

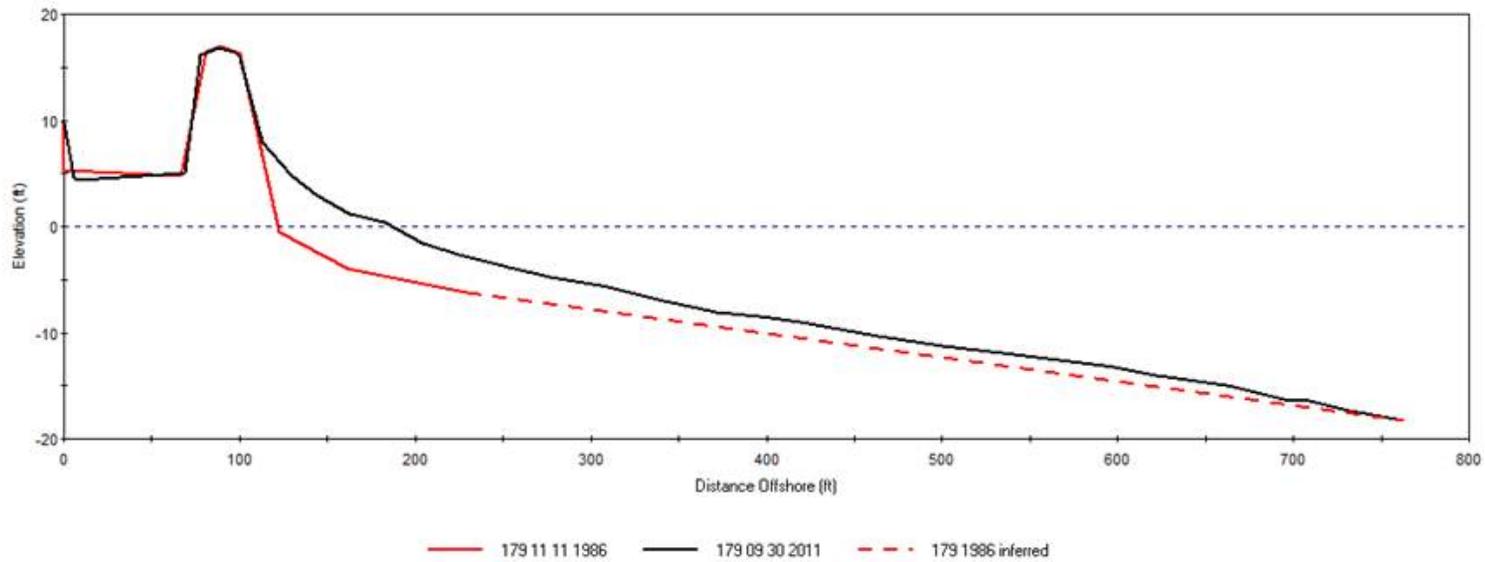


Figure 52. This profile lies north of a rock revetment that juts seaward of the natural shoreline position and blocks the northward transport of sand. The Monmouth County Federal beach nourishment and subsequent maintenance fill added sand but the site remains in an erosional state. (Left photo October 11, 1989 [view to the southeast]; right photo September 30, 2011 [view to the south]).



## 25-Year Coastal Changes at Site 179, Cottage Road, Monmouth Beach, Monmouth Co.

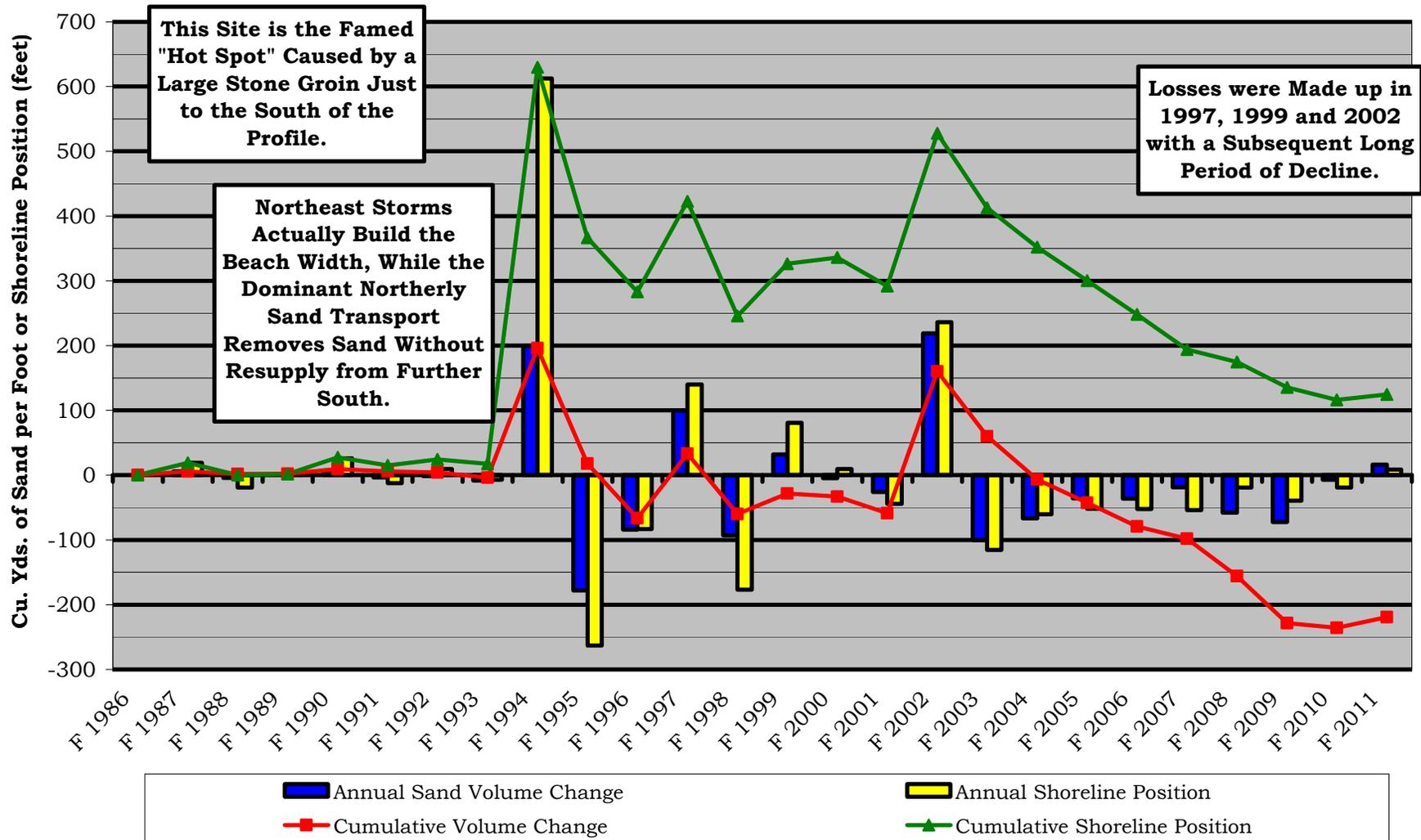


Figure 53. This site initially had several feet of water at the seaward base of the seawall rocks prior to the Federal project starting in 1994. A high initial loss rate forced the ACOE to make up the deficit in 1997 followed by maintenance work in 2002. Chronic losses continue because the groins, once the sole protection for the Monmouth Beach Club, now prevent sand from reaching this site from the south. The smaller 2010 loss is due to NE storms moving sand from the groin, reversing the trend. A small gain occurred in 2011 as sand dredged from Shrewsbury River was pumped across to the beach (55,000 cy).

**Site 178, Monmouth Beach Club, Monmouth Beach – September 30, 2011**



**Figure 54. Shown above is the view looking south from the swash zone at the Monmouth Beach Club in Monmouth Beach, NJ.**

# New Jersey Beach Profile Network

## #178 - Monmouth Beach Club, Monmouth County

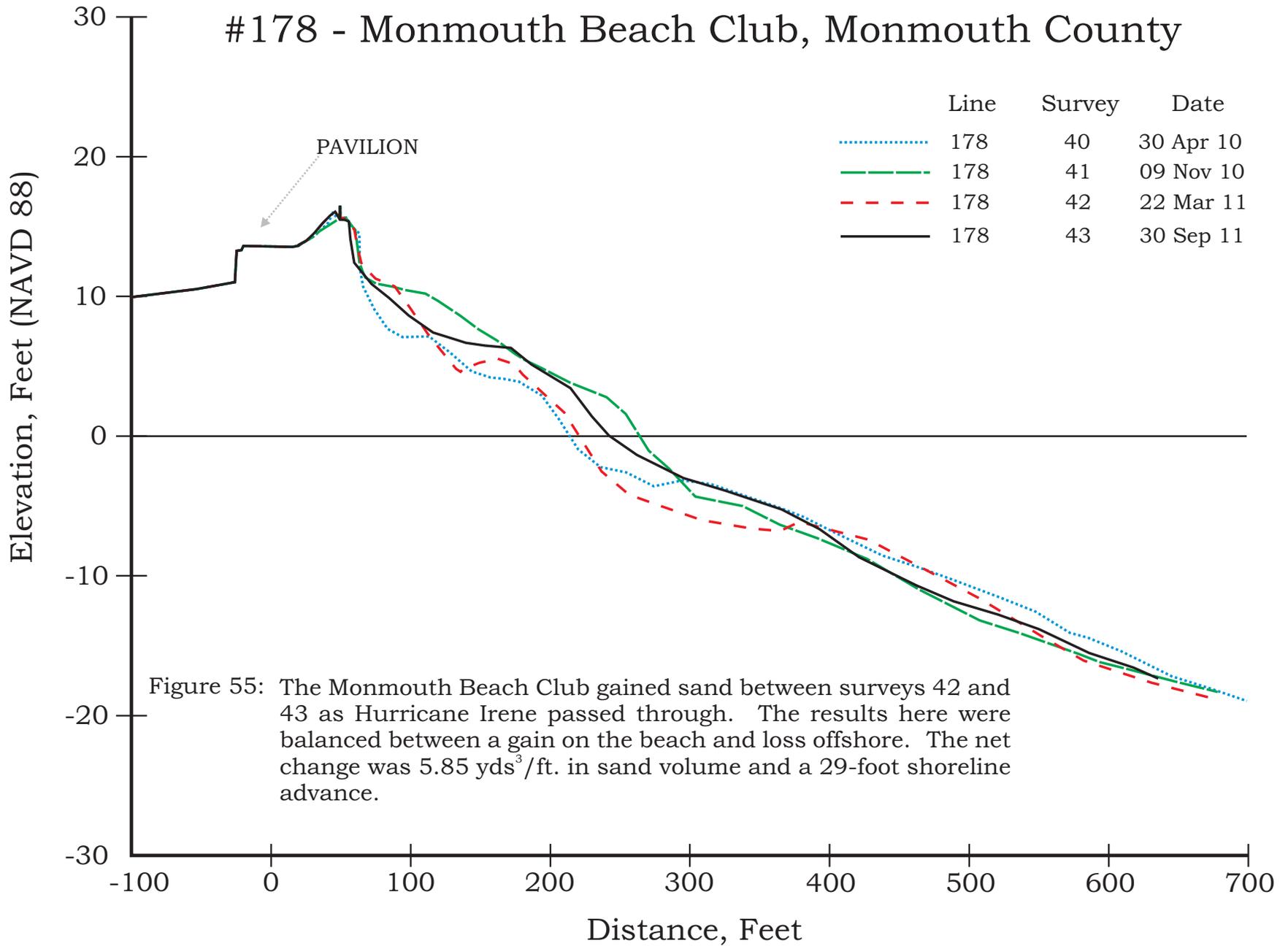


Figure 55: The Monmouth Beach Club gained sand between surveys 42 and 43 as Hurricane Irene passed through. The results here were balanced between a gain on the beach and loss offshore. The net change was 5.85 yds<sup>3</sup>/ft. in sand volume and a 29-foot shoreline advance.

## MONMOUTH BEACH CLUB, MONMOUTH BEACH- SITE 178

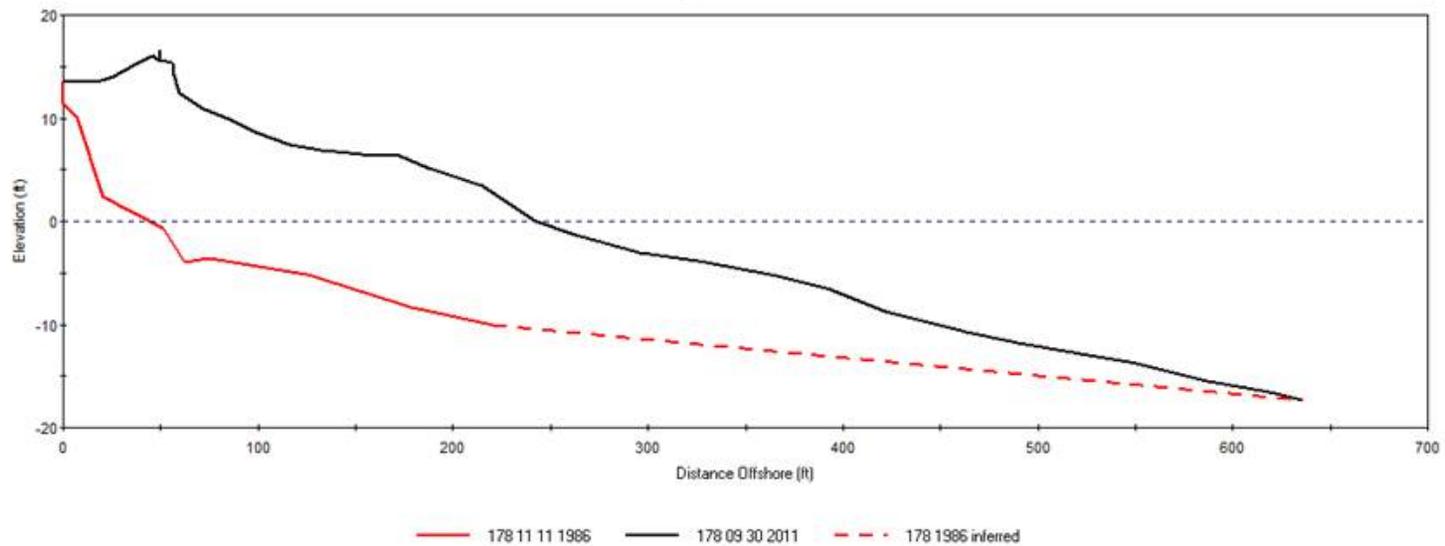


Figure 56. In 1986, this beach was narrow and steep in front of the beach club due to its proximity to the rock revetment at site 179. Sand losses have been moderate since the Monmouth County Federal beach nourishment project and maintenance fill. (Left photo October 22, 1991 [view to the northeast]; right photo taken September 30, 2011 [view to the north]).



## 25-Year Coastal Changes at Site 178, Monmouth Beach Club, Monmouth Co.

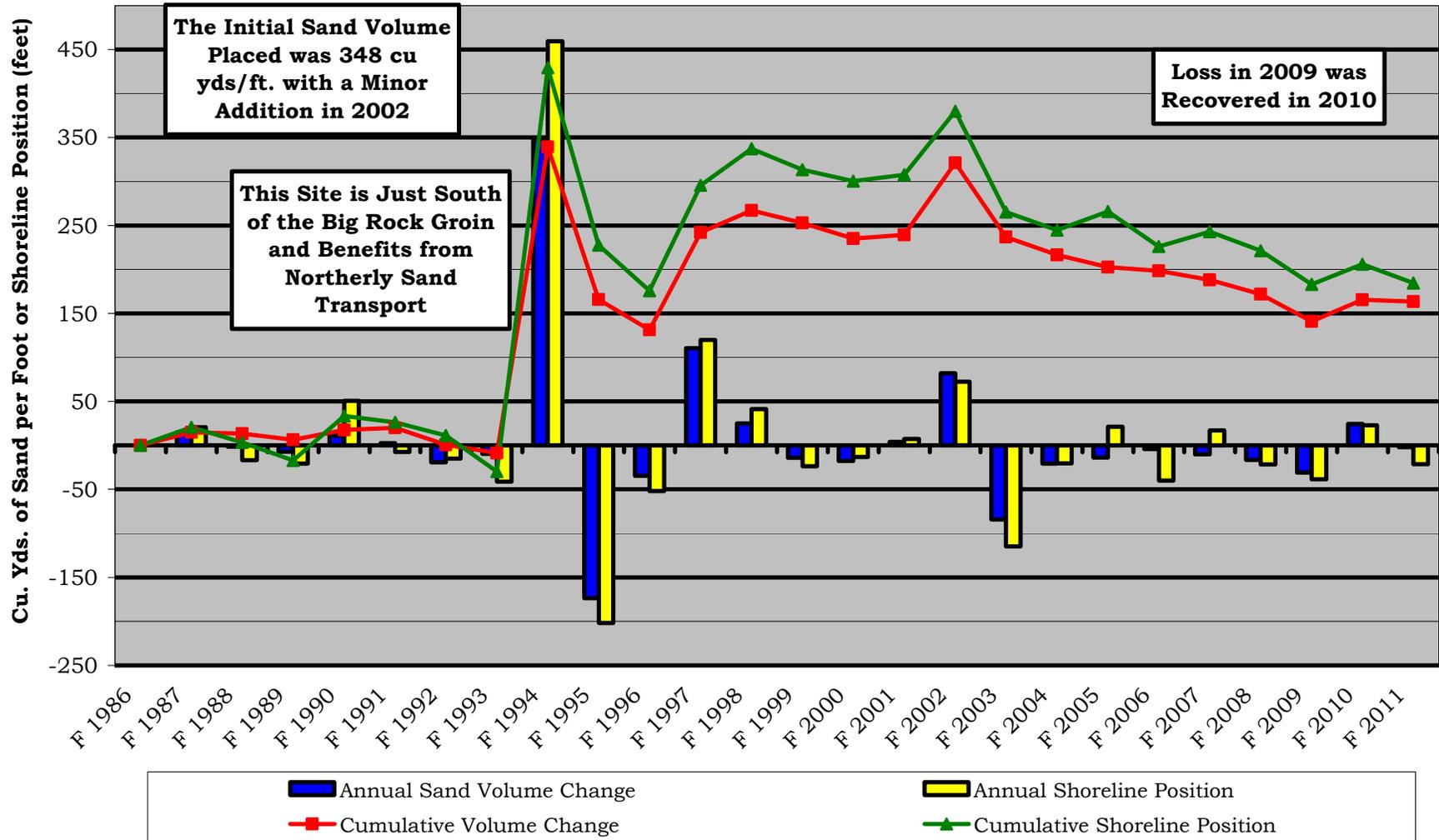


Figure 57. Shoreline retreat and sand volume losses have occurred following the Federal beach nourishment and maintenance fill projects. However, this beach is in much better condition today than prior to the projects.

**Site 177, 404 Ocean Avenue, Long Branch – September 30, 2011**



**Figure 58. Shown above is the view looking north from the berm at 404 Ocean Avenue in Long Branch, NJ.**

# New Jersey Beach Profile Network

#177 - Ocean Avenue, Long Branch, Monmouth County

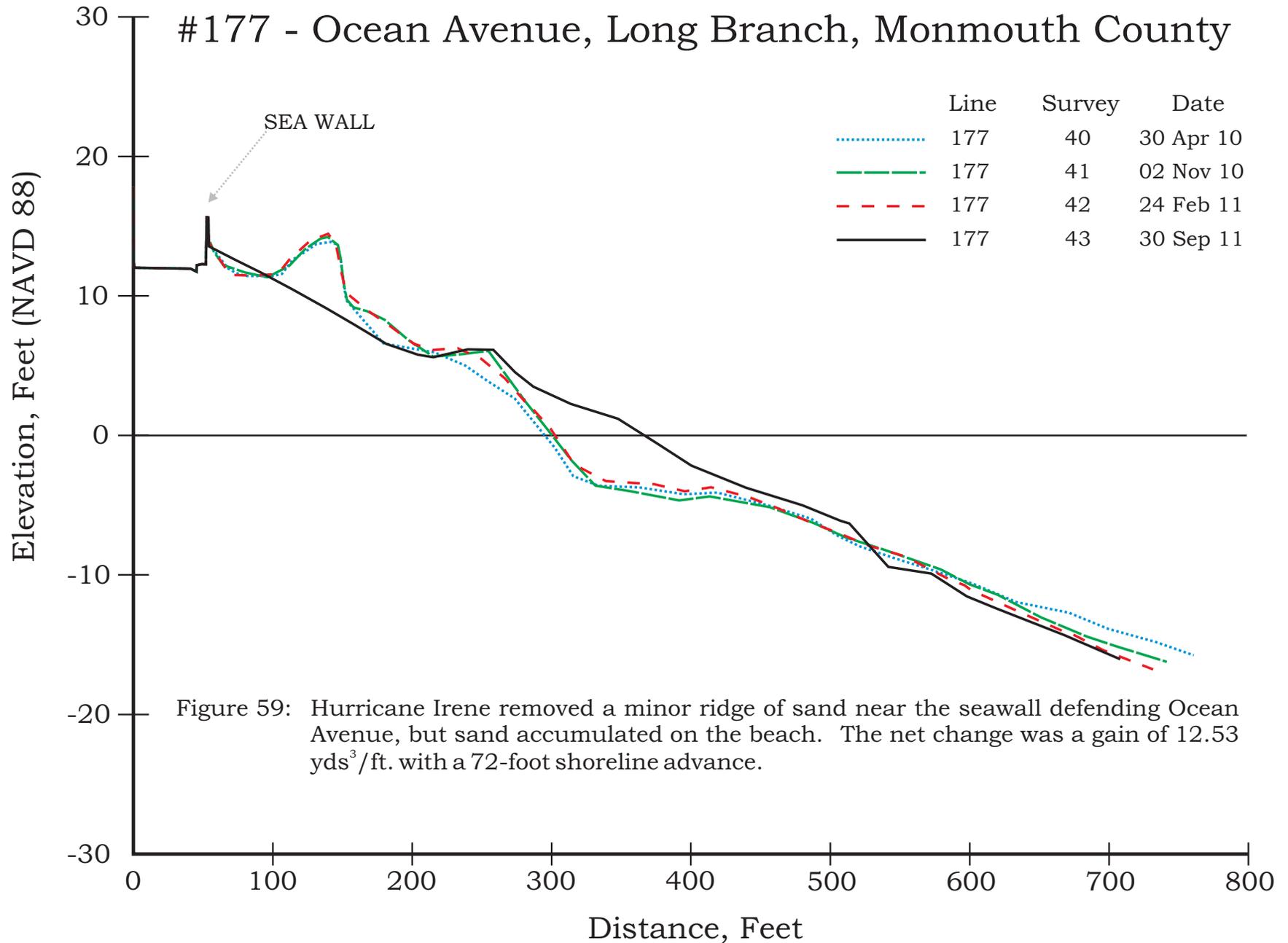


Figure 59: Hurricane Irene removed a minor ridge of sand near the seawall defending Ocean Avenue, but sand accumulated on the beach. The net change was a gain of 12.53 yds<sup>3</sup>/ft. with a 72-foot shoreline advance.

## 404 OCEAN AVENUE, LONG BRANCH- SITE 177

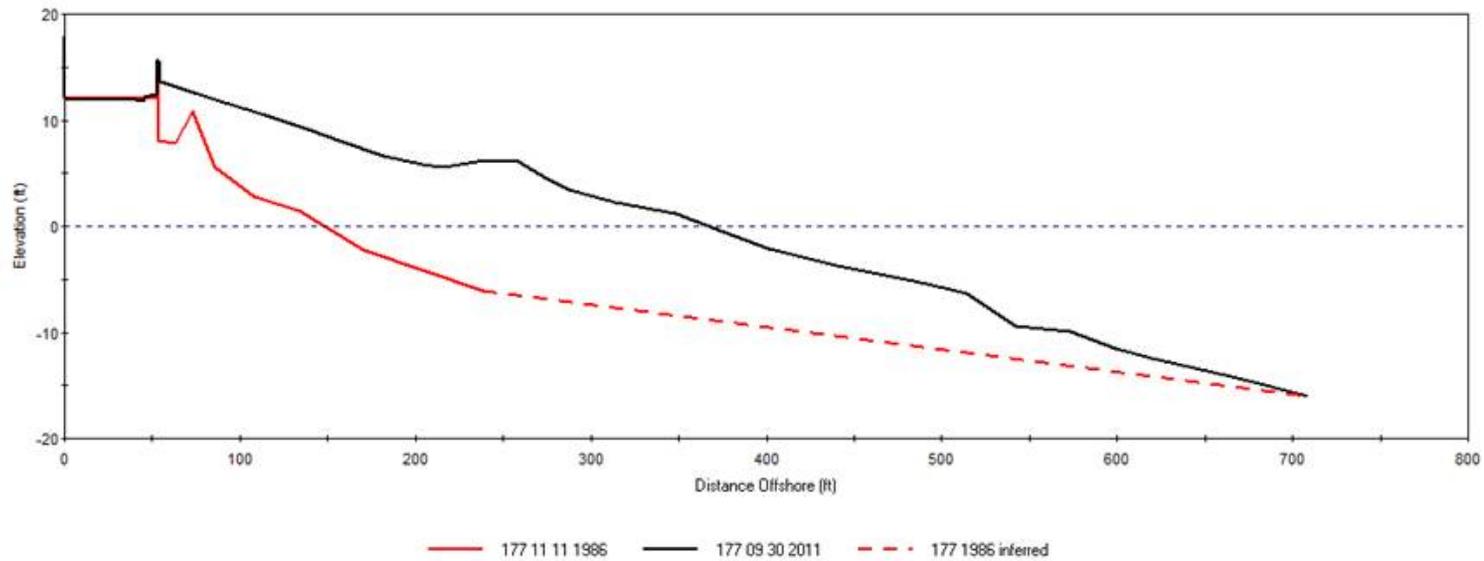
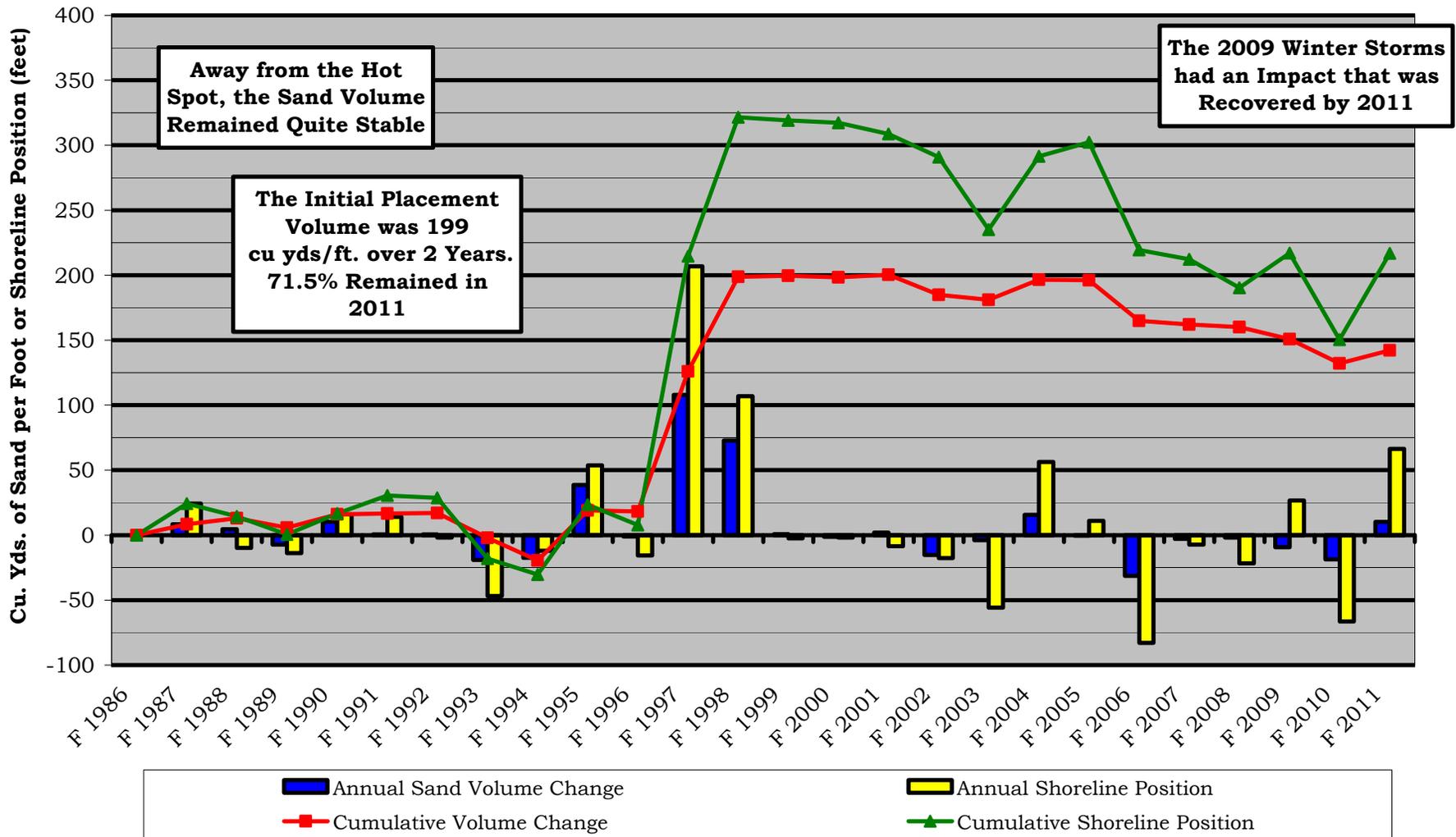


Figure 60. Sand was added to this site in the Monmouth County Federal beach nourishment project but none was added in the 2002 maintenance fill. The profile has experienced minimal sand losses since that time. (Left photo October 17, 1990 [view to the east]; right photo September 30, 2011 [view to the north]).



**25-Year Coastal Changes at Site 177, Ocean Avenue, Long Branch, Monmouth Co.**



**Figure 61.** This site benefits from the large rock groin located to the north which slows littoral flow and allows this beach to remain relatively constant in width and volume.

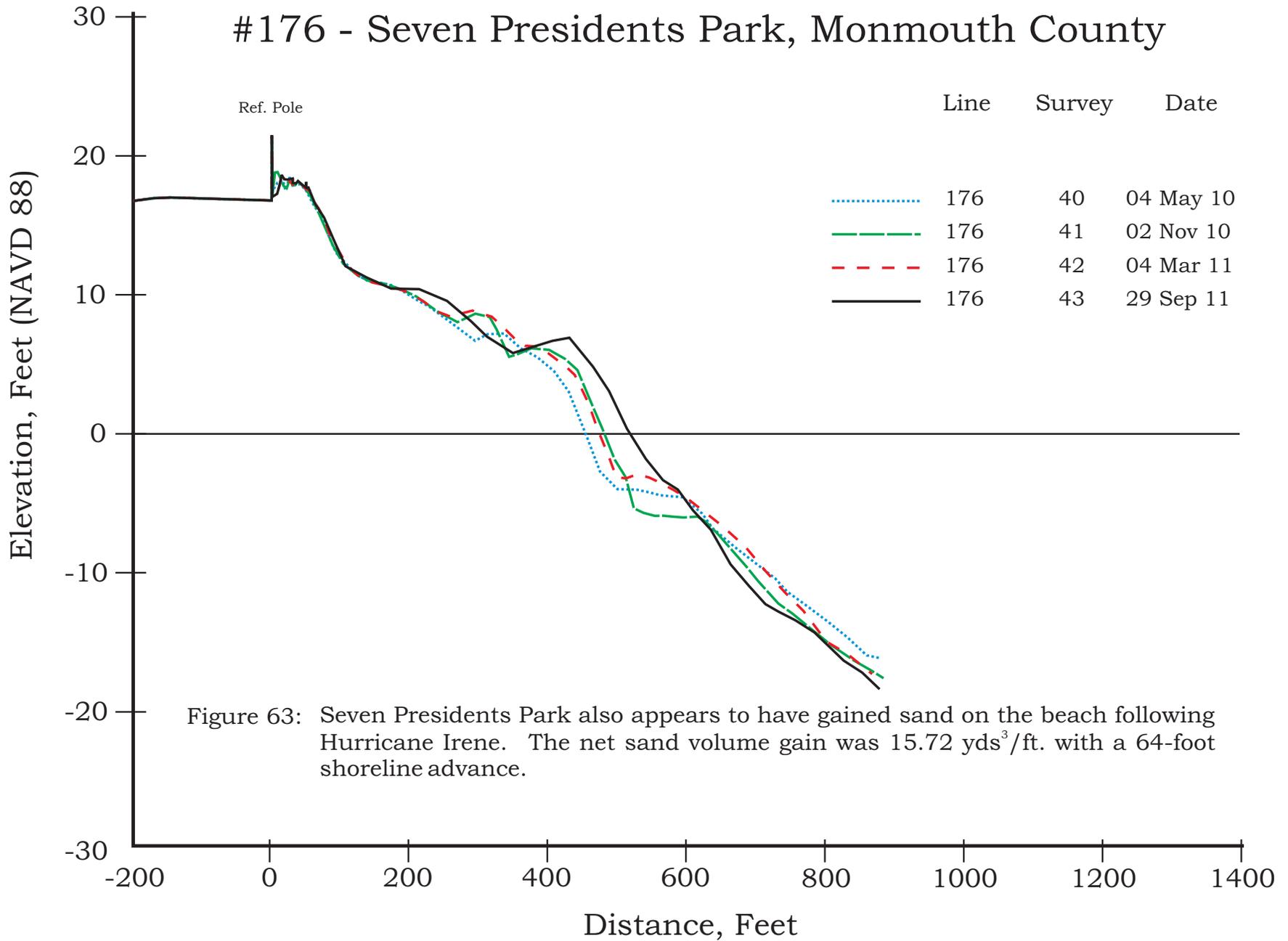
**Site 176, Seven President's Park, Long Branch – September 29, 2011**



**Figure 62. Shown above is the view looking north from the dune at Seven President's Park in Long Branch, NJ.**

# New Jersey Beach Profile Network

## #176 - Seven Presidents Park, Monmouth County



## SEVEN PRESIDENT'S PARK, LONG BRANCH- SITE 176

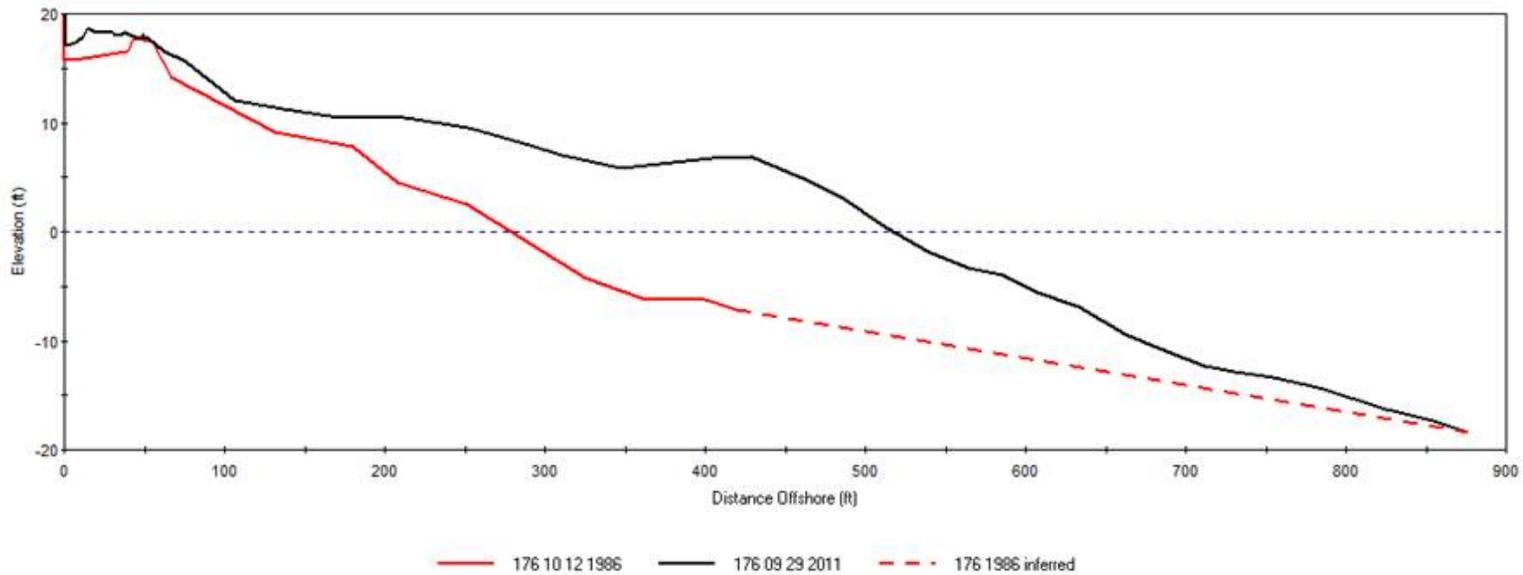


Figure 64. The northernmost Long Branch profile had a narrow beach in 1986 and sand was added in the Monmouth County Federal beach nourishment project. No sand was added in the 2002 maintenance fill. (Left photo October 12, 1988 [view to the northeast]; right photo September 29, 2011 [view to the northeast]).



## 25-Year Coastal Changes at Site 176, Seven Presidents Park, Monmouth Co.

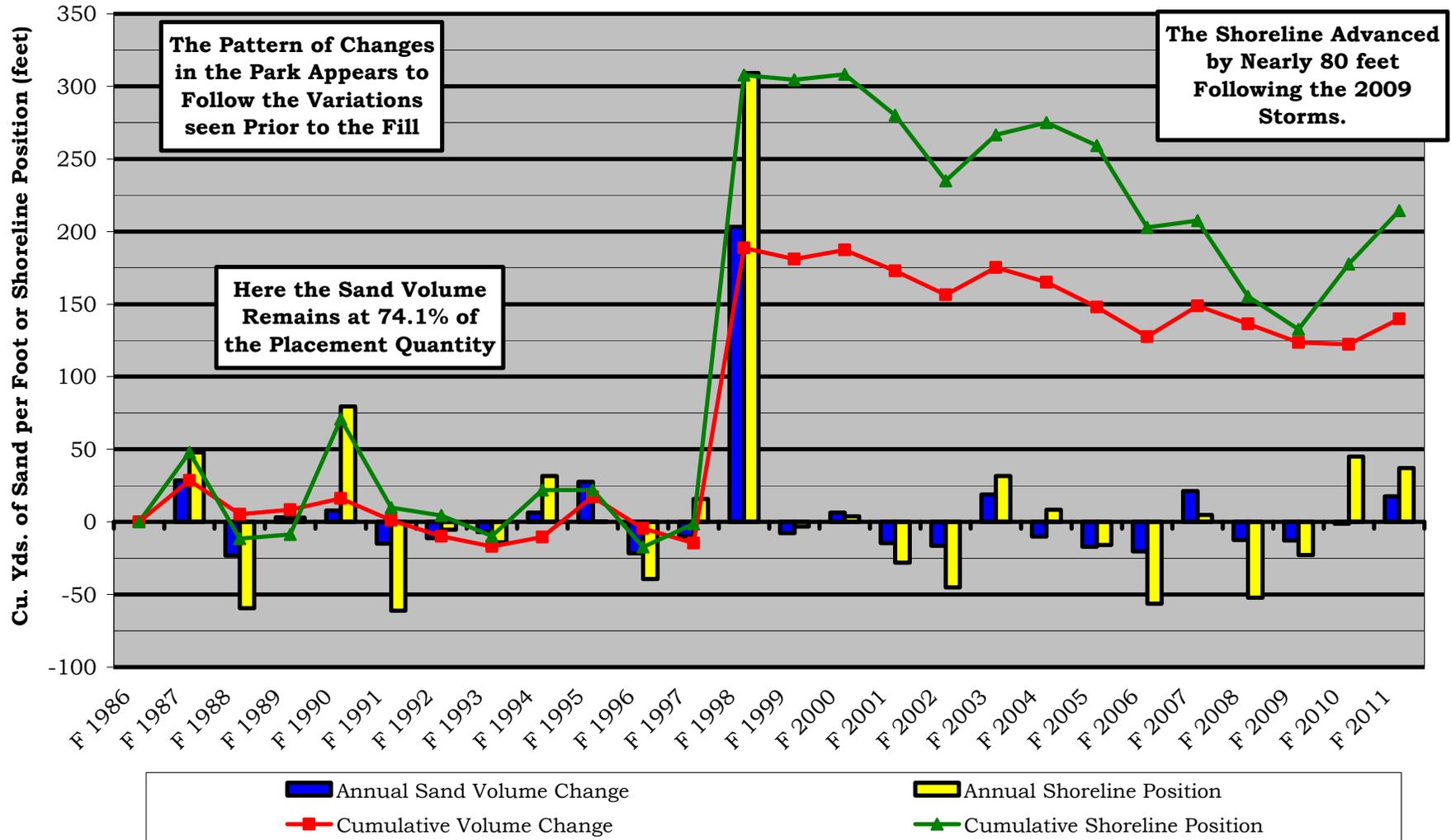


Figure 65. This site is a popular recreational park that has undergone some variability over the 25-year time period. The beach has lost sand since the Federal beach nourishment project, though storms have had a greater impact on shoreline movement.

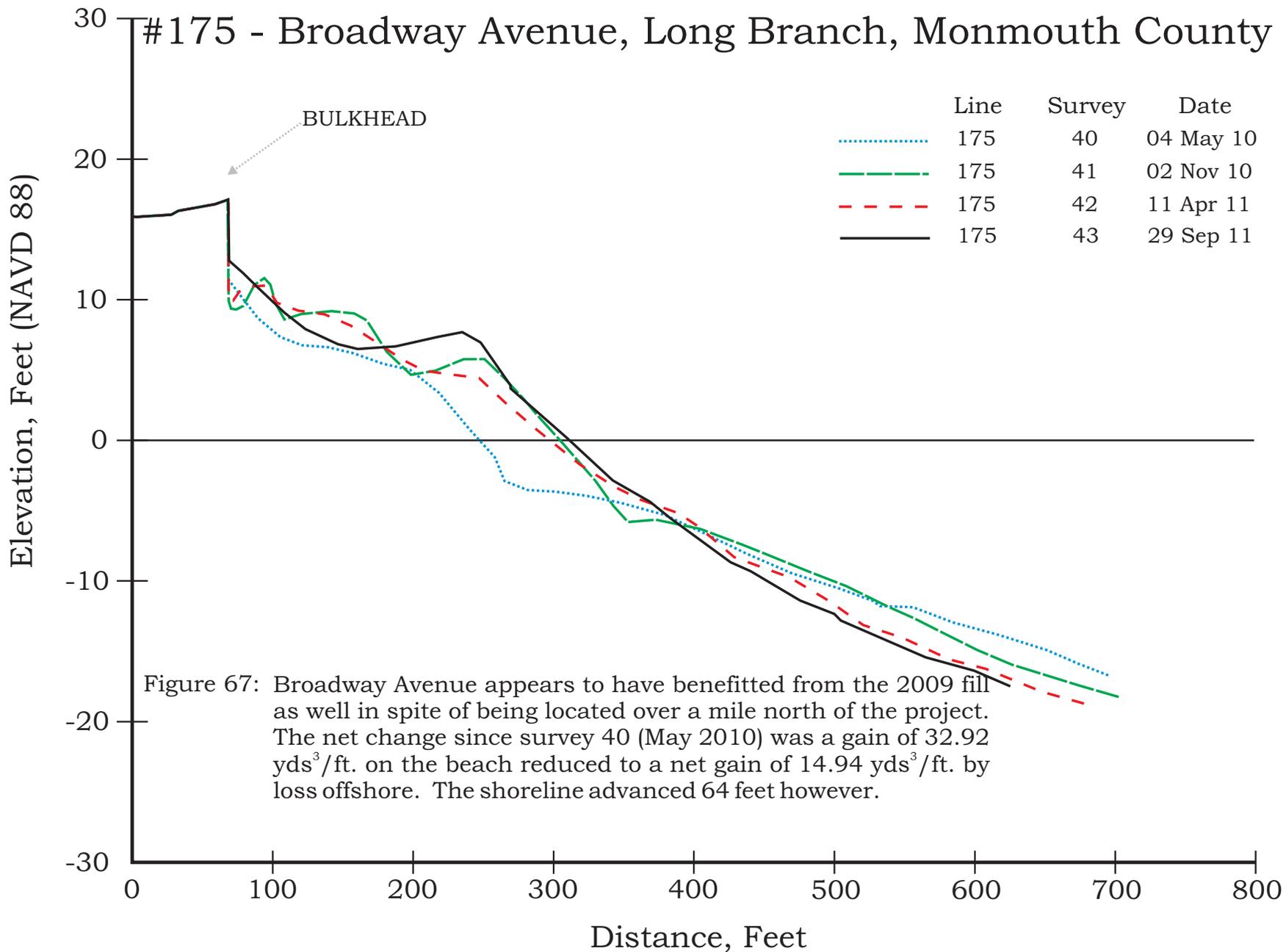
**Site 175, Broadway Avenue, Long Branch – September 29, 2011**



**Figure 66. Shown above is the view looking south from the berm at Broadway Avenue in Long Branch, NJ.**

# New Jersey Beach Profile Network

#175 - Broadway Avenue, Long Branch, Monmouth County



## BROADWAY AVENUE, LONG BRANCH – SITE 175

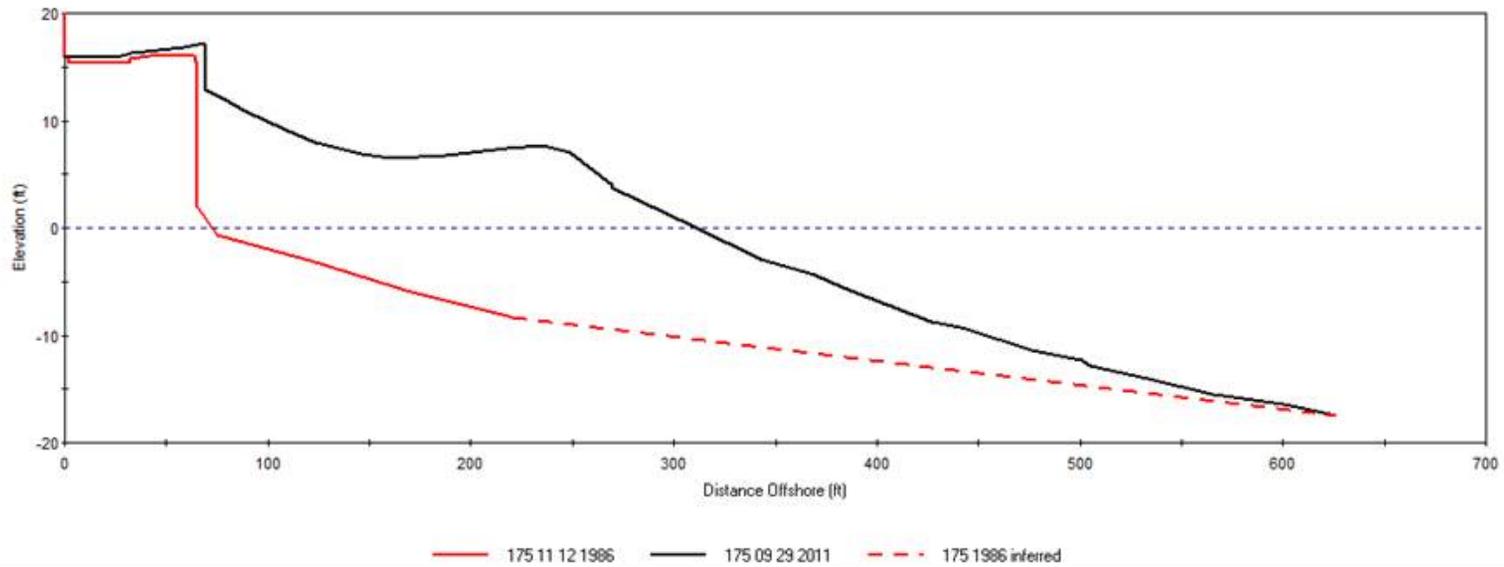
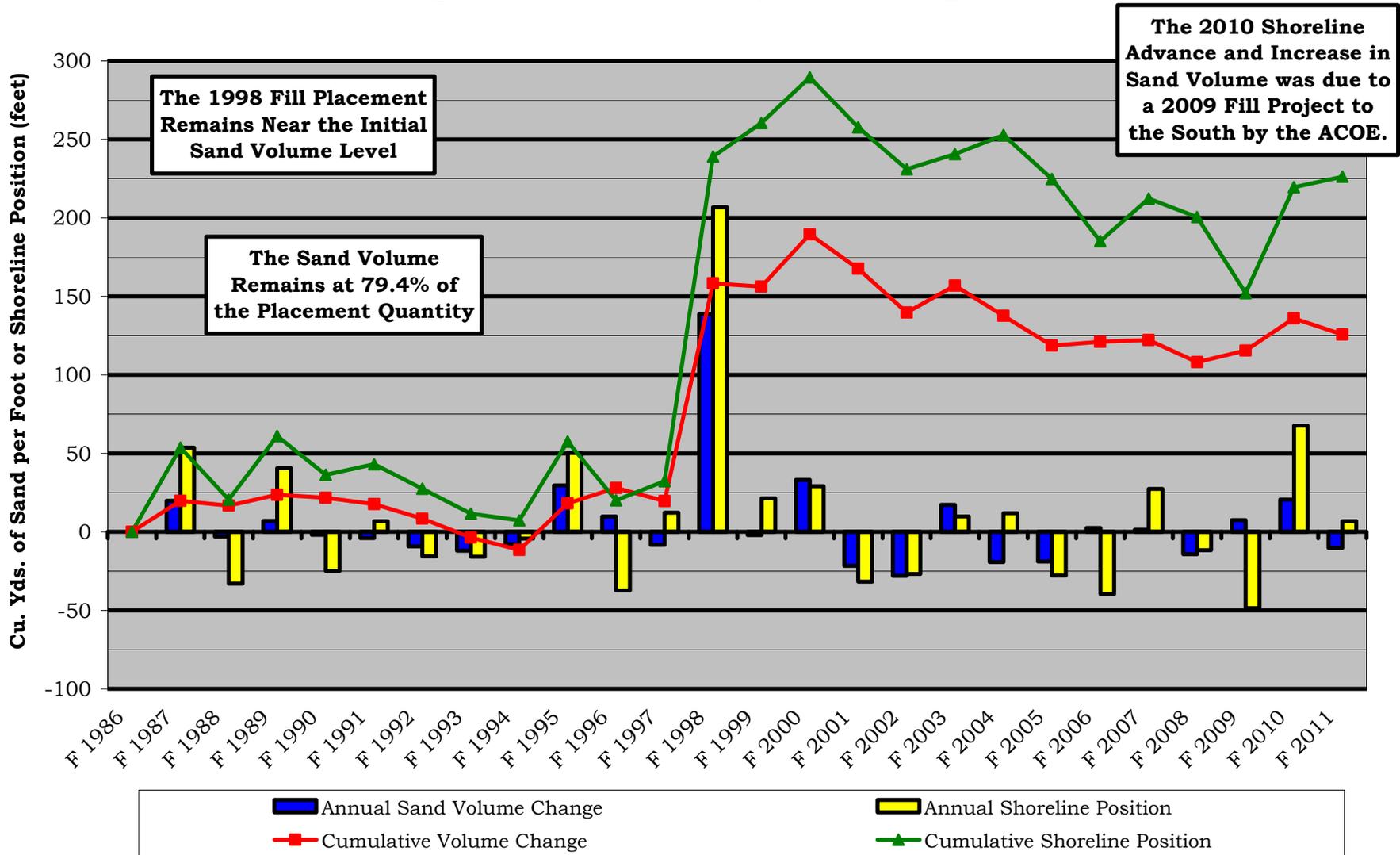


Figure 68. In 1986, the beach was located approximately 14 feet below the top of the steel bulkhead. Sand was added in the Monmouth County Federal beach nourishment project but none was added in the 2002 maintenance fill because the site is relatively stable. (Left photo October 10, 1989 [view to the northeast]; right photo September 29, 2011 [view to the north]).



**25-Year Coastal Changes at Site 175, Broadway Avenue, Long Branch, Monmouth Co.**



**Figure 69.** This site greatly benefitted from the Federal beach nourishment project which placed over 150 cy/ft of sand on the beach here. Since then, the site has decreased in volume and the shoreline has been variable due to the influence of storms and the placement of sand on beaches to the south of this location in 2009.

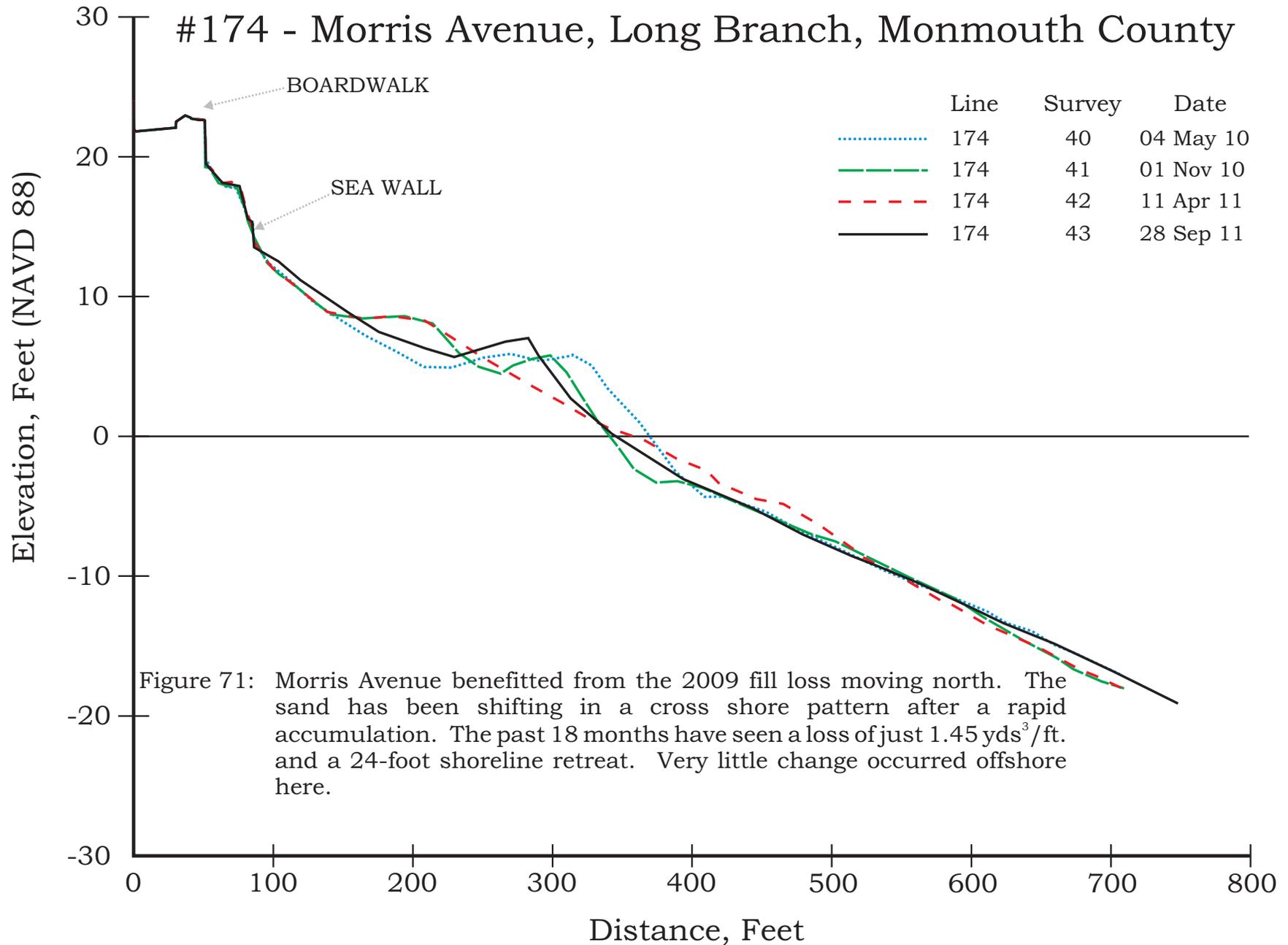
**Site 174, Morris Avenue, Long Branch – September 28, 2011**



**Figure 70. Shown above is the view looking north from the seaward crest at Morris Avenue in Long Branch, NJ.**

# New Jersey Beach Profile Network

#174 - Morris Avenue, Long Branch, Monmouth County



## MORRIS AVENUE, LONG BRANCH – SITE 174

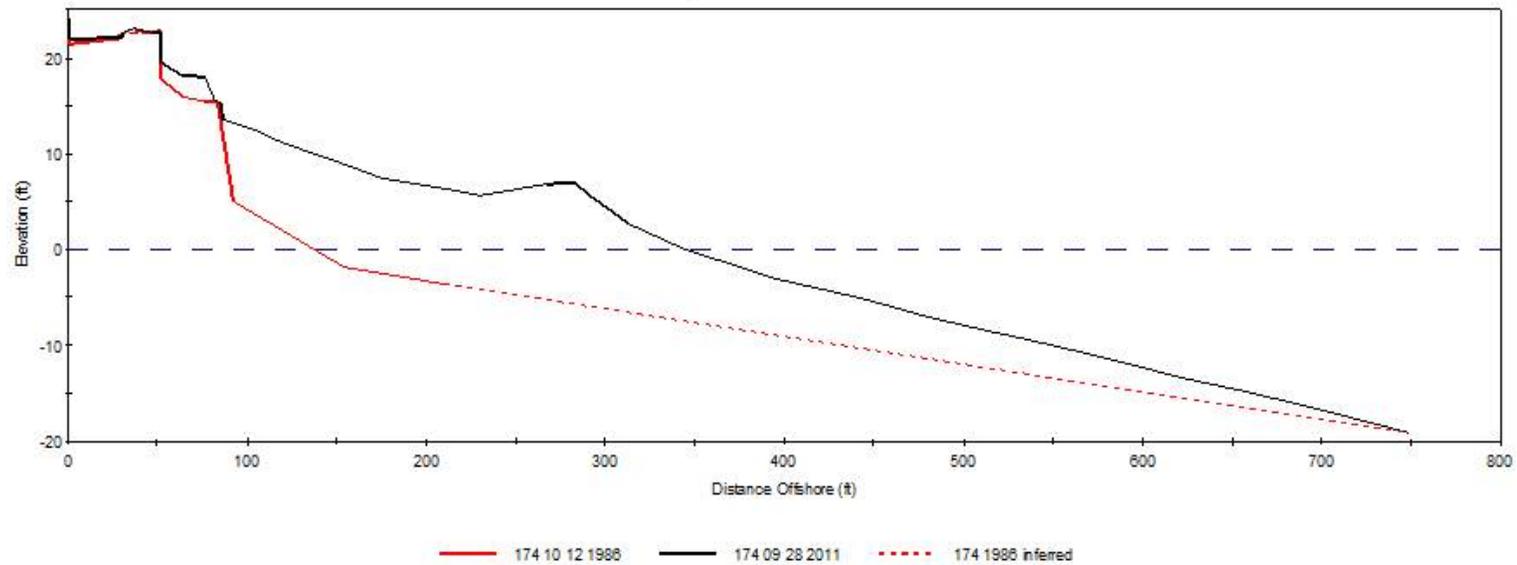


Figure 72. Sand was added in the Monmouth County Federal beach nourishment project over two seasons. This site was not included in the the 2002 maintenance fill, though sand was added in 2009. (Left photo October 15, 1990 [view to the northeast]; right photo September 28, 2011 [view to the northeast]).



## 25-Year Coastal Changes at Site 174, Morris Avenue, Long Branch, Monmouth Co.

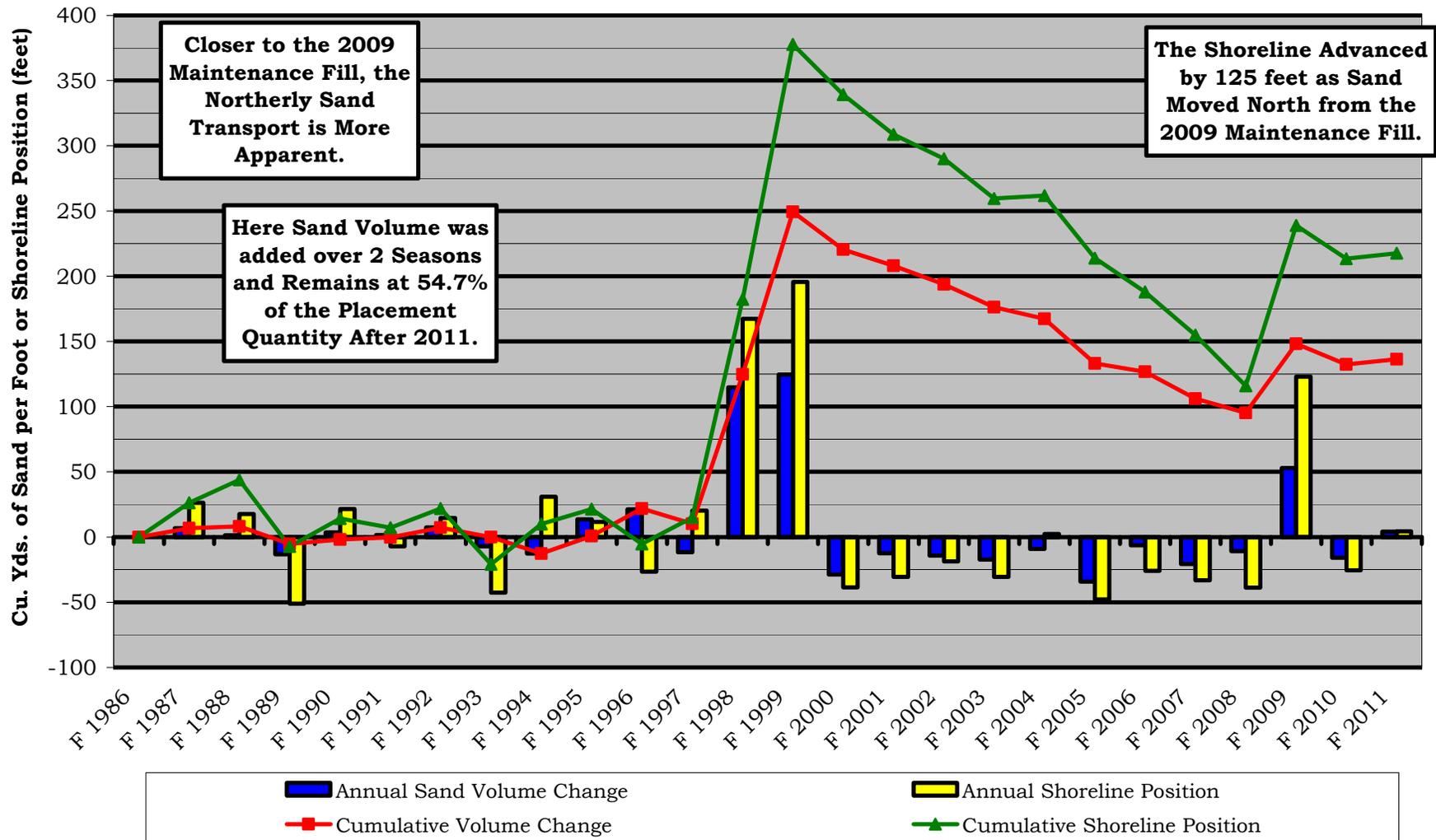


Figure 73. Shoreline retreat and volume losses have been more dramatic at this Long Branch site than the site to the north (#175). This is probably due to the location of this site with respect to the southern boundary of the Federal beach nourishment project. Sand added to the beaches south of here in 2009 has begun to move northward and benefitted this site.

**Site 173, West End Avenue, Long Branch – September 28, 2011**



**Figure 74. Shown above is the view looking north from the berm at West End Avenue in Long Branch, NJ.**

# New Jersey Beach Profile Network

#173 - West End Avenue, Long Branch, Monmouth County

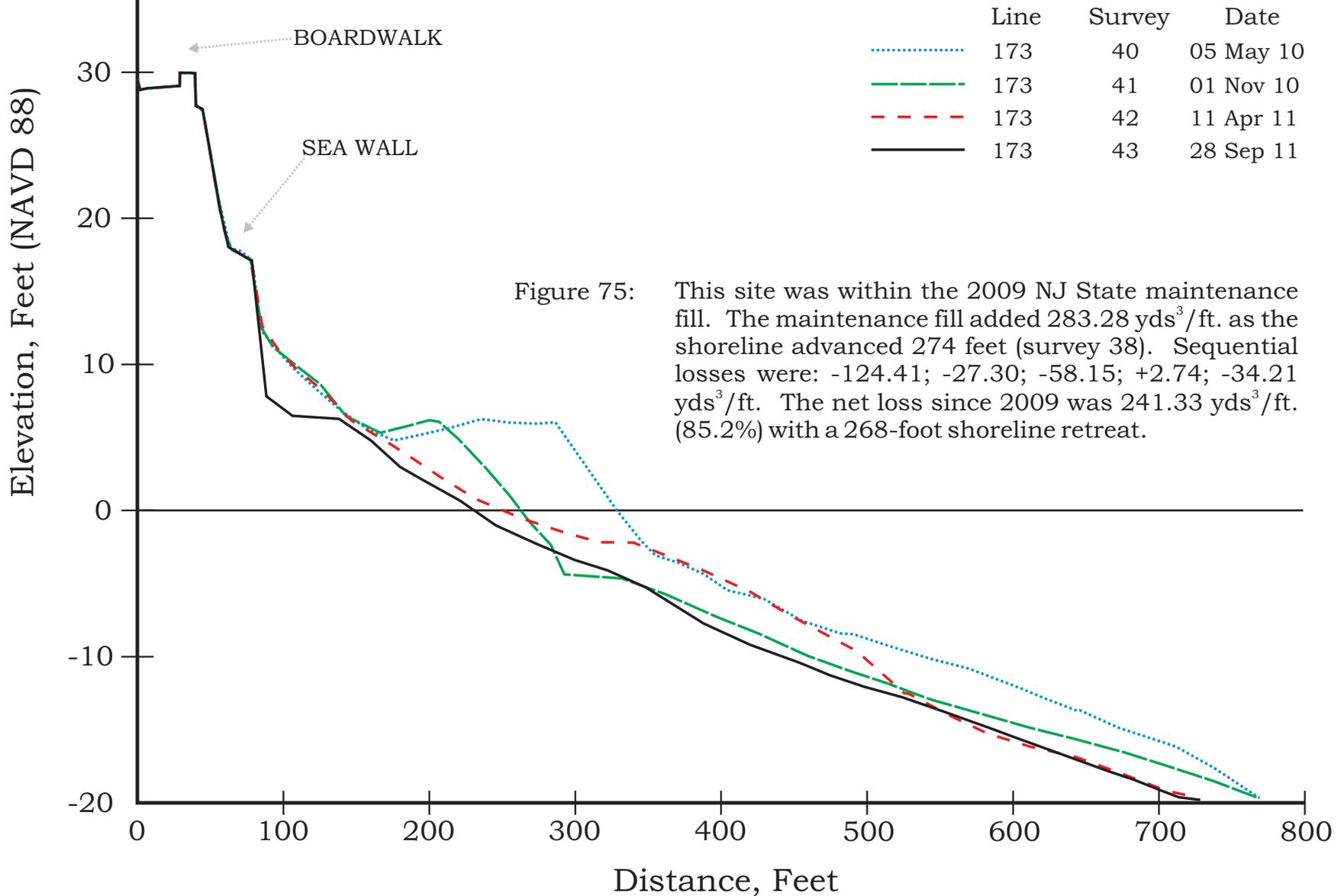


Figure 75: This site was within the 2009 NJ State maintenance fill. The maintenance fill added 283.28 yds<sup>3</sup>/ft. as the shoreline advanced 274 feet (survey 38). Sequential losses were: -124.41; -27.30; -58.15; +2.74; -34.21 yds<sup>3</sup>/ft. The net loss since 2009 was 241.33 yds<sup>3</sup>/ft. (85.2%) with a 268-foot shoreline retreat.

## WEST END AVENUE, LONG BRANCH – SITE 173

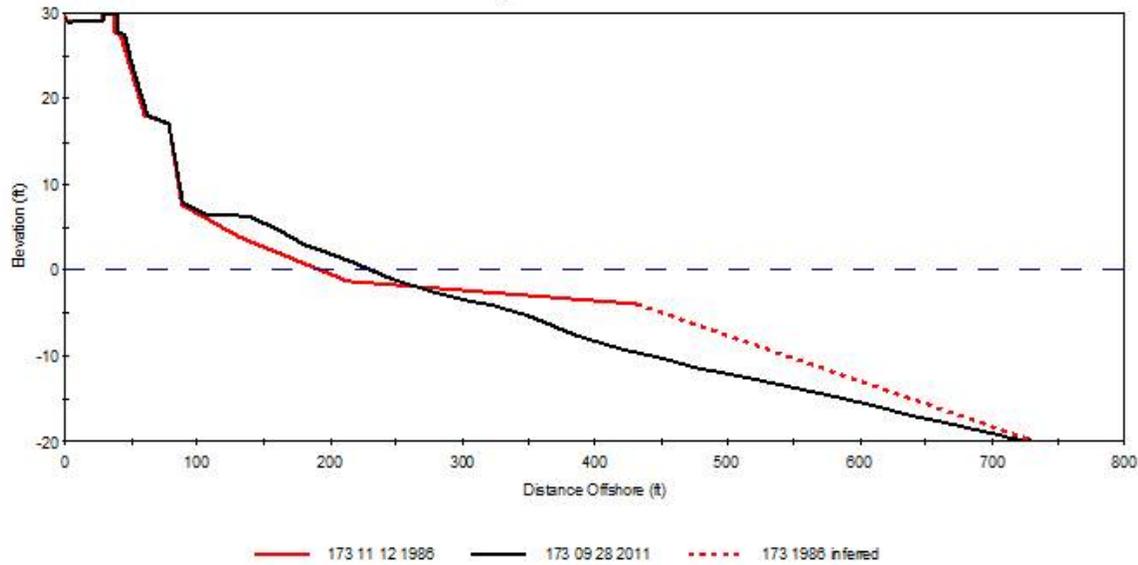


Figure 76. This site is located at the southern limit of the Monmouth County Federal beach nourishment project and is more erosional than other sites within Long Branch. (Left photo October 12, 1988 [view to the northeast]; right photo September 28, 2011 [view to the northeast]).



## 25-Year Coastal Changes at Site 173, West End Avenue, Long Branch, Monmouth Co.

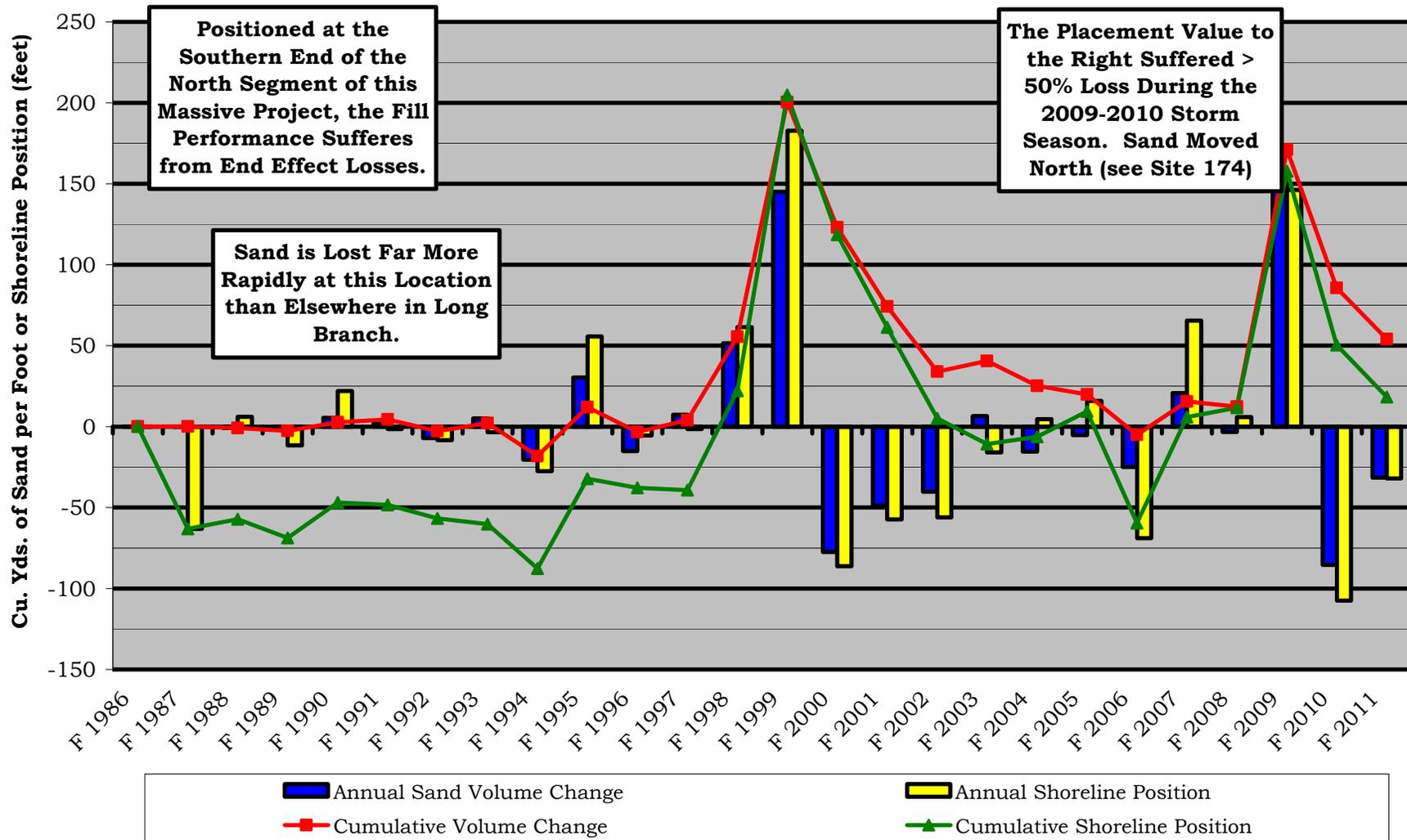


Figure 77. This site is at the southern limit of sand placement of the massive fill project that took place here. The loss of sand volume and shoreline position was immediate and continued at a consistent pace until 2007 when a mild reversal took place. In 2009 a maintenance fill took place here, and immediately following it the pattern of loss commenced again resulting in a 50% loss in the 2009-2010 storm season. That loss continues as sand is lost more rapidly at this location than elsewhere in Long Branch, the result of End Effect Losses.

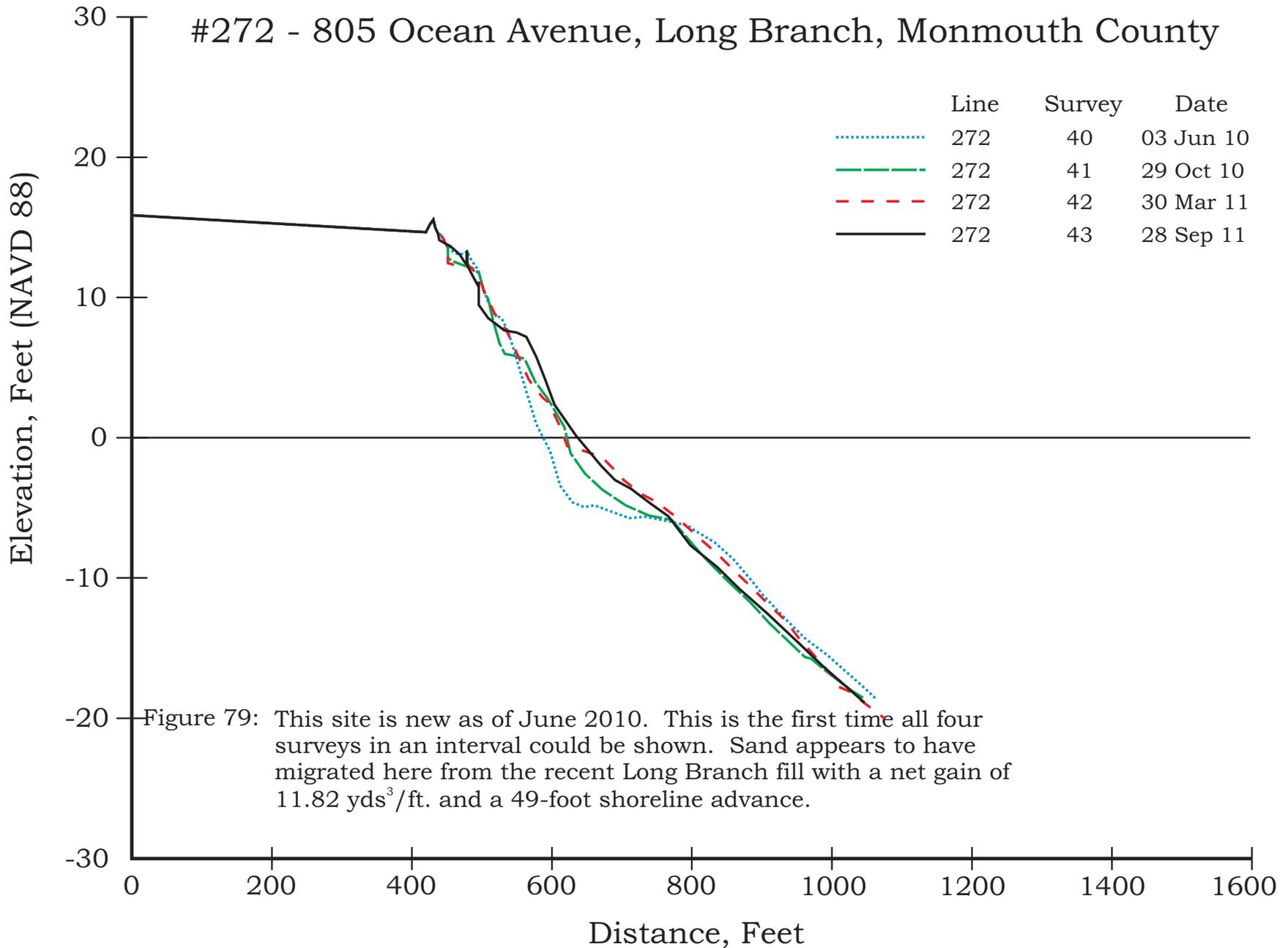
Site 272, 805 Ocean Avenue, Long Branch – September 28, 2011



Figure 78. Shown above is the view looking south from the berm at 805 Ocean Avenue in Long Branch, NJ.

# New Jersey Beach Profile Network

#272 - 805 Ocean Avenue, Long Branch, Monmouth County



## 805 OCEAN AVENUE, LONG BRANCH – SITE 272



Figure 80. This new site was established in June 2010 because former Site 172 was lost to development. (Top photo October 29, 2010 [view to the south]; bottom photo September 28, 2011 [view to the south]).



**A 25-year trend analysis was not completed for Site 272 because it was newly established in 2010. Surveys of Site 172 ended in 1992.**

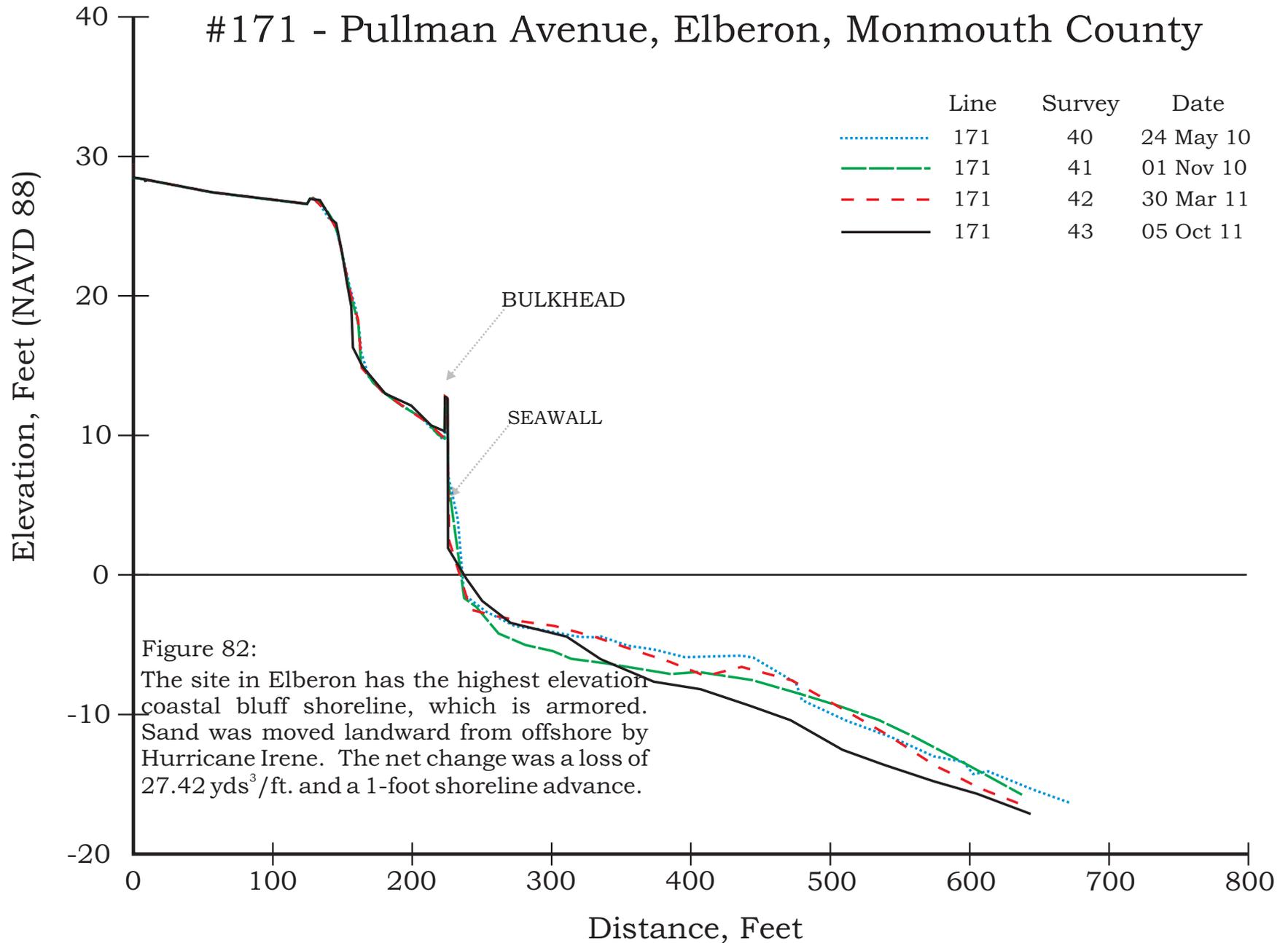
**Site 171, 805 Pullman Avenue, Elberon – October 5, 2011**



**Figure 81. Shown above is the view looking north from the landward top of the revetment at 805 Pullman Avenue in Elberon, NJ.**

# New Jersey Beach Profile Network

#171 - Pullman Avenue, Elberon, Monmouth County



## PULLMAN AVENUE, ELBERON – SITE 171

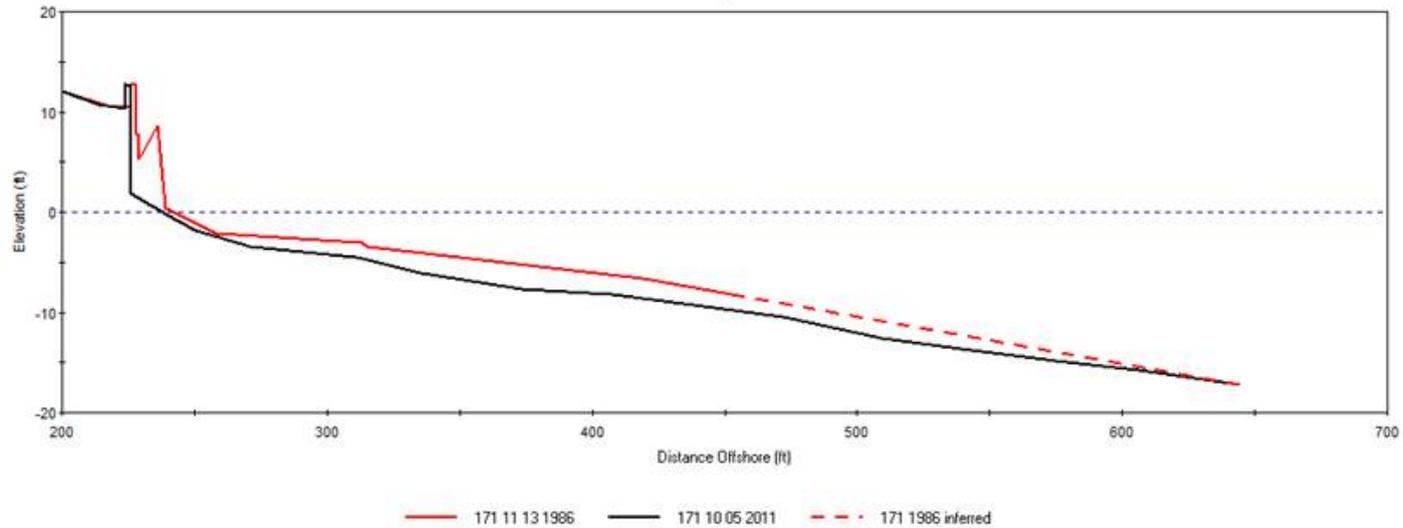


Figure 83. Sand lost from the Monmouth County Federal beach nourishment project was moved southward to this location and the beach temporarily benefitted from the project. With no new input of sand, this site (positioned at the highest elevation of the Monmouth County bluff) is in a long-term state of erosion. Typically, there is no dry sand beach at this location. (Left photo October 13, 1988 [view to the south]; right photo October 5, 2011 [view to the south]).



## 25-Year Coastal Changes at Site 171, Pullman Avenue, Elberon, Monmouth Co.

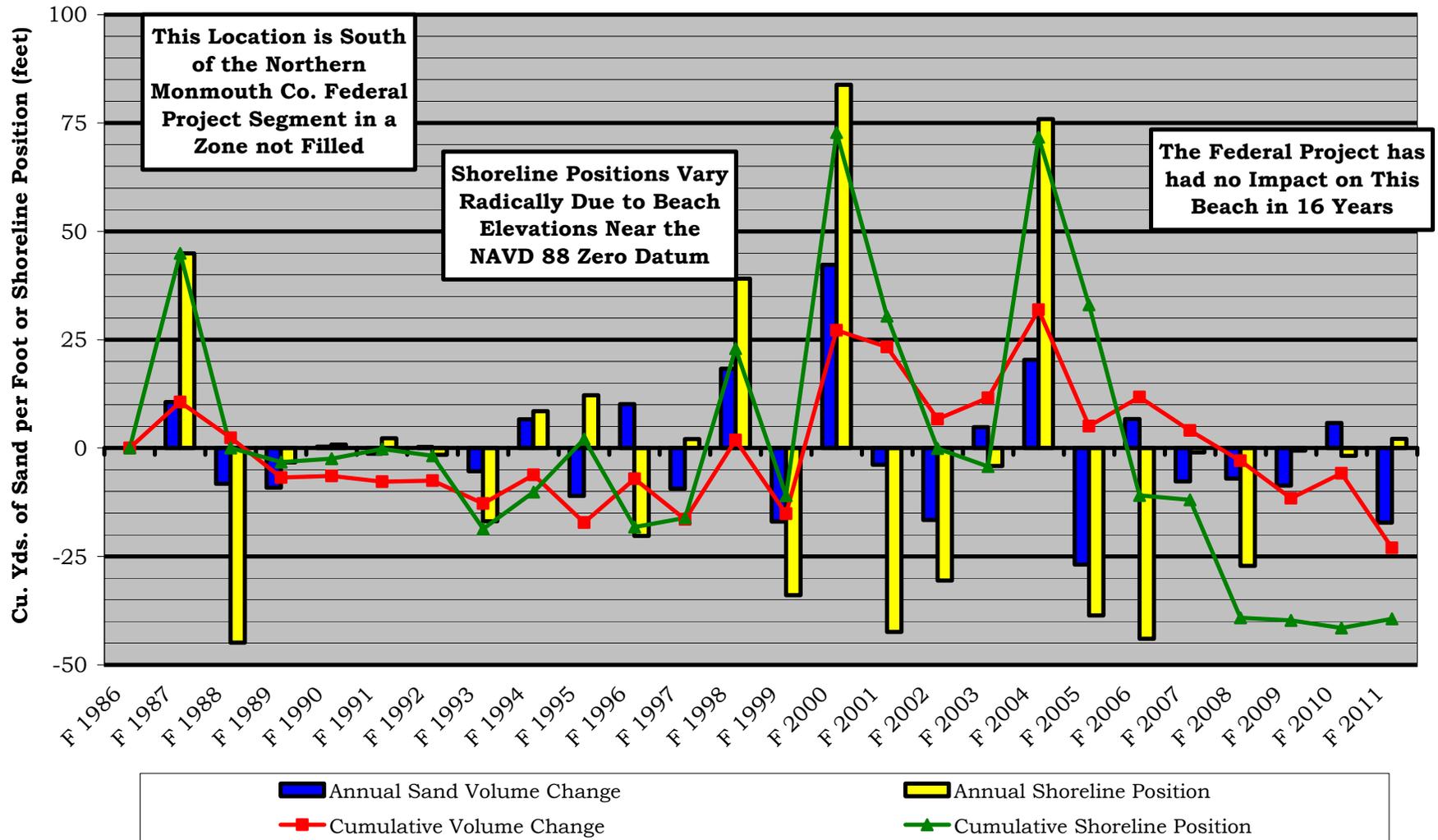
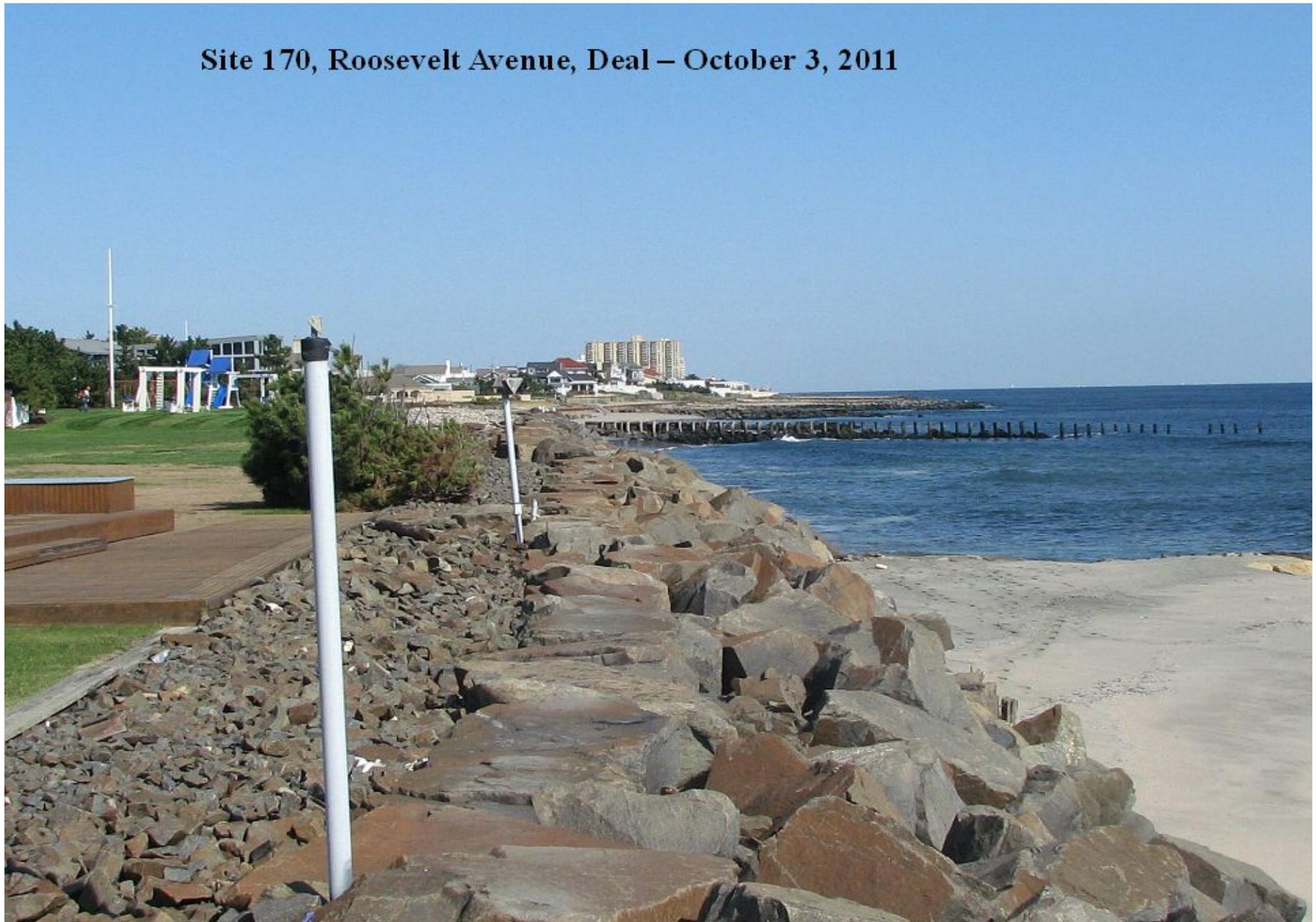


Figure 84. This site received no direct sand placement as a result of the ACOE project to the north. However the large variations in the years following the fill project indicate that this site benefited from sand placed in Long Branch directly to the north. Beginning in 2005, however, the trend seemed to be that of consistent loss and the shoreline retreated 30 feet landward of where this site was at its initial survey in 1986.

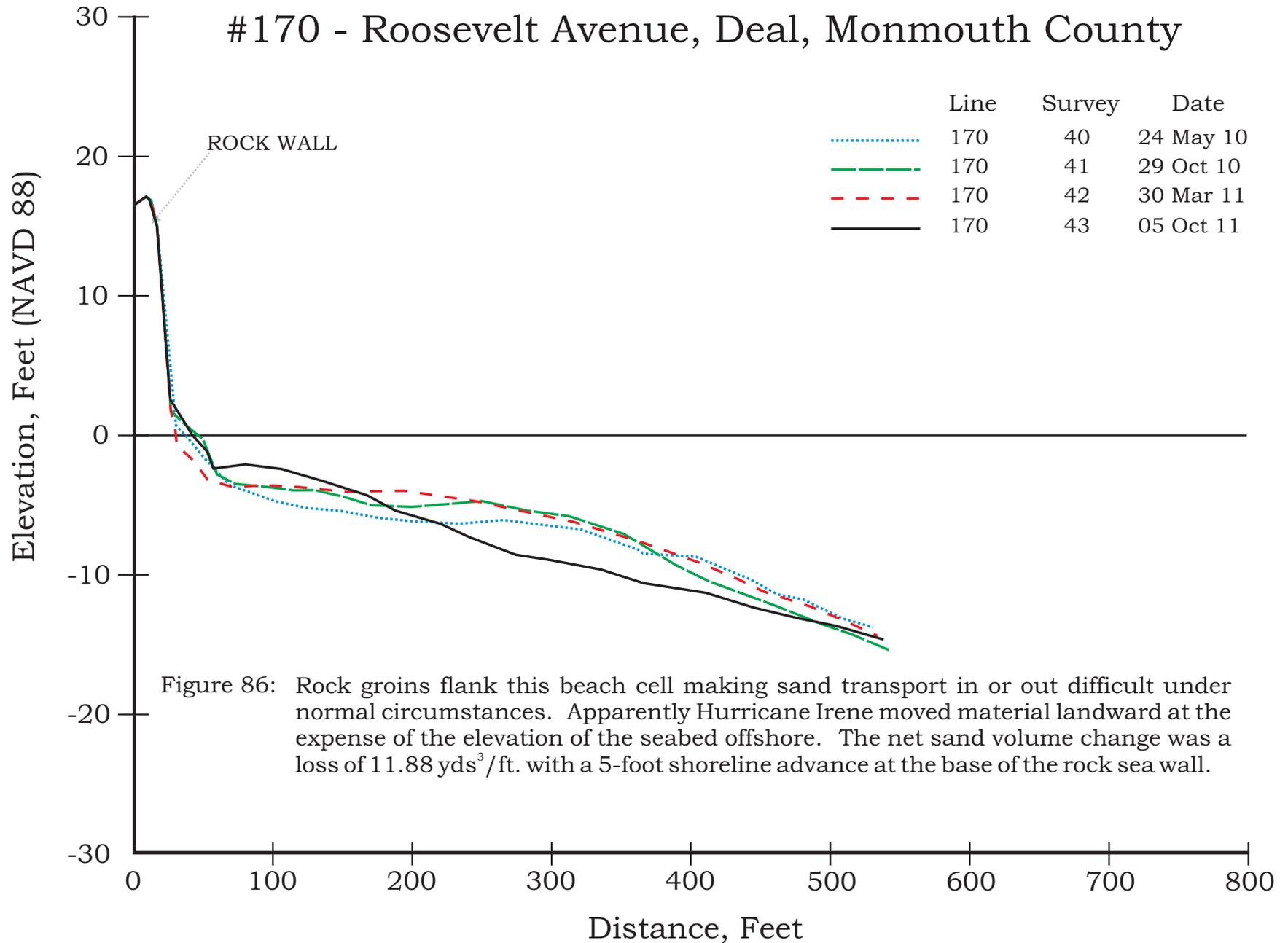
**Site 170, Roosevelt Avenue, Deal – October 3, 2011**



**Figure 85. Shown above is the view looking north from the crest of the rocks at Roosevelt Avenue in Deal, NJ.**

# New Jersey Beach Profile Network

#170 - Roosevelt Avenue, Deal, Monmouth County



# ROOSEVELT AVENUE, DEAL – SITE 170

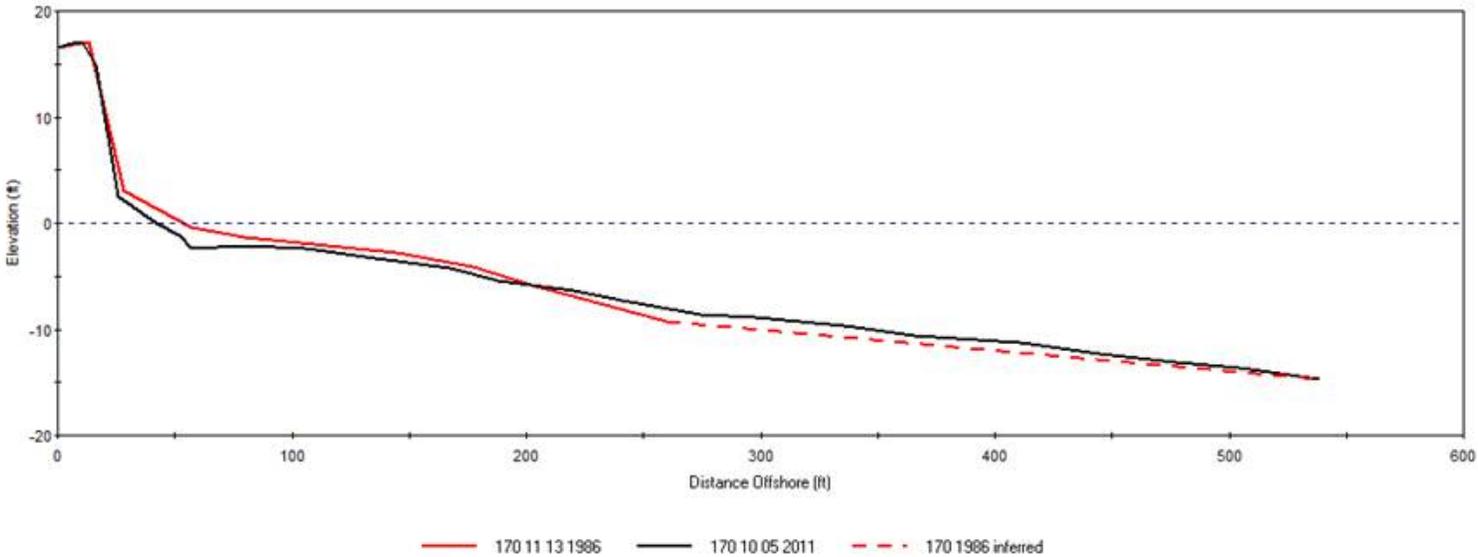


Figure 87. This site has experienced little dramatic changes over the past 25 years with the exception of the shoreline fluctuations recorded in 2005 and 2006. This location was not included in the Federal beach nourishment project but may have benefitted by the additional sand in the littoral system. (Left photo October 13, 1988 [view to the southeast]; right photo October 3, 2011 [view to the southeast]).



**25-Year Coastal Changes at Site 170, Roosevelt Avenue, Deal, Monmouth Co.**

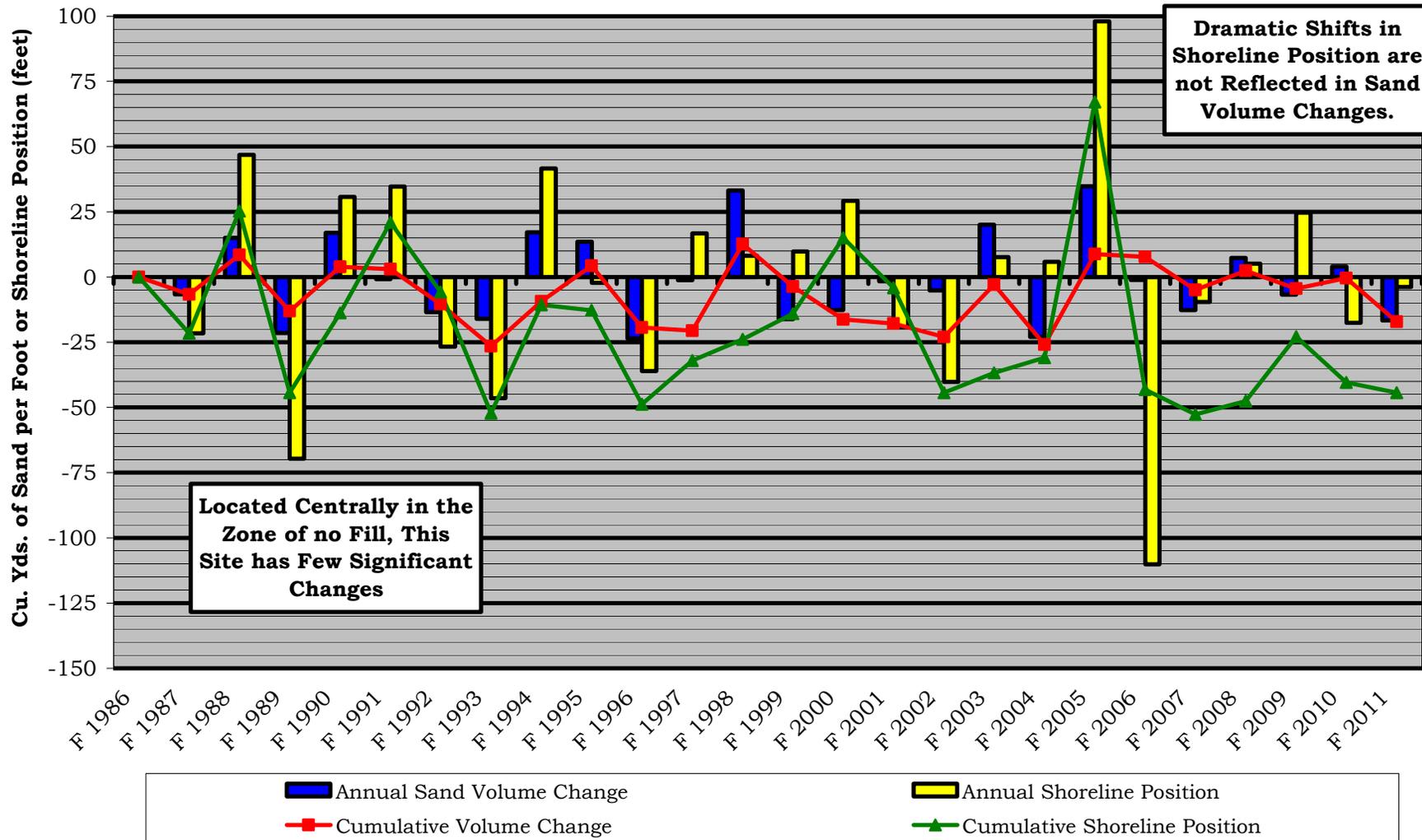


Figure 88. This site was also excluded from the ACOE fill project and received no direct sand placement. Flanked between 2 groins this site has changed little as a result. Shifts in the shoreline position in 2005 and 2006 had no significant effect on the sand volume.

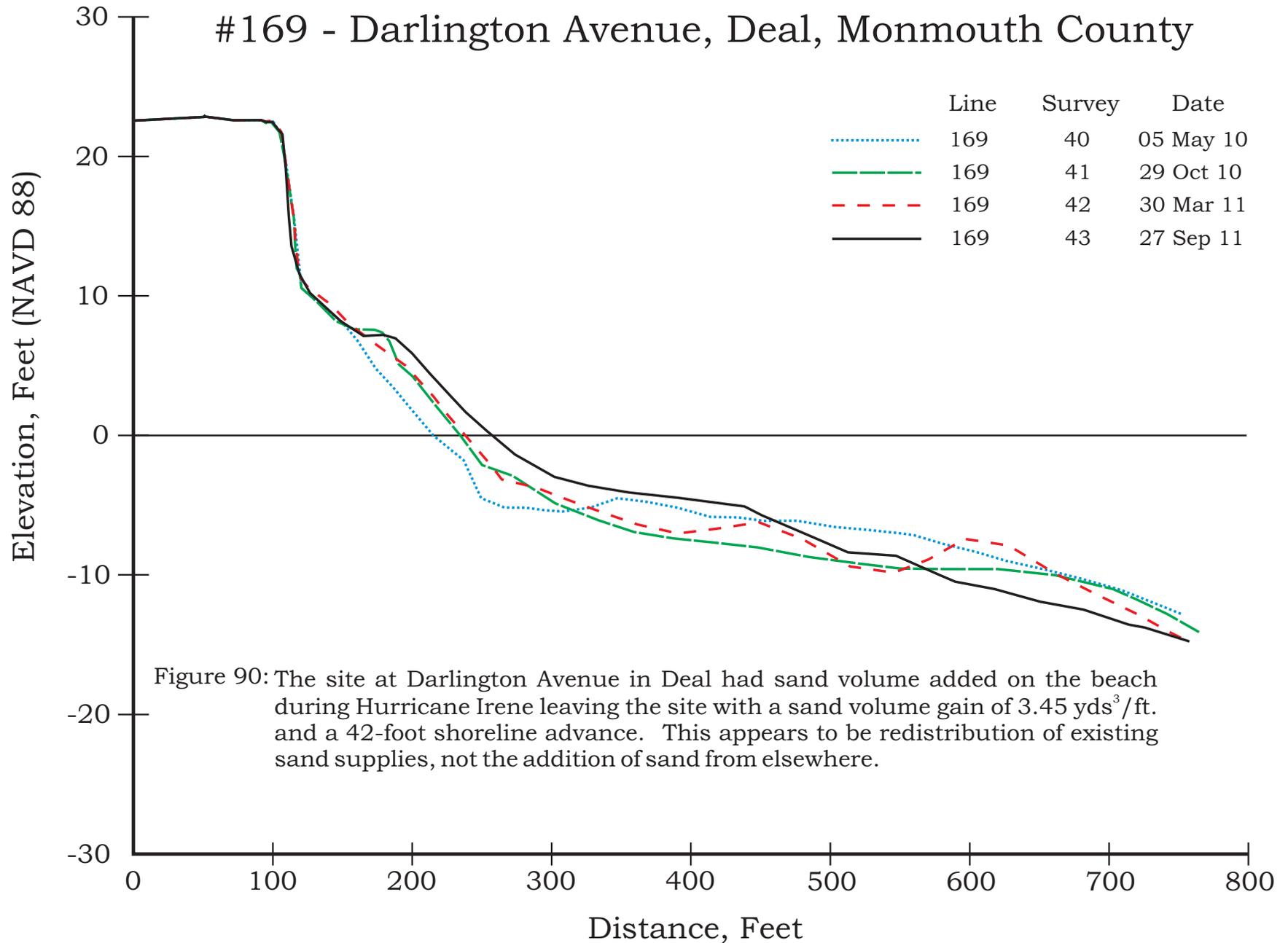
Site 169, Darlington Avenue, Deal – September 27, 2011



Figure 89. Shown above is the view looking south from on top of the bluff at Darlington Avenue in Deal, NJ.

# New Jersey Beach Profile Network

#169 - Darlington Avenue, Deal, Monmouth County



## DARLINGTON AVENUE, DEAL – SITE 169

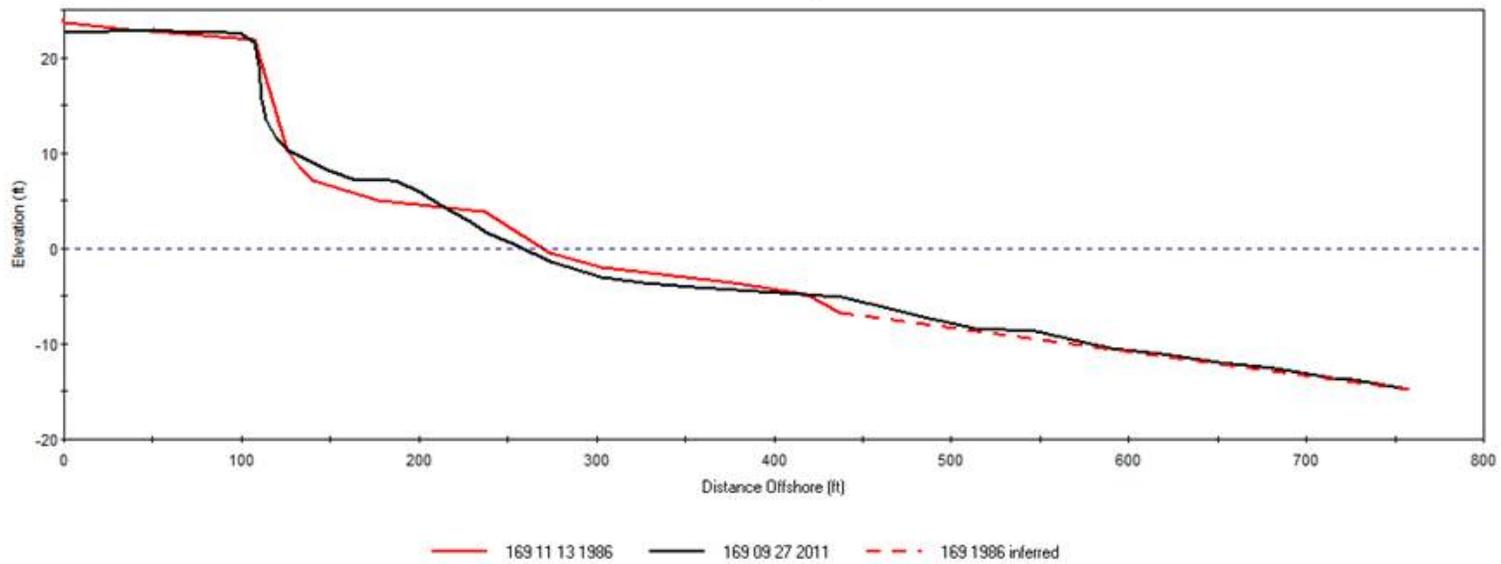


Figure 91. This site has been variable over the past 25 years with periods of erosion that can be attributed to the groins that limit northward transport of sand. Overall, this site has experienced little net change. (Left photo October 10, 1989 [view to the northeast]; right photo September 27, 2011 [view to the north]).



**25-Year Coastal Changes at Site 169, Darlington Avenue, Deal, Monmouth Co.**

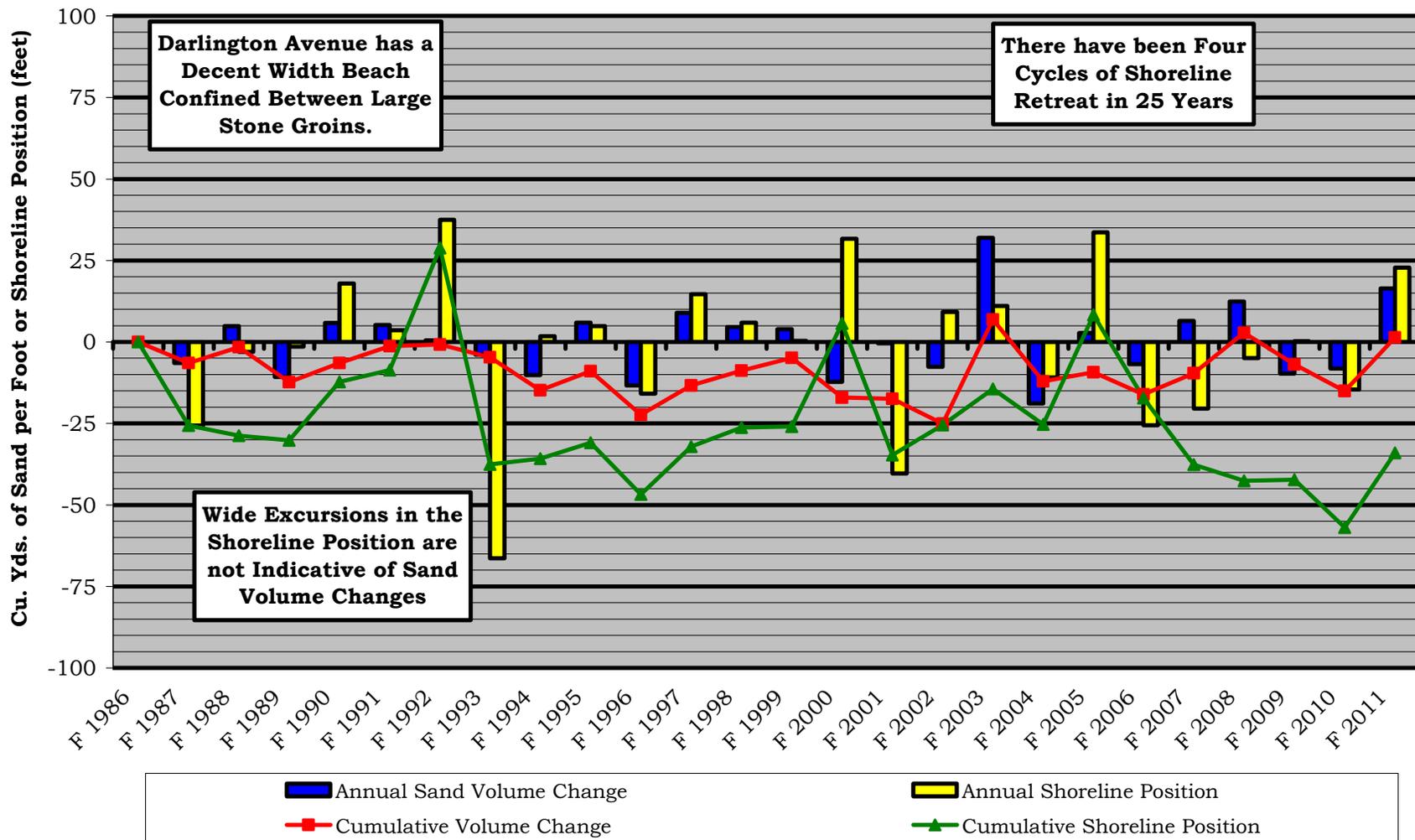


Figure 92. This site has had more sand within the groin compartment than most other Deal shoreline segments. This is because the bluff was less protected from direct wave erosion, which over time introduces new sand to the system as the bluff intermittently erodes and due to the presence of a large groin a block to the north at Roseld Avenue that traps sand from moving north. The variation in shoreline positions here has been less than that seen to the north, but the trend showing retreat that reverses following 1996 is similar. In spite of the similar shoreline retreat in 2006 that continued until 2010, the 25-year trend shows little net change to the beach over that time as sand moves around within the beach compartment formed by the two large groins.

Site 168, Corlies Avenue, Allenhurst – September 27, 2011



Figure 93. Shown above is the view looking east from on top of the seawall at Corlies Avenue in Allenhurst, NJ.

# New Jersey Beach Profile Network

#168 - Corlies Avenue, Allenhurst, Monmouth County



Figure 94: Allenhurst's beach is confined by a concrete wall that protects the sedimentary bluff from erosion, and a rock groin at the border with Deal. Hurricane Irene produced a wide, flatter beach with sand added near the concrete seawall, clipped of f the berm and deposited in abundance above the profile surveyed in April 2011 (43.78 yds<sup>3</sup>/ft. The 18-month sand volume increased by 63.09 yds<sup>3</sup>/ft. with a 90-foot shoreline advance seaward.

## CORLIES AVENUE, ALLENHURST – SITE 168

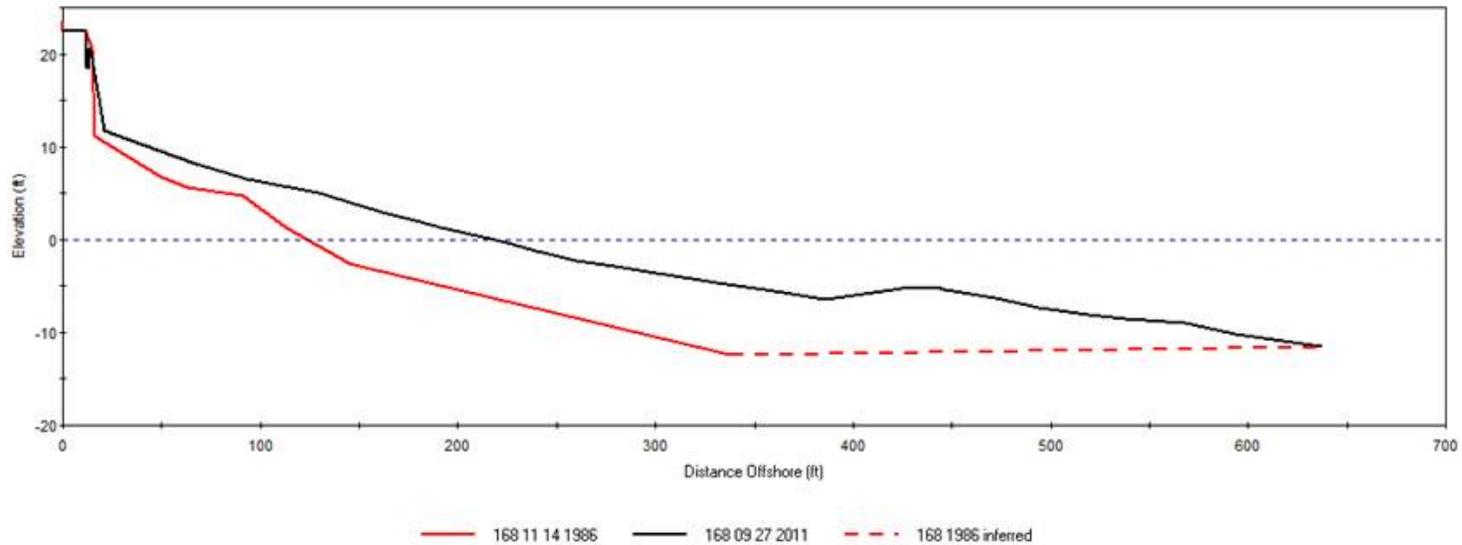


Figure 95. The municipality placed 180,000 cy of sand on this beach in 1989. Later, this beach benefitted from the beach nourishment that took place less than a mile to the south in Asbury Park. Overall, this site has experienced a net gain of sand. (Left photo October 25, 1991 [view to the north]; right photo September 27, 2011 [view to the north]).



## 25-Year Coastal Changes at Site 168, Corlies Avenue, Allenhurst, Monmouth Co.

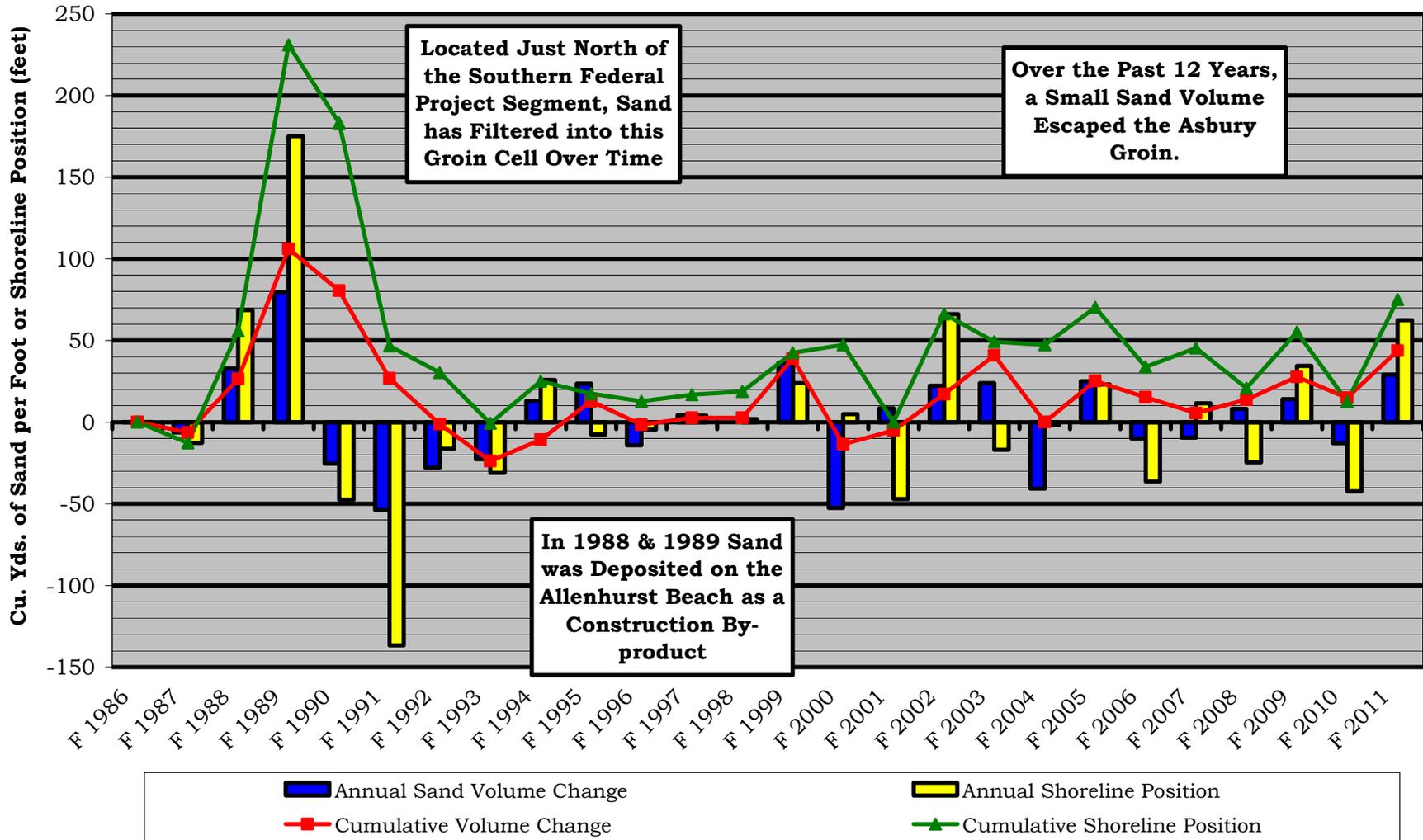


Figure 96. Positioned less than a mile north of Asbury Park where the ACOE project commenced south to the Manasquan Inlet, this Allenhurst site also shows a post-construction positive trend in shoreline position and sand volume since 2000. The big spike in 1989 was due to the municipality trucking in 180,000 cubic yards of sand placed directly onto this locally important recreational beach. The shoreline advanced almost 200 feet seaward, and then proceeded to retreat until 1993 where it stabilized. Since 2000 the beach has slowly gained sand as a result of sand escaping the Asbury Groin to the south.

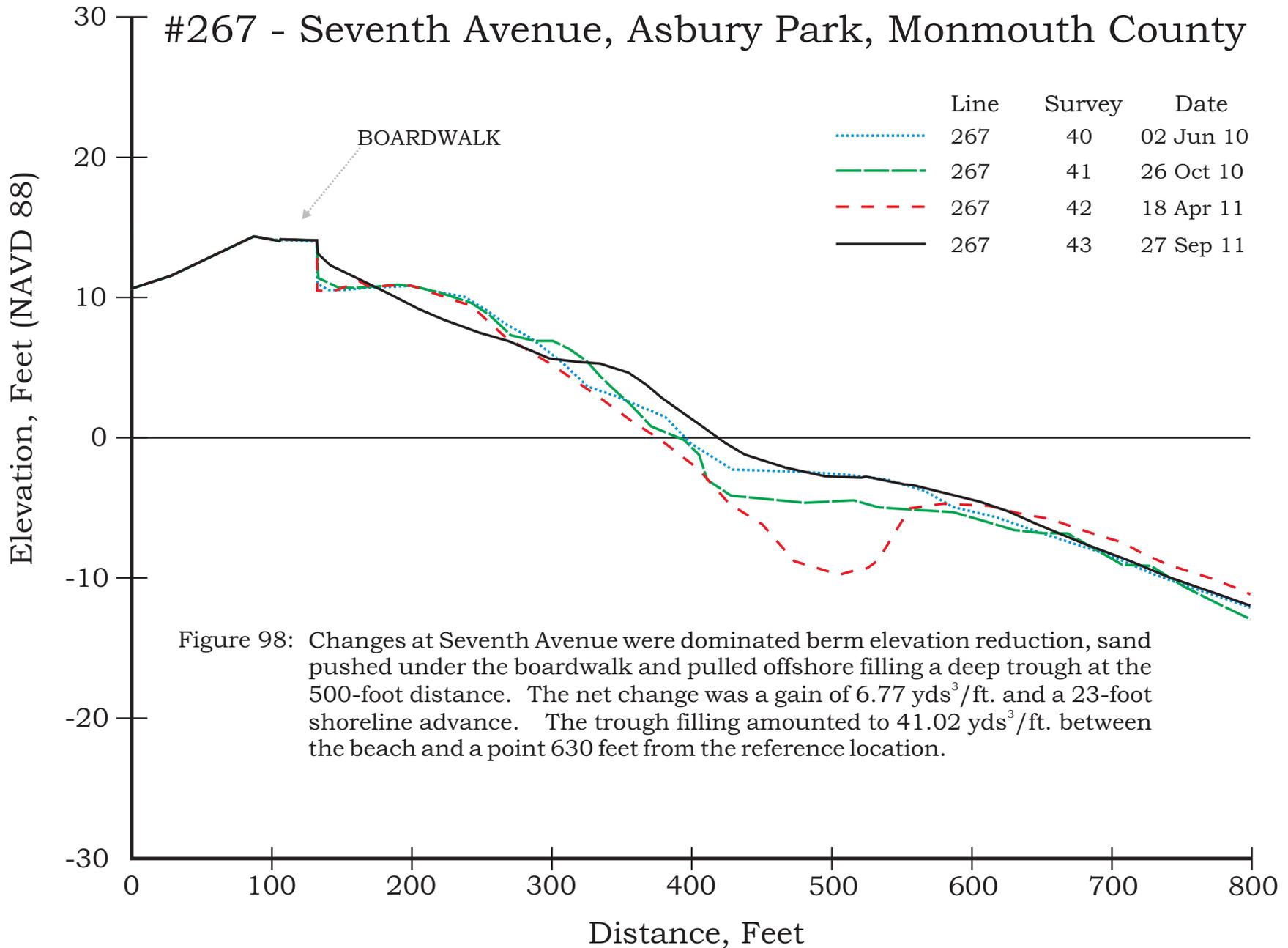
Site 267, 7<sup>th</sup> Avenue, Asbury Park – September 27, 2011



Figure 97. Shown above is the view looking south from the boardwalk at 7<sup>th</sup> Avenue in Asbury Park, NJ.

# New Jersey Beach Profile Network

#267 - Seventh Avenue, Asbury Park, Monmouth County



## 7<sup>th</sup> AVENUE, ASBURY PARK – SITE 267

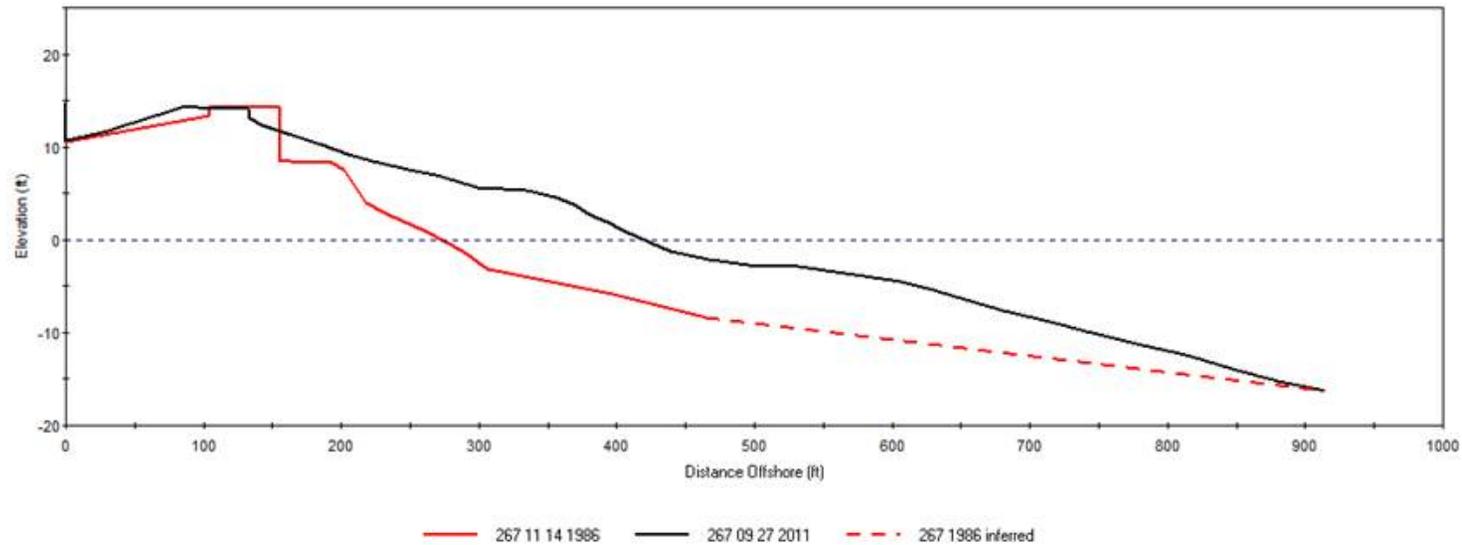
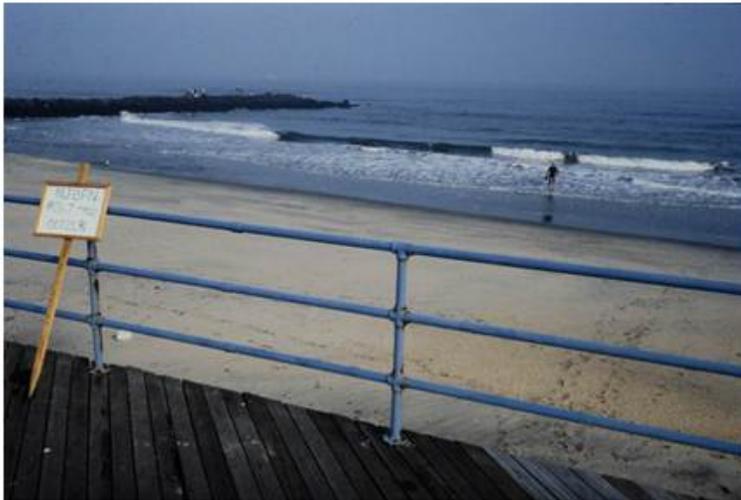


Figure 99. Sand was last added to this site in 1999 by the USACE, and little sand has left the system since that time. No dunes were created by the Federal project due to the heavy recreational use. (Left photo October 25, 1991 [view to the northeast]; right photo September 27, 2011 [view to the north]).



**25-Year Coastal Changes at Site 267, Seventh Avenue Asbury Park, Monmouth Co.**

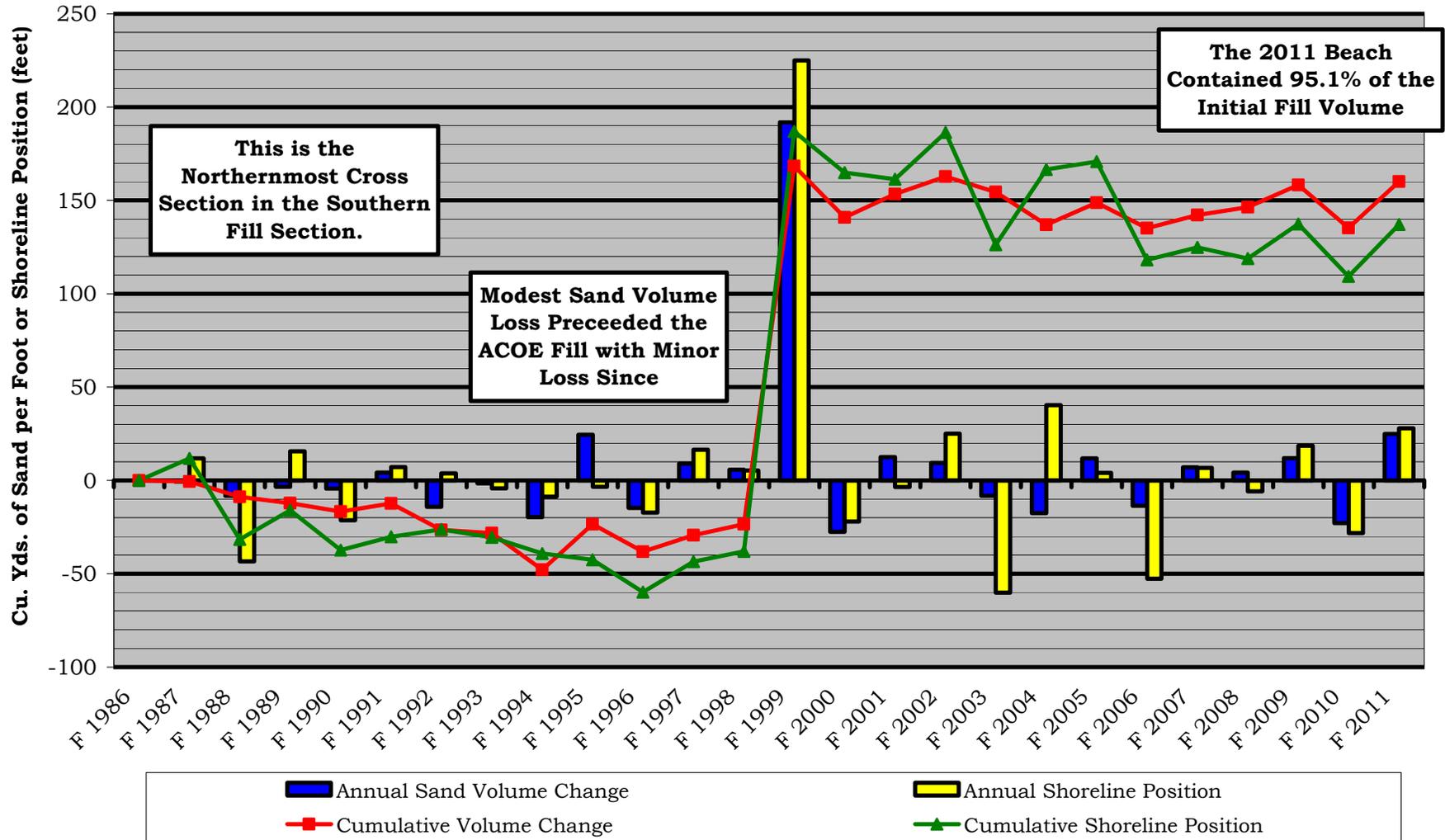


Figure 100. Located two blocks from Deal Lake in Asbury Park, the effects of the 1999 ACOE shore protection project are clear. Despite that no new sand has been added here since 1999 the 2011 beach contained 95.1% of the initial fill volume.

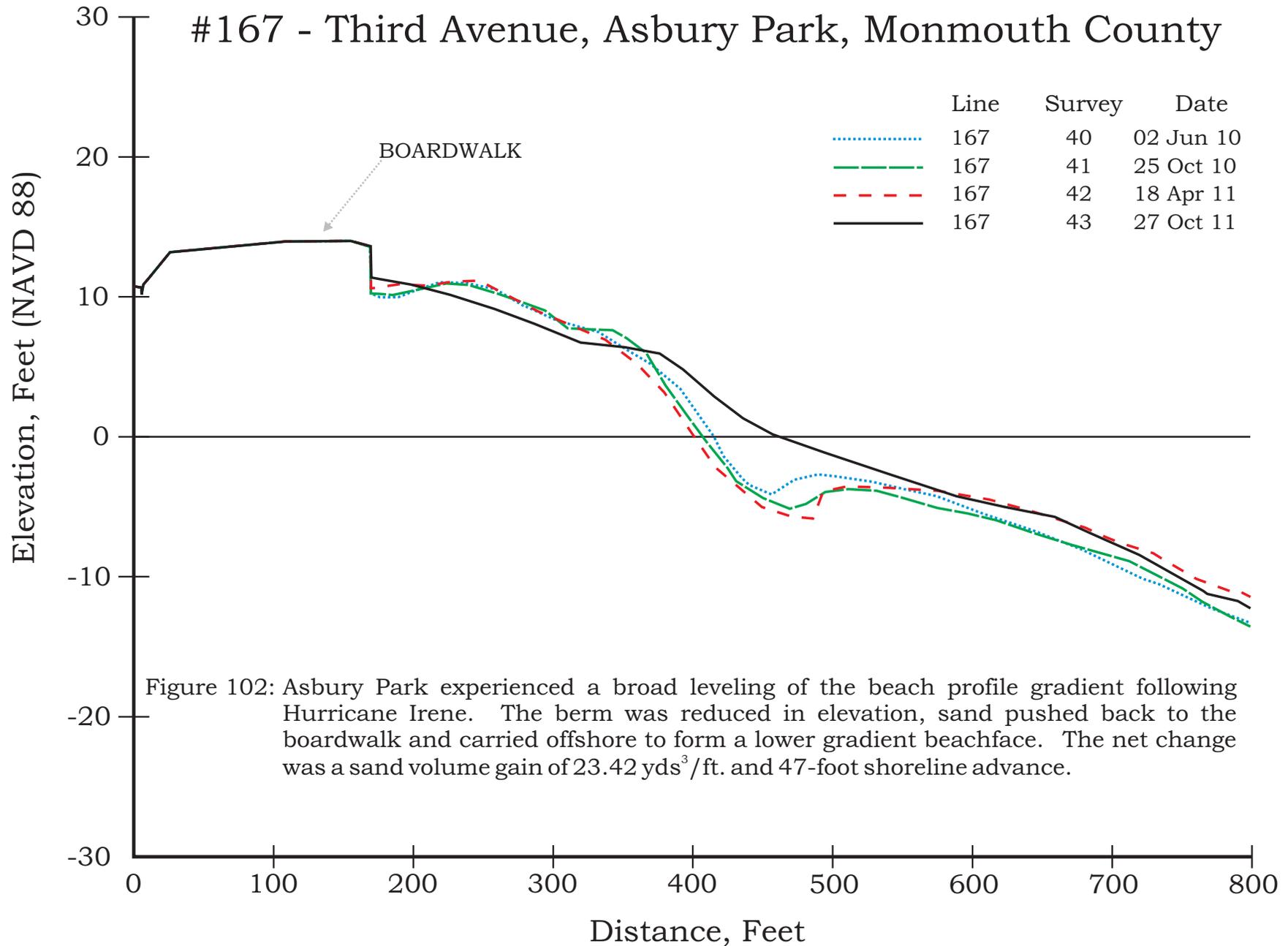
**Site 167, 3rd Avenue, Asbury Park – September 27, 2011**



**Figure 101. Shown above is the view looking north from the berm at 3<sup>rd</sup> Avenue in Asbury Park, NJ.**

# New Jersey Beach Profile Network

#167 - Third Avenue, Asbury Park, Monmouth County



### 3<sup>rd</sup> AVENUE, ASBURY PARK – SITE 167

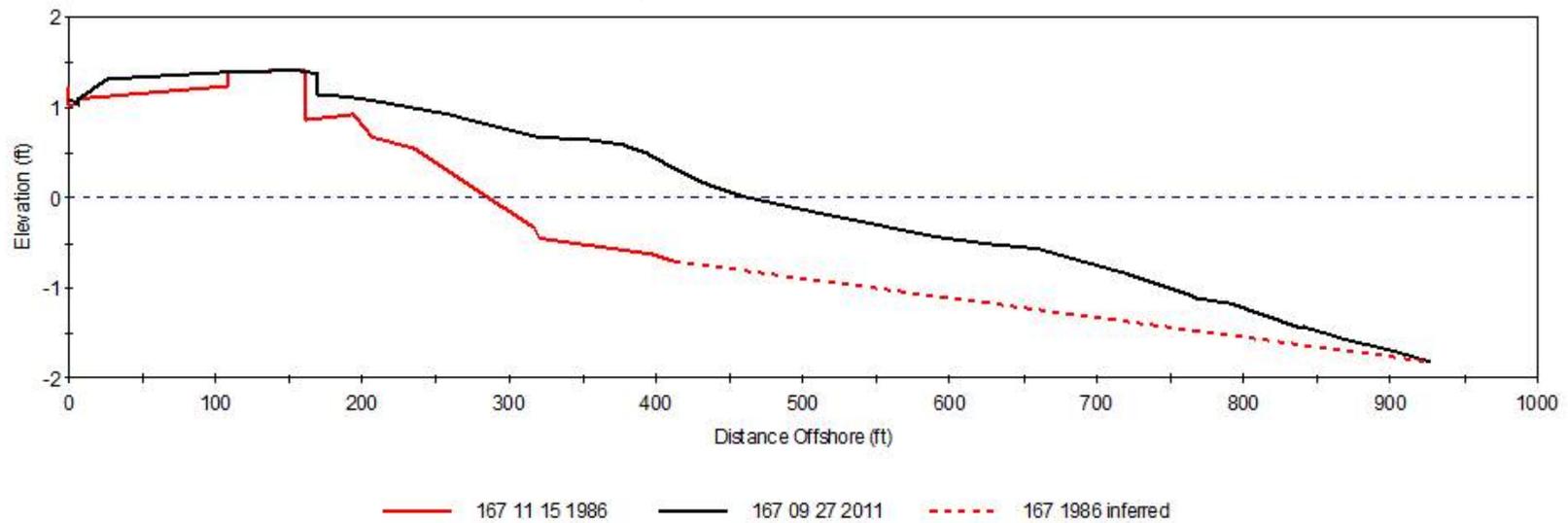
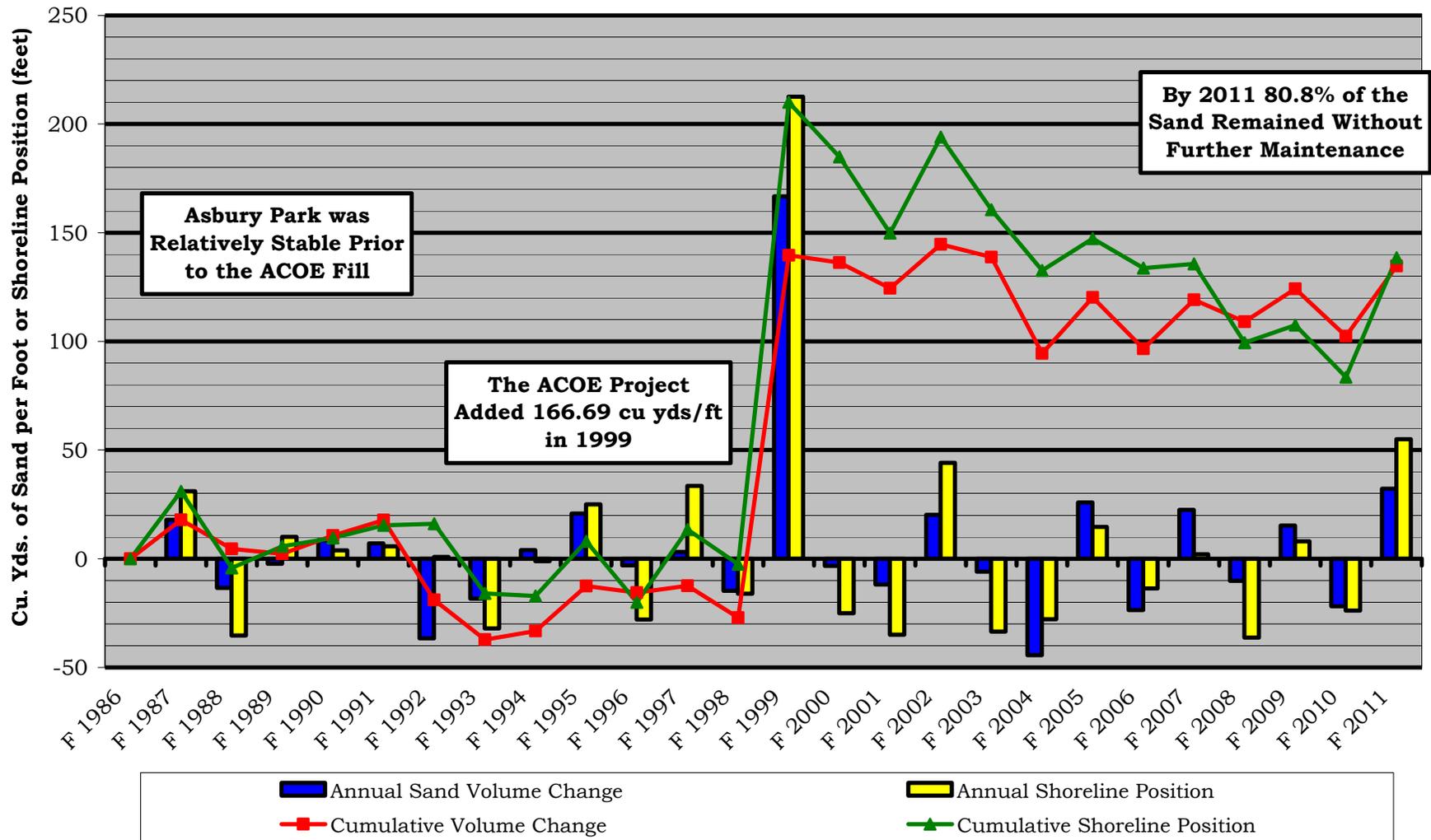


Figure 103. Sand was added to this site during the 1998 Federal beach nourishment project. No dunes were created because of the heavy recreational use. Wind transports the sand landward under the boardwalk and later removed by the municipality so that no dunes establish. (Left photo October 25, 1991 [view to the northeast]; right photo September 27, 2011 [view to the northeast]).



**25-Year Coastal Changes at Site 167, Third Avenue, Asbury Park, Monmouth Co.**



**Figure 104. The Third Avenue location in Asbury Park received the Federal beach nourishment in 1999. No additional work has been required since. Four of the eleven years since saw additional natural accretion that helped keep the beach near the ACOE sand placement volume seen in 1999. The fall 2009 survey preceded the majority of the northeast events so those losses are reflected in the decline in 2010. The shoreline advanced and the site gained in volume in 2011.**

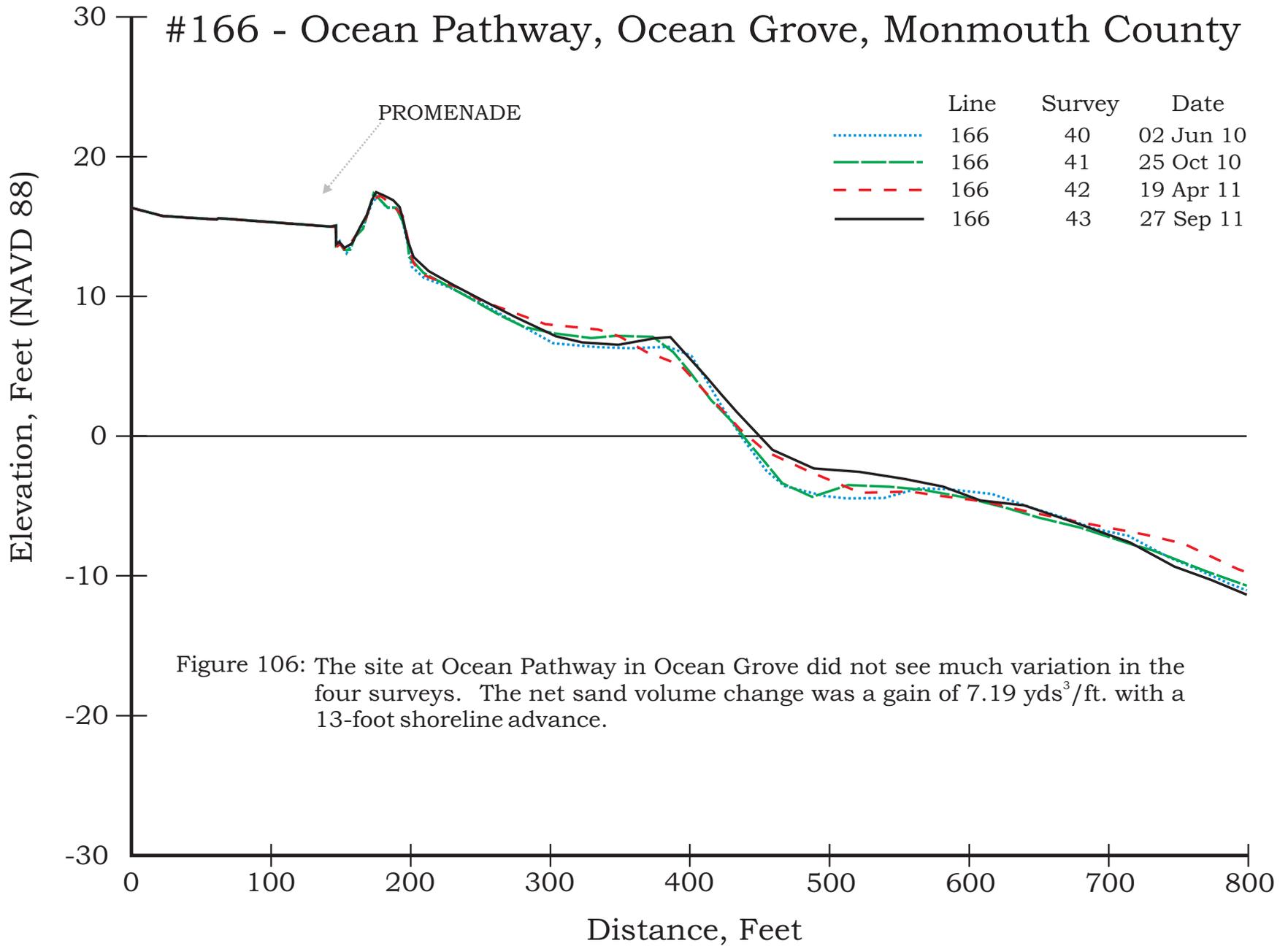
Site 166, Ocean Pathway, Ocean Grove – September 27, 2011



Figure 105. Shown above is the view looking northeast from the dune at Ocean Pathway in Ocean Grove, NJ.

# New Jersey Beach Profile Network

#166 - Ocean Pathway, Ocean Grove, Monmouth County



## OCEAN PATHWAY, OCEAN GROVE– SITE 166

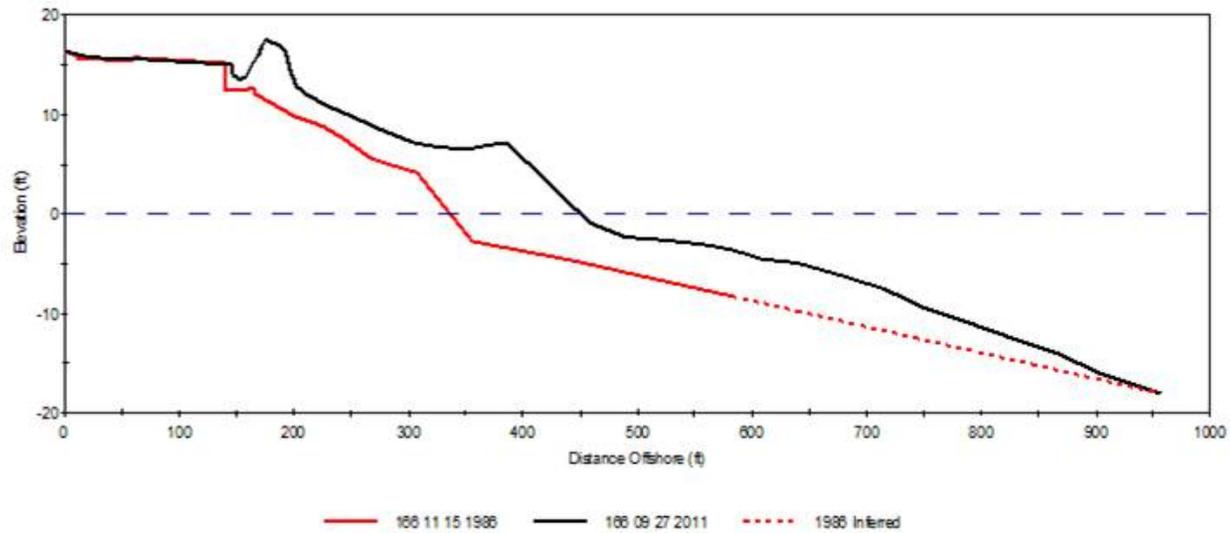


Figure 107. The USACE completed a beach nourishment project in 1999 which attributed to greater than a 300-ft advance of the shoreline. This site has remained relatively stable and no maintenance sand has been added here. Left photo October 14, 1988 [view to the northeast]; right photo September 27, 2011 [view to the northeast].



**25-Year Coastal Changes at Site 166, Ocean Pathway, Ocean Grove, Monmouth Co.**

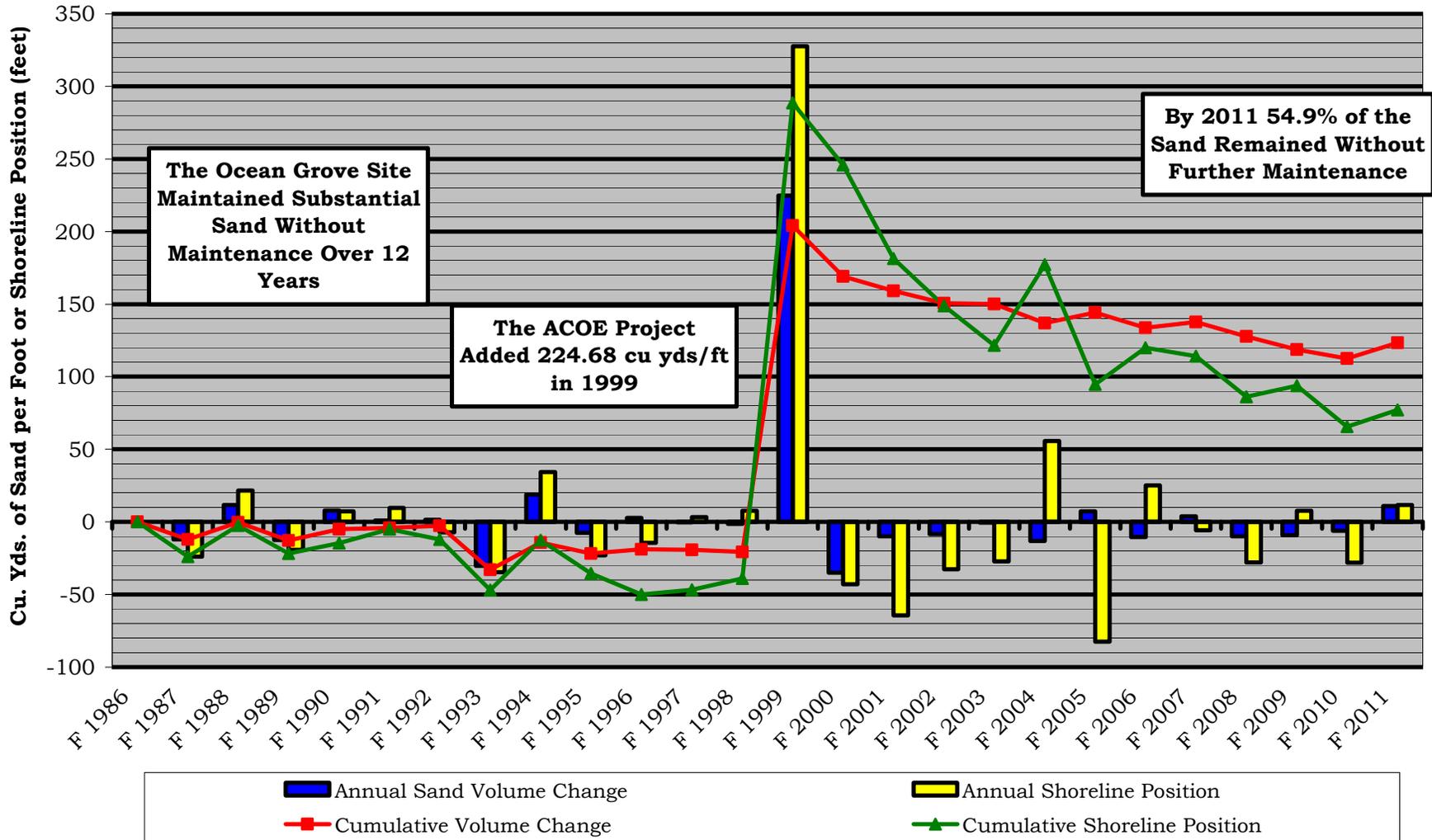


Figure 108. The extended period of slow shoreline retreat ended in 1999 with a better than 300-foot advance in the position with the fill project construction. Since 2000 there has been a pattern of slow sand volume loss and shoreline retreat which continued through 2011. By 2011 54.9% of the sand remained from the ACOE fill in 1998.

Site 165, McCabe Avenue, Bradley Beach – September 27, 2011

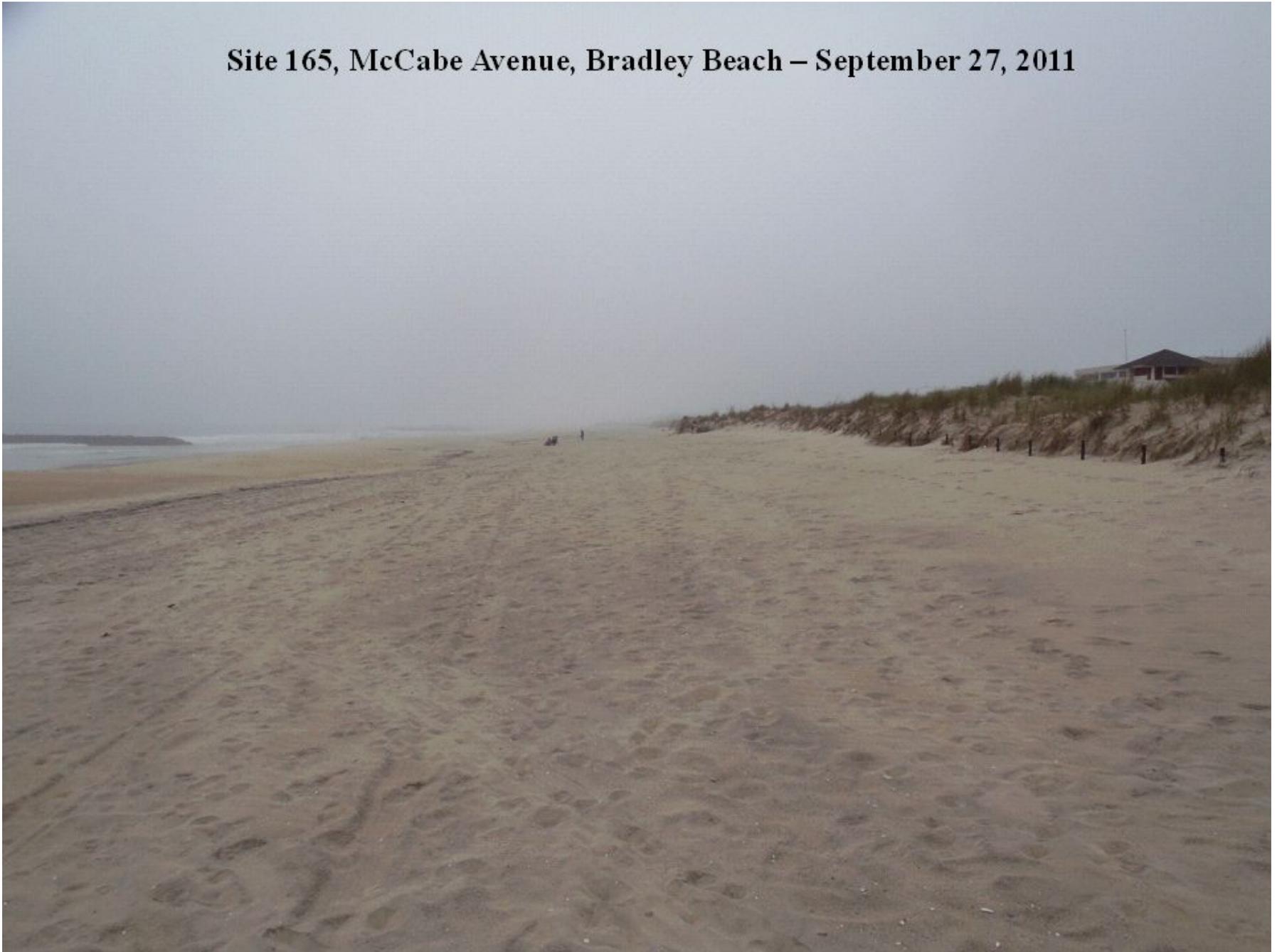
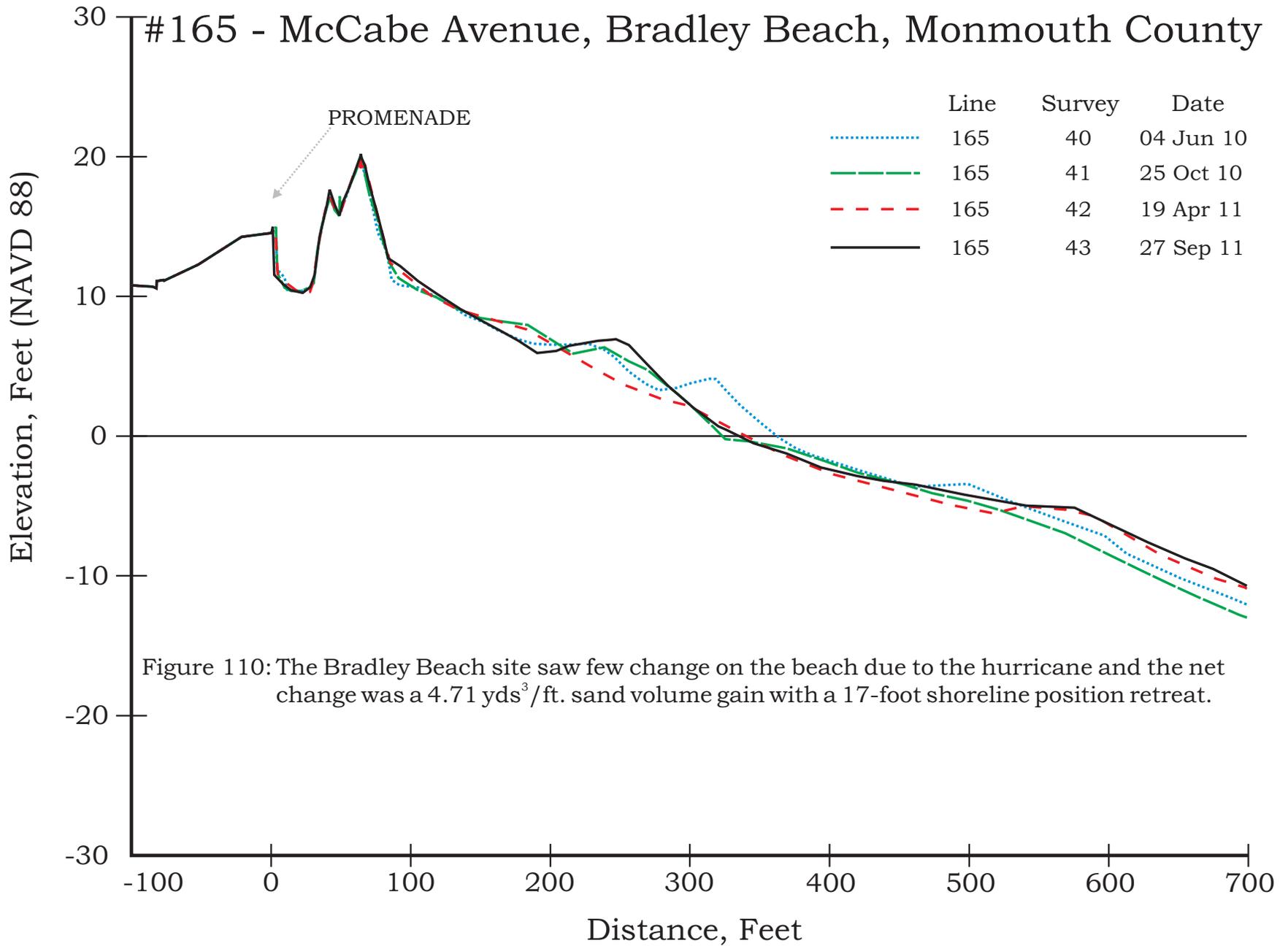


Figure 109. View to the south along the dunes on the upper beach.

# New Jersey Beach Profile Network

#165 - McCabe Avenue, Bradley Beach, Monmouth County



## McCABE AVENUE, BRADLEY BEACH – SITE 165

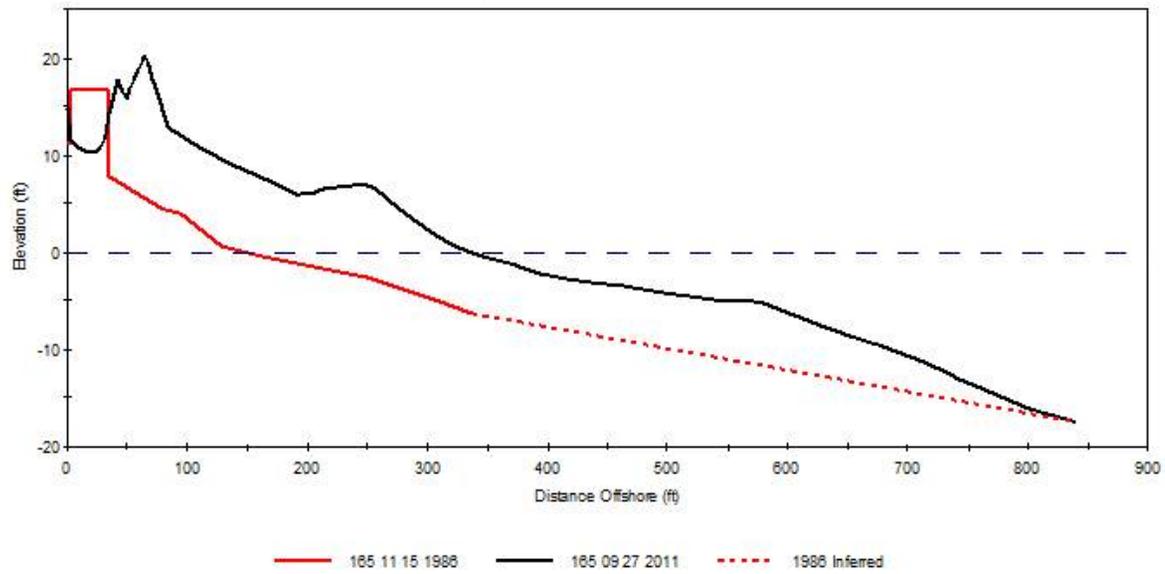


Figure 111. The boardwalk shown in the 1988 photo and cross section above was damaged in the 1992 nor'easter and the municipality moved it landward to the top of the bluff. This site received sand from the 1999 Federal beach nourishment project. No maintenance sand has been added here as the site remains relatively stable. (Left photo October 14, 1988 [view to the east]; right photo September 27, 2011 [view to the northeast]).



**25-Year Coastal Changes at Site 165, McCabe Avenue, Bradley Beach, Monmouth Co.**

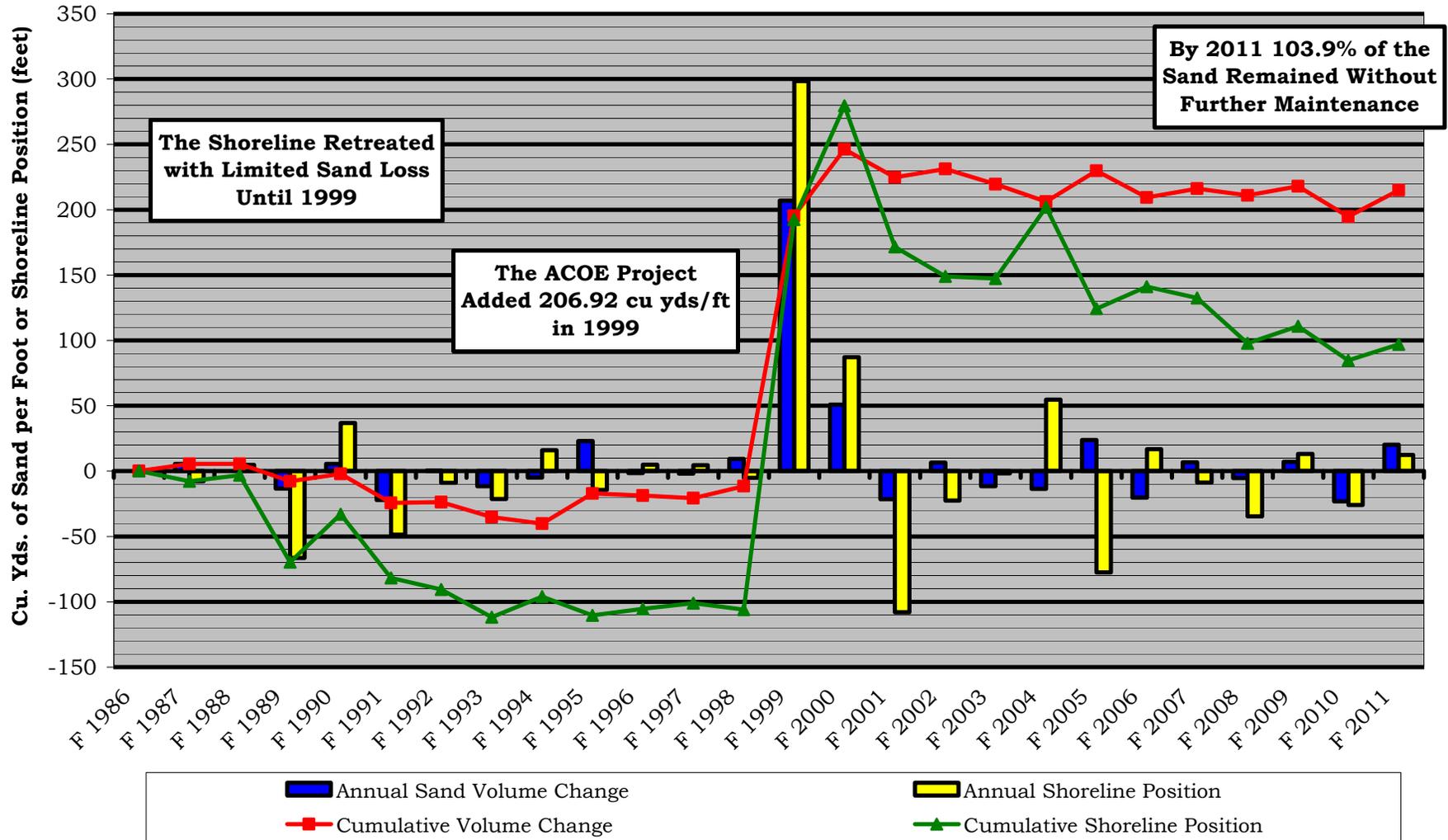


Figure 112. The rate of shoreline retreat was greater in Bradley Beach than in Ocean Grove prior to the ACOE project. The 1992 storm forced the municipality to pull the boardwalk completely off the beach and move it onto the top edge of the bluff. This provided an additional 40 feet of badly needed recreational beach area following the storm. The beachfill in 1999 added significant width to the beach and was followed by a further shoreline advances in 2000. Since 2000 the sand volume remained stable while the shoreline position slowly retreated.

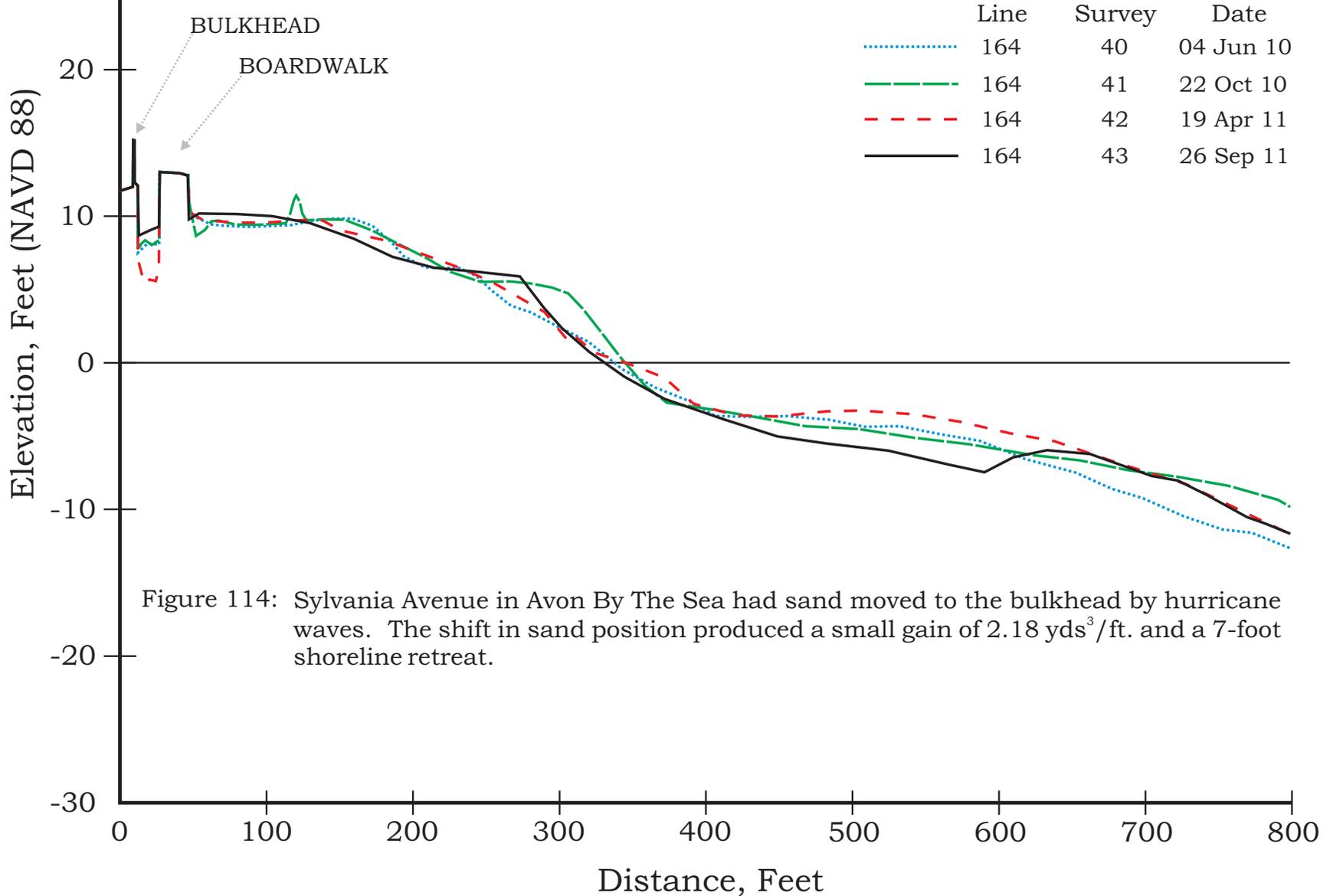
**Site 164, Sylvania Avenue, Avon By the Sea – September 26, 2011**



**Figure 113. View to the south on the beachface looking toward Shark River Inlet.**

# New Jersey Beach Profile Network

#164 - Sylvania Avenue, Avon By The Sea, Monmouth County



## SYLVANIA AVENUE, AVON BY THE SEA – SITE 164

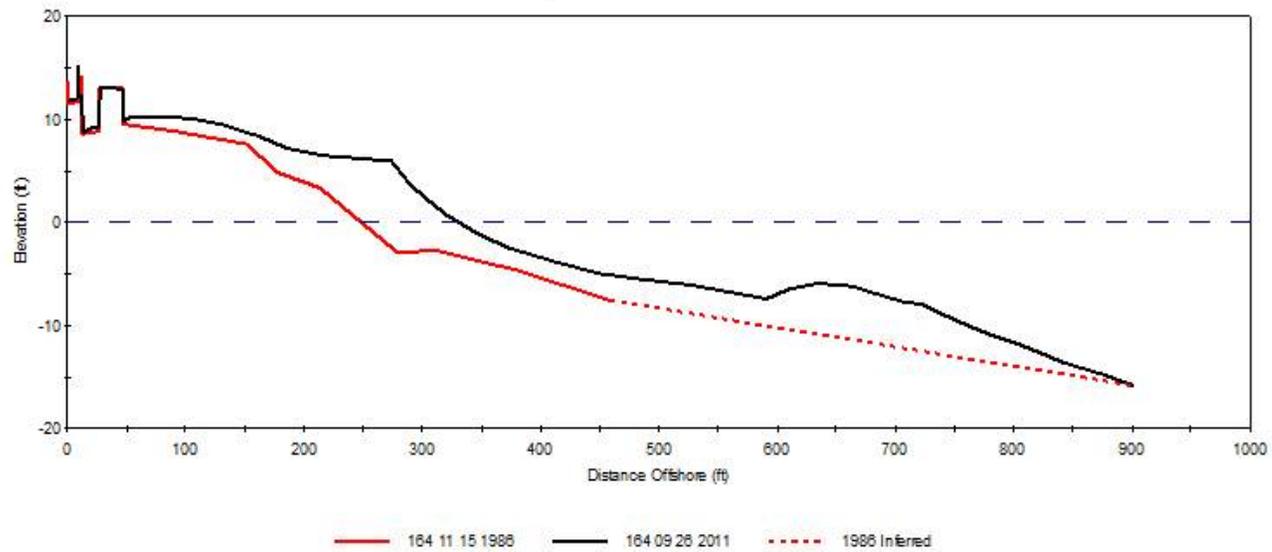


Figure 115. The shoreline began advancing two years prior to the 1999 Federal beach nourishment project. No dunes were constructed because of the heavy recreational use. The site remains relatively stable as no maintenance fill has been required. (Left photo October 17, 1990 [view to east]; right photo September 26, 2011 [view to the northeast]).



## 25-Year Coastal Changes at Site 164, Sylvania Avenue, Avon-By-The-Sea, Monmouth Co.

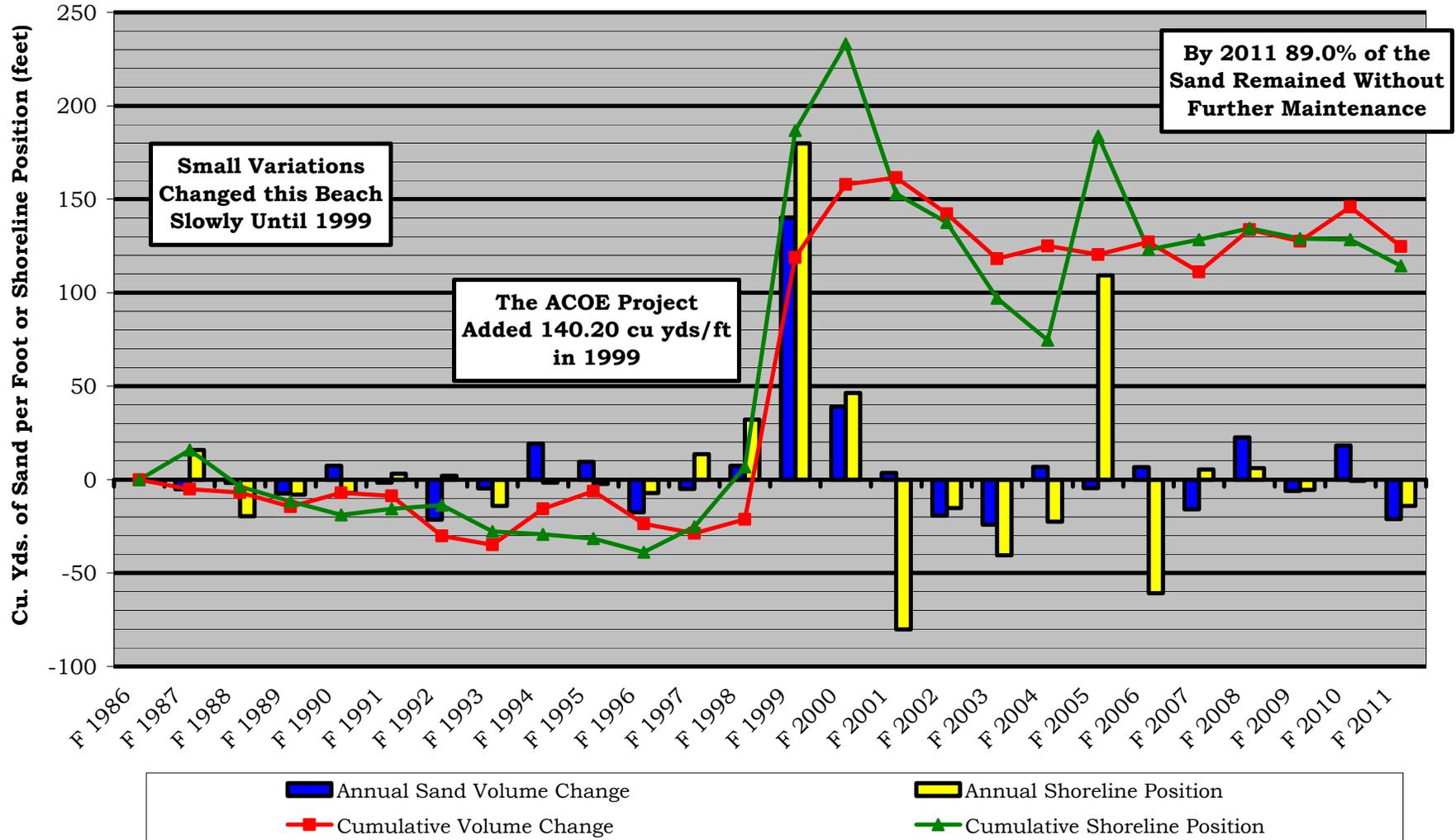


Figure 116. Between 1986 and 1996 the shoreline was slowly retreating as sand left the Avon beachfront. This trend reversed in 1997 for two years prior to the ACOE project was completed in 1999. Sand continued to accumulate advancing the shoreline another 40 feet by 2000. There were fluctuations in shoreline position in 2001, 2005, and 2006, but despite that the sand volume has remained relatively stable. By 2011 89% of the sand remained which was placed from the 1998 fill project.

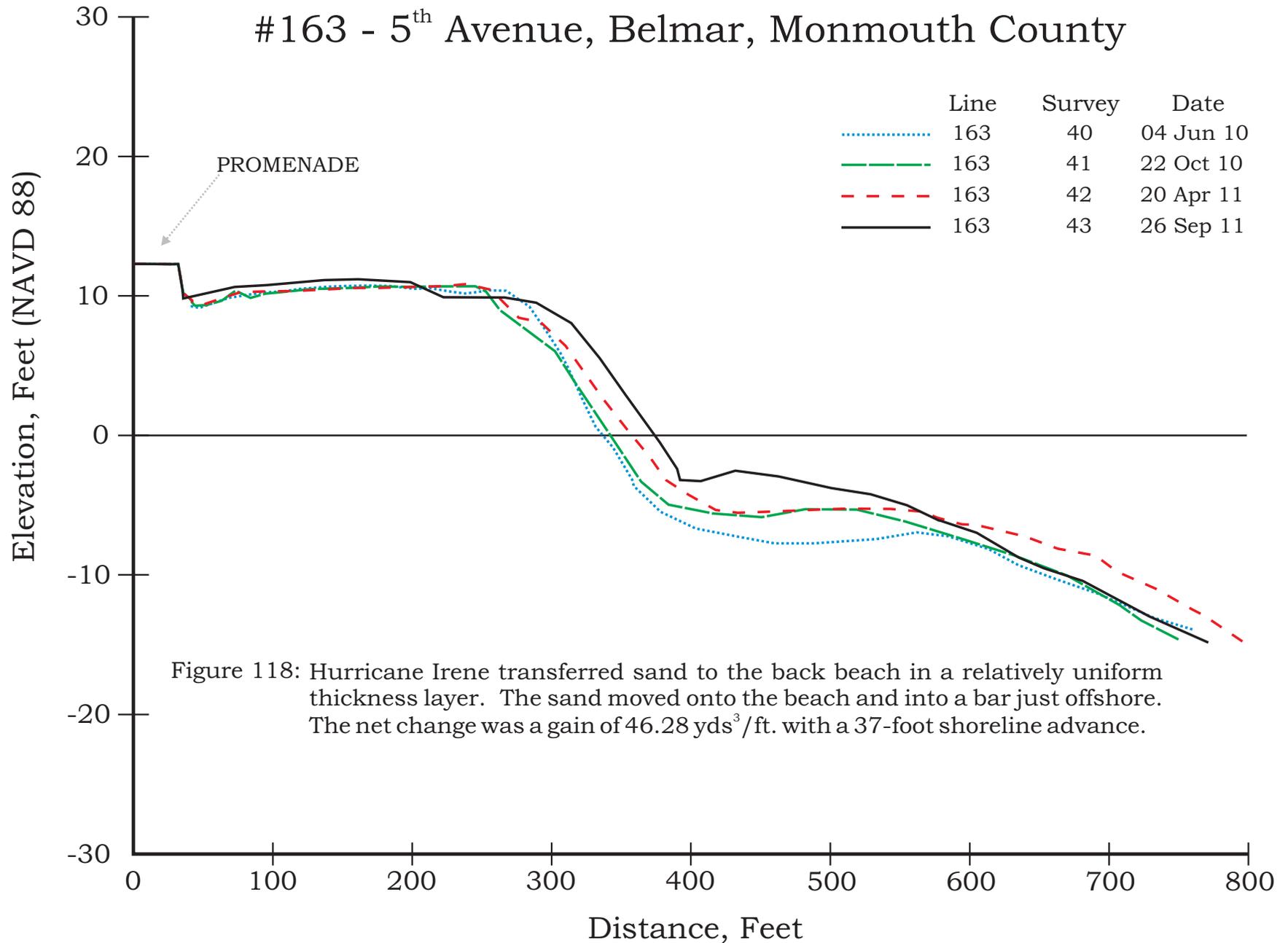
Site 163, 5<sup>th</sup> Avenue, Belmar – September 26, 2011



Figure 117. View to the south along the beach at 5<sup>th</sup> Avenue in Belmar.

# New Jersey Beach Profile Network

#163 - 5<sup>th</sup> Avenue, Belmar, Monmouth County



### 5<sup>TH</sup> AVENUE, BELMAR – SITE 163

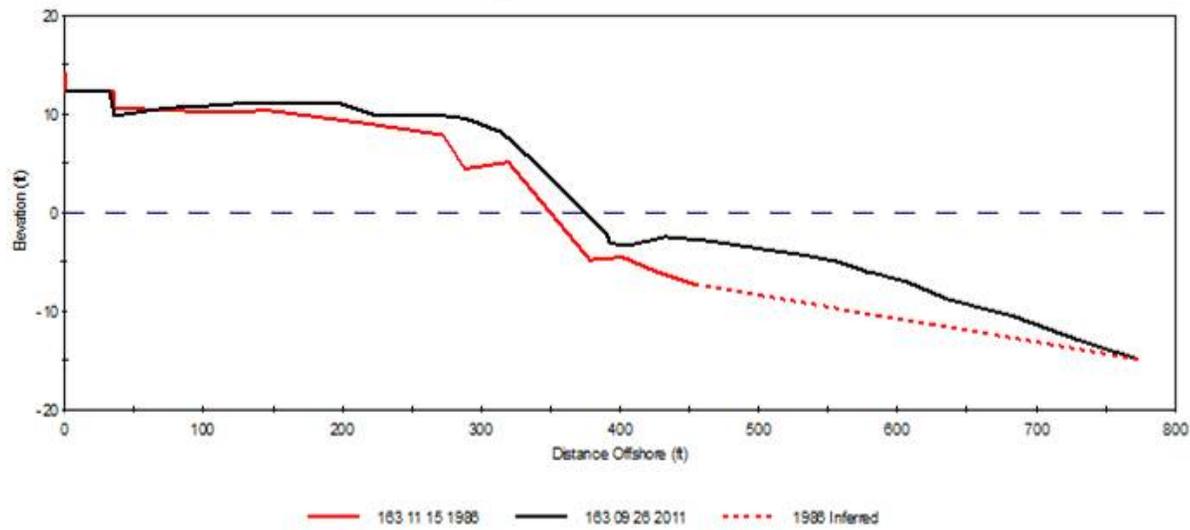


Figure 119. This site is located close to the south jetty of Shark River Inlet and has remained relatively stable over time. Variations in the shoreline location and volume are attributed to the balance of the littoral sand transport and movement of sand from offshore. (Left photo October 14, 1988 [view to the east]; right photo September 26, 2011 [view to the north]).



### 25-Year Coastal Changes at Site 163, Fifth Avenue, Belmar, Monmouth Co.

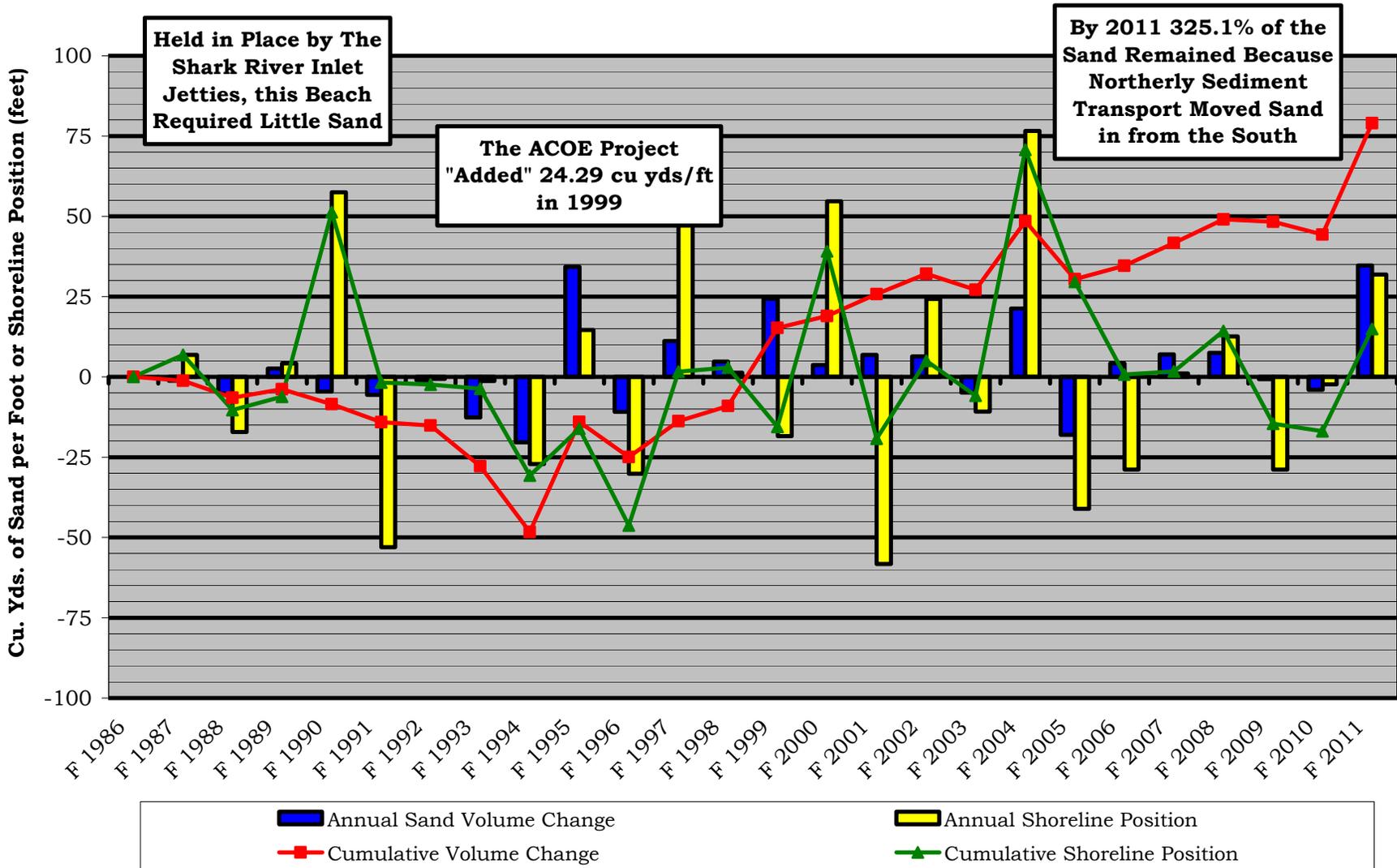


Figure 120. This site received little direct sand placement due to its proximity to the Shark River Inlet. The south inlet jetty accumulates sand and as a result formed a wide recreational beach for decades preceding the fill, and the ACOE project manager determined that no sand would be added to regional beaches in proximity to the jetty. The pattern of accretion has continued in the years following the fill; by 2011 325.1% of the sand remained as a result of the northerly sediment transport movement.

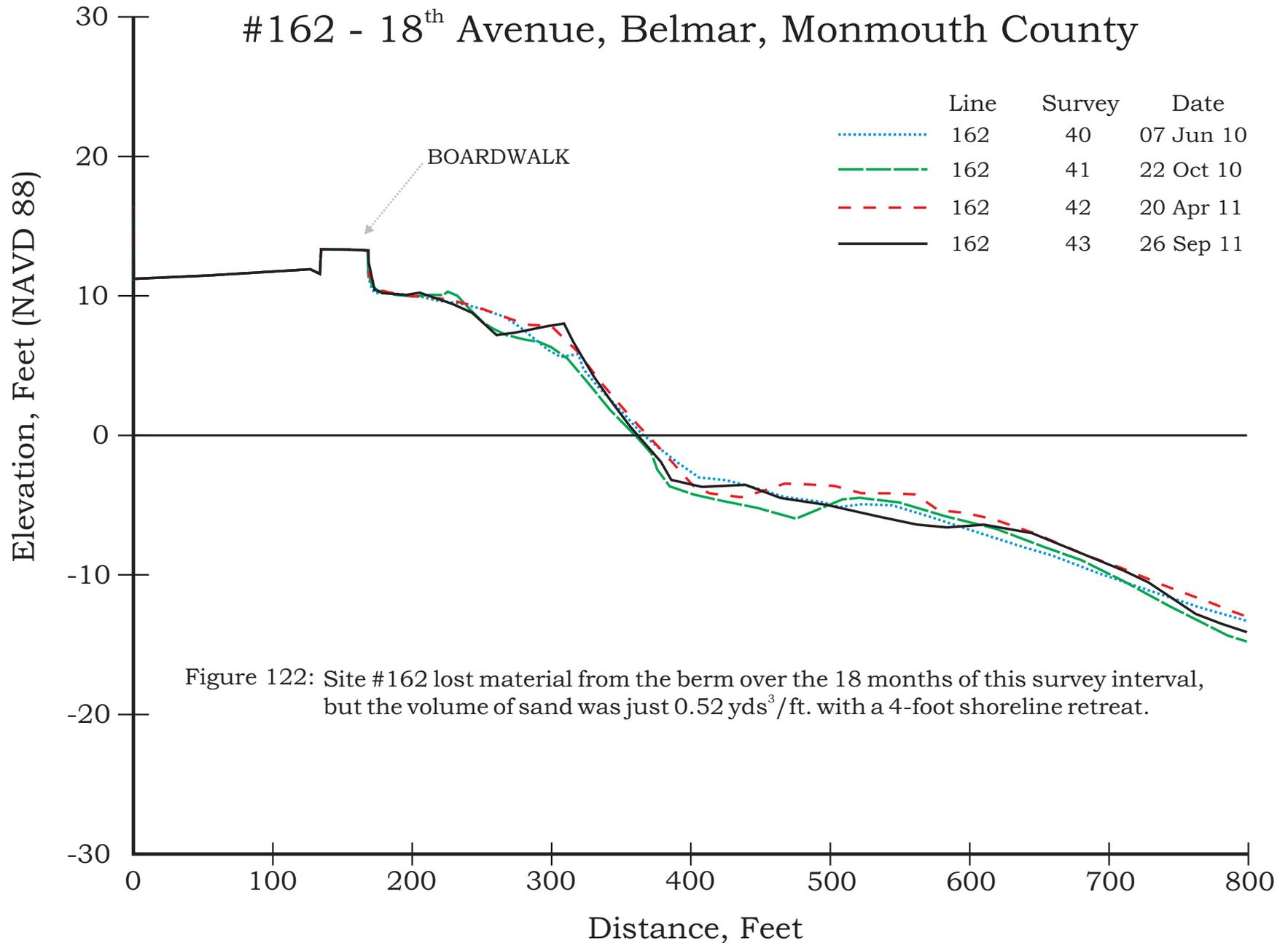
**Site 162, 18<sup>th</sup> Avenue, Belmar – September 26, 2011**



**Figure 121. View to the north along the berm in Belmar, NJ.**

# New Jersey Beach Profile Network

#162 - 18<sup>th</sup> Avenue, Belmar, Monmouth County



## 18<sup>TH</sup> AVENUE, BELMAR – SITE 162

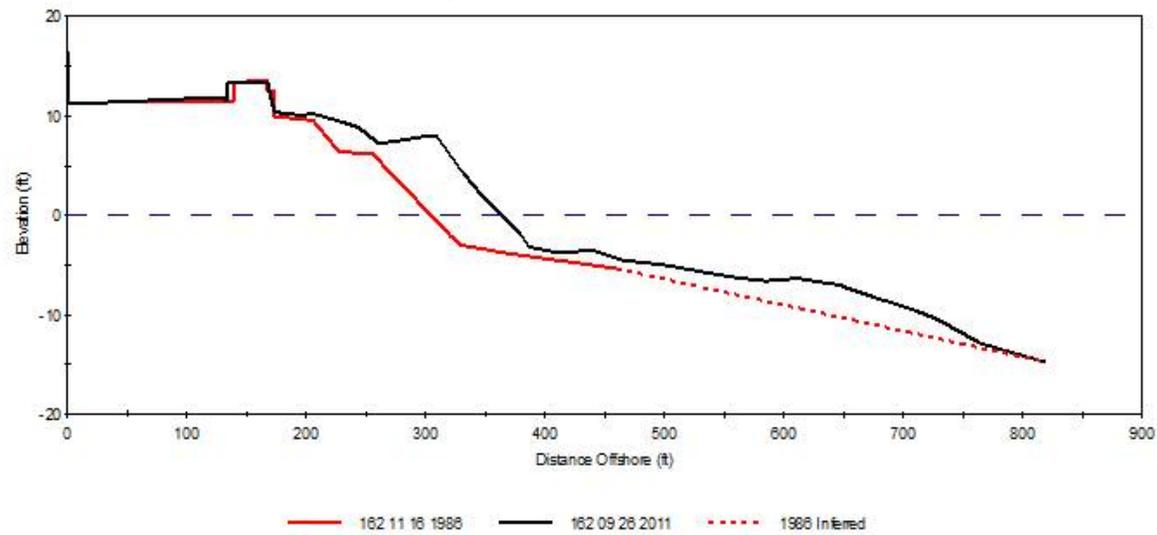


Figure 123. Sand was added to this site in the 1997 Federal beach nourishment project. Since that time, the site has had small amounts of gains and losses, but overall remains relatively stable. (Left photo October 9, 1989 [view to the east]; right photo September 26, 2011 [view to the north]).



### 25-Year Coastal Changes at Site 162, Eighteenth Avenue, Belmar, Monmouth Co.

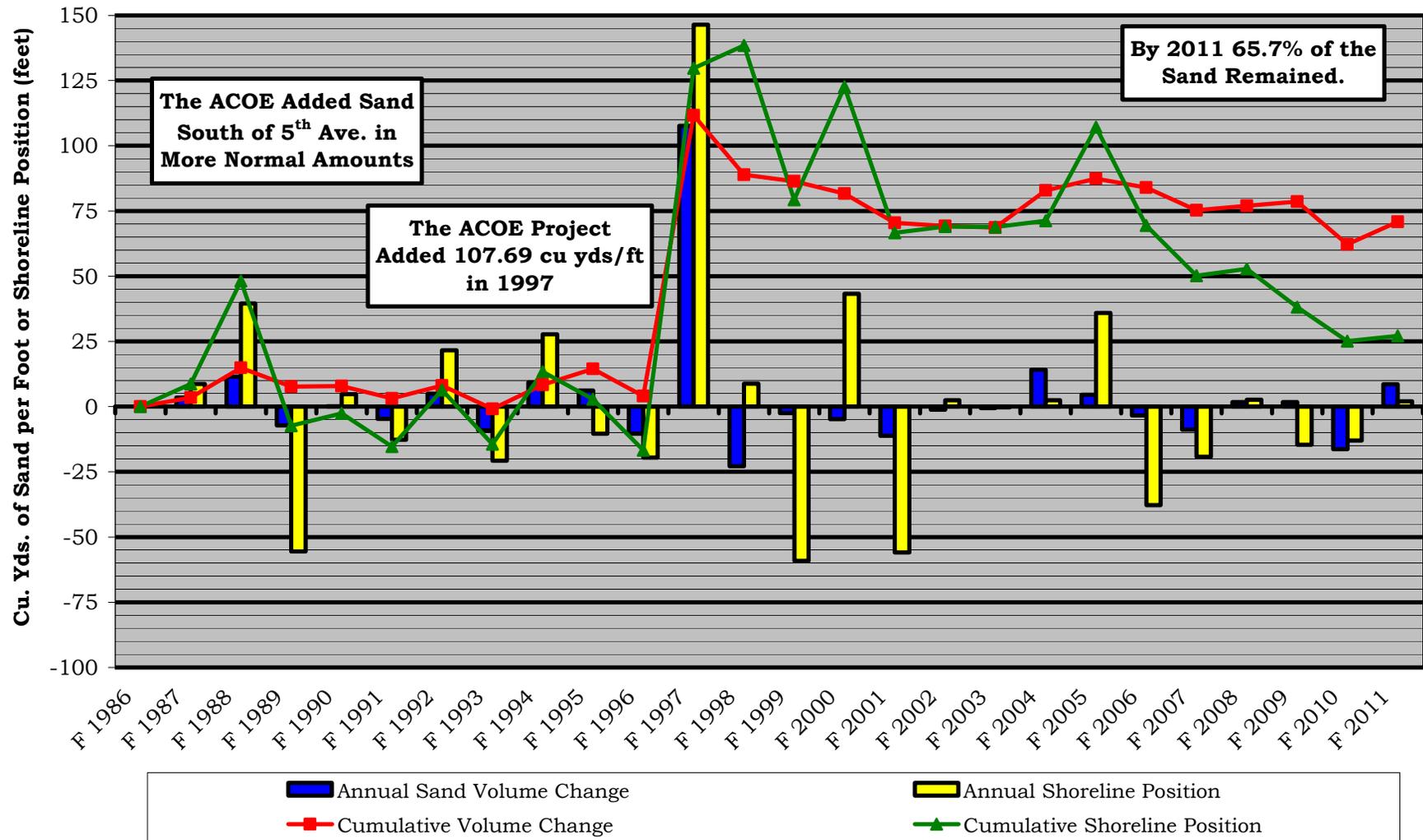


Figure 124. At the 18<sup>th</sup> Avenue beach, the ACOE project did provide a 150-foot advance to the shoreline position. That was followed by a period of oscillation of the shoreline and sand volume decline until 2001 when both stabilized. Recovery occurred until 2006. In 2007 a pattern of shoreline retreat began while the sand volume has remained relatively stable. By 2011 65.7% of the sand remained from the 1997 fill.

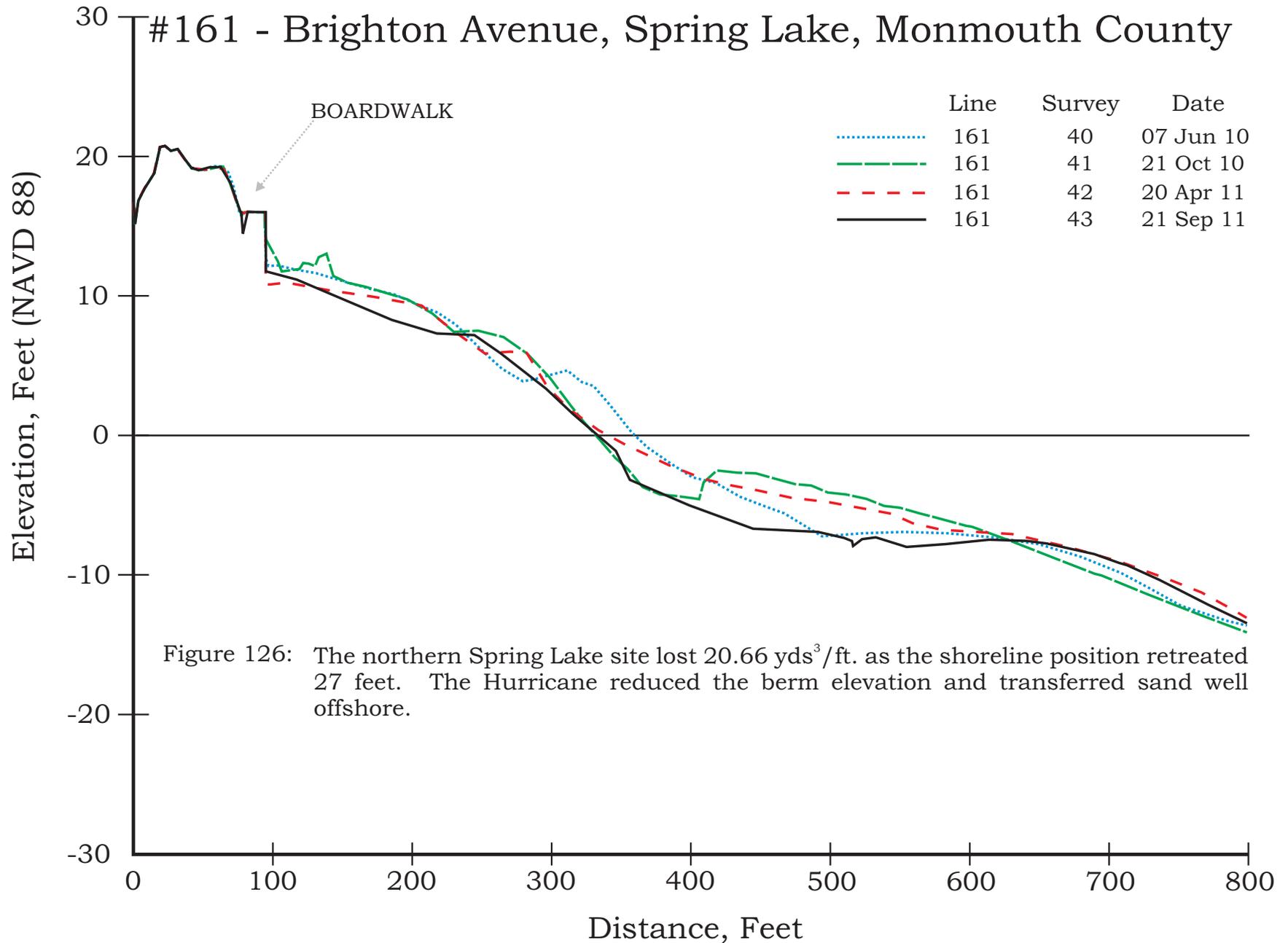
Site 161, Brighton Avenue, Spring Lake – September 21, 2011



Figure 125. View looking north along the wave swash line in Spring Lake.

# New Jersey Beach Profile Network

#161 - Brighton Avenue, Spring Lake, Monmouth County



## BRIGHTON AVENUE, SPRING LAKE – SITE 161

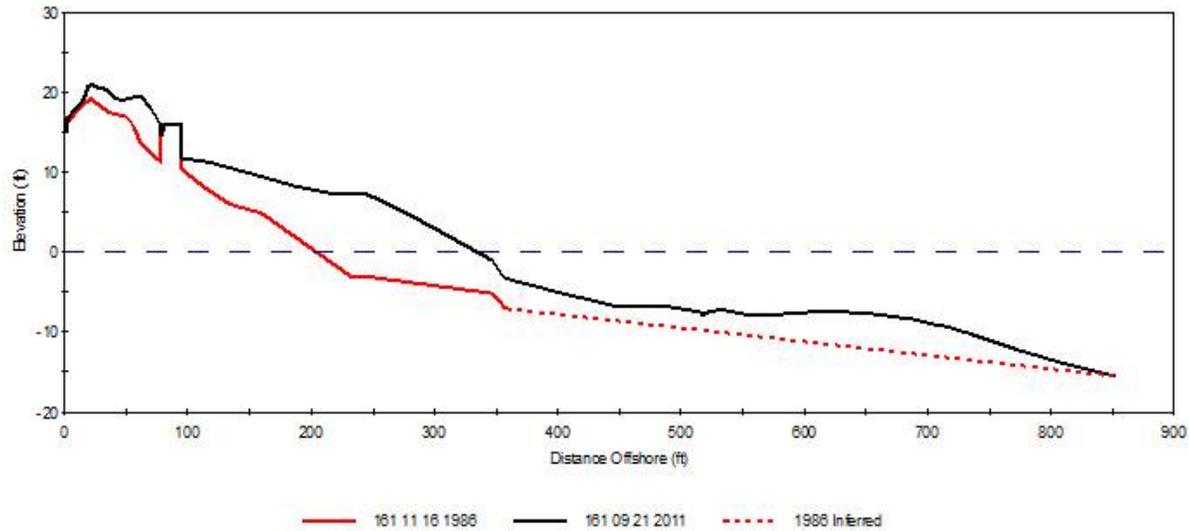


Figure 127. Sand was added to this site in the 1997 Federal beach nourishment project and the shoreline remained stable in the years that followed. (Left photo October 9, 1989 [view to the northeast]; right photo September 21, 2011 [view to the north]).



**25-Year Coastal Changes at Site 161, Brighton Avenue Spring Lake, Monmouth Co.**

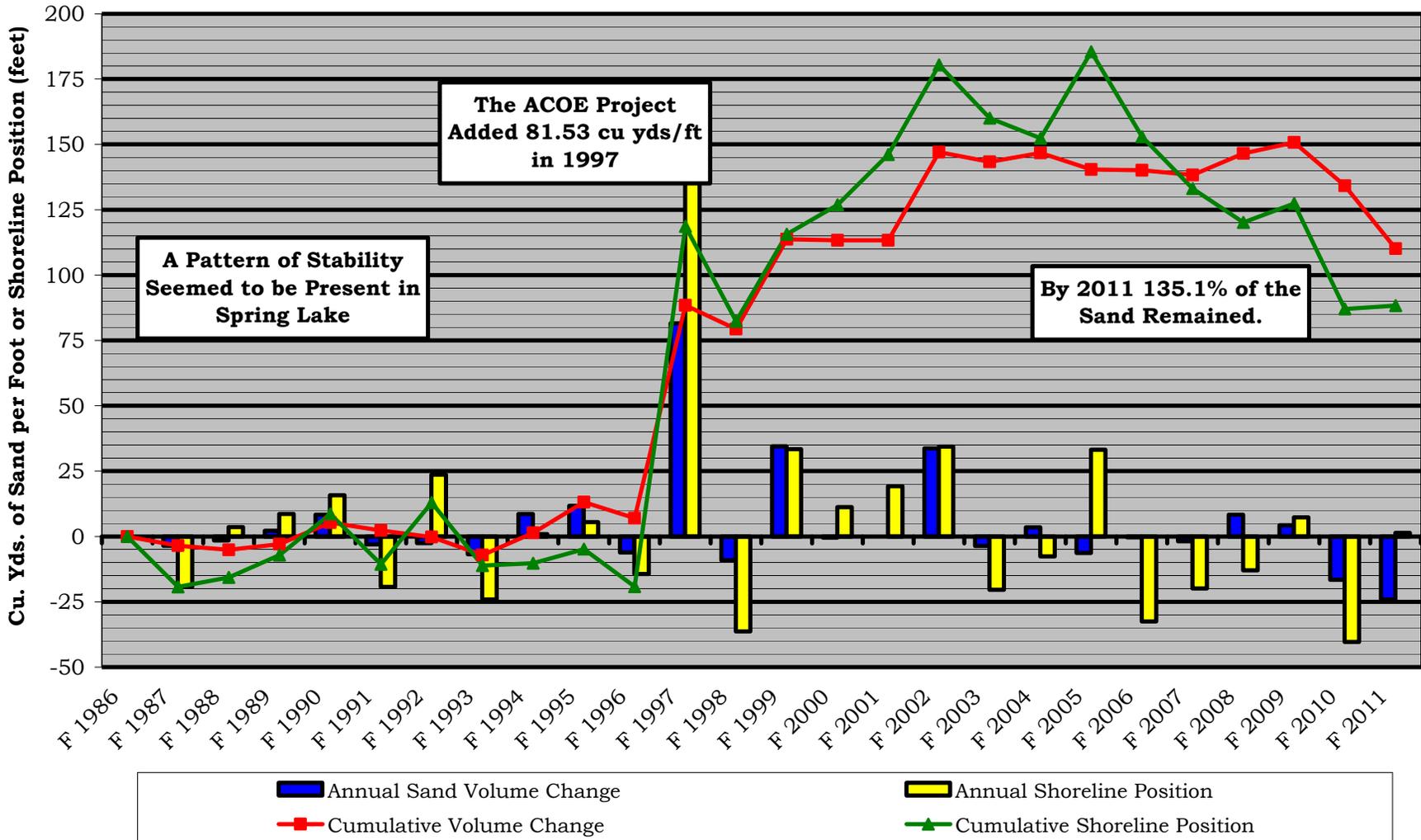


Figure 128. The northern Spring Lake site showed a marked trend toward continued accretion of the beach following the ACOE project in 1997. By 2011 135.1% of the sand placed in 1997 fill remained.

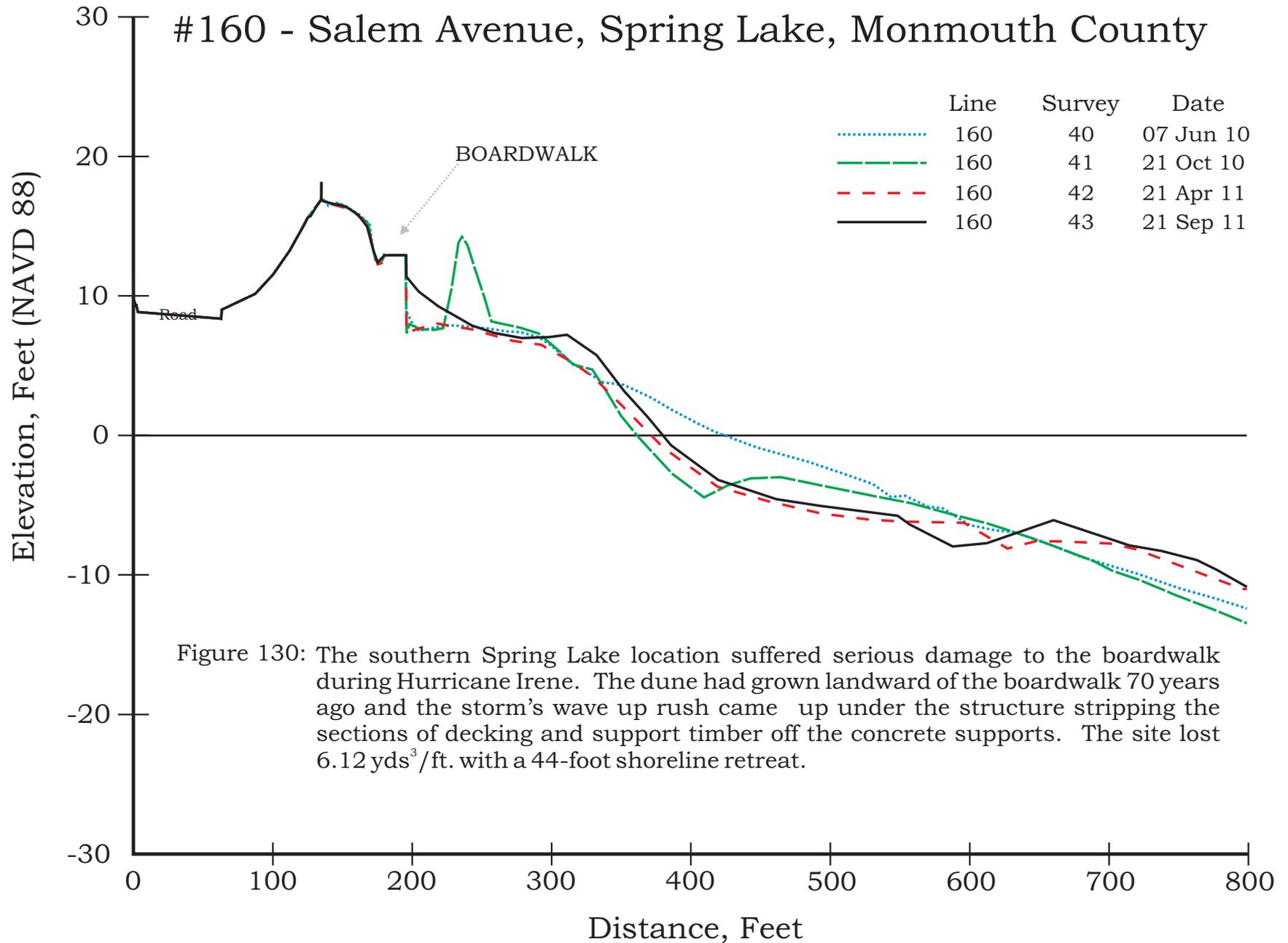
**Site 160, Salem Avenue, Spring Lake – September 20, 2011**



**Figure 129. View to the south at the berm crest in Spring Lake.**

# New Jersey Beach Profile Network

#160 - Salem Avenue, Spring Lake, Monmouth County



### SALEM AVENUE, SPRING LAKE – SITE 160

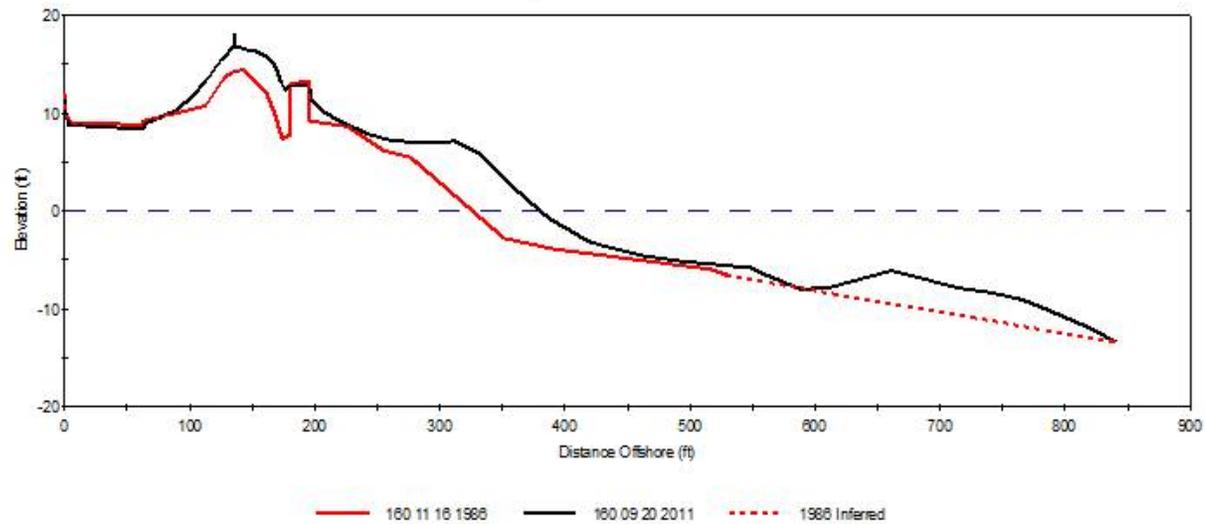


Figure 131. Prior to the 1997 Federal beach nourishment project, the shoreline was retreating. After the project, the dune grew under natural conditions. The site has experienced shoreline retreat over the past five years. (Left photo October 23, 1991 [view to the northeast]; right photo September 20, 2011 [view to the northeast]).



## 25-Year Coastal Changes at Site 160, Salem Avenue Spring Lake, Monmouth Co.

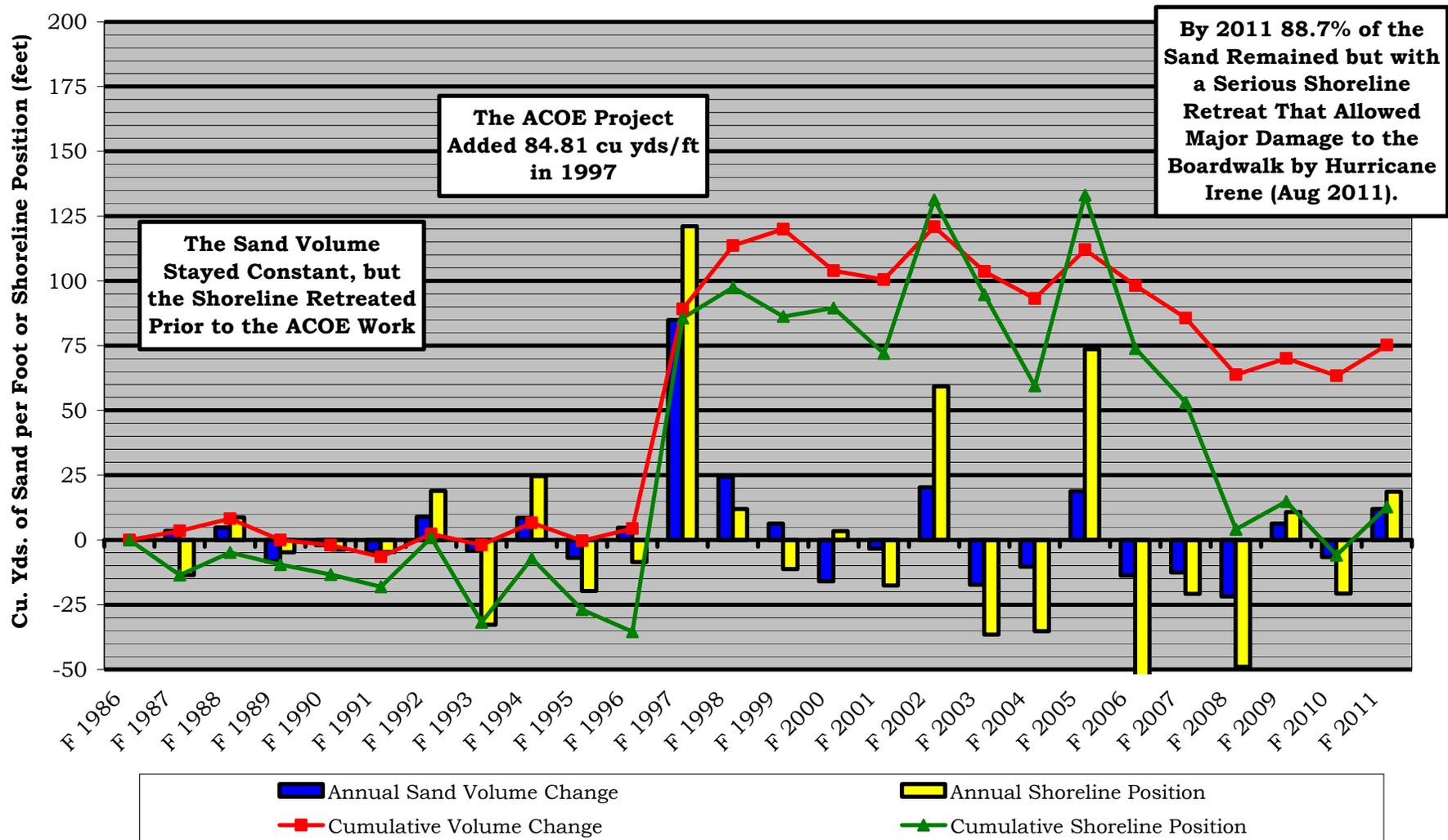


Figure 132. This is another site selected to show the relative stability of the southern fill sector in Monmouth County. The fill volume of 85 yds<sup>3</sup>/ft. completed in 1997 was followed by 5 of 13 years with sand added to that placed in 1997. For a decade the site maintained an excess volume of sand over that placed by the ACOE. 2008 took the biggest bite out of the sand supply with a partial recovery in 2009. That survey in 2009 preceded most of the northeast storms which are reflected in the decline shown between the fall of 2009 and 2010.

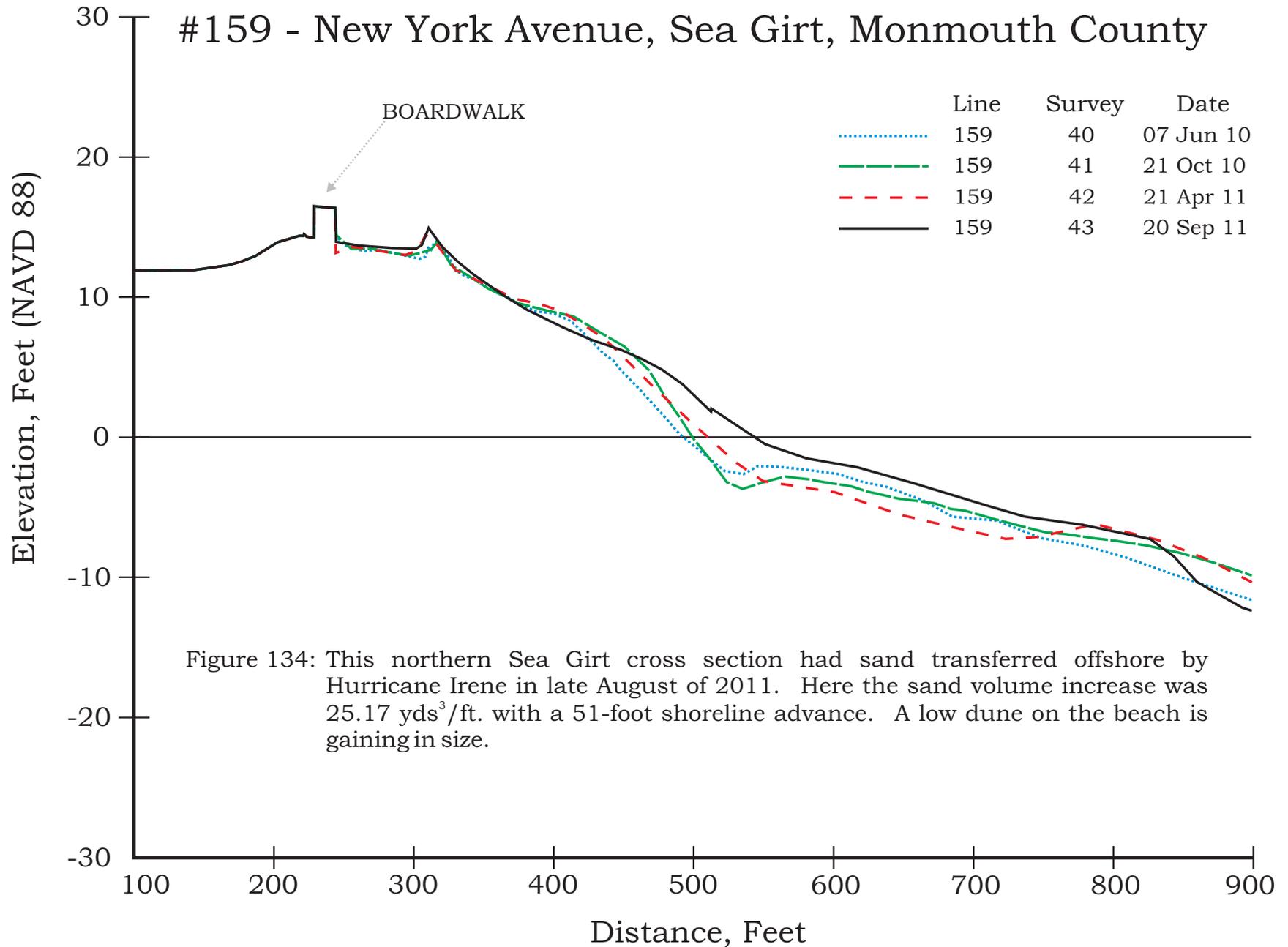
**Site 159, New York Avenue, Sea Girt – September 20, 2011**



**Figure 133. Looking south along the beachface in Sea Girt, NJ.**

# New Jersey Beach Profile Network

#159 - New York Avenue, Sea Girt, Monmouth County



## NEW YORK AVENUE, SEA GIRT – SITE 159

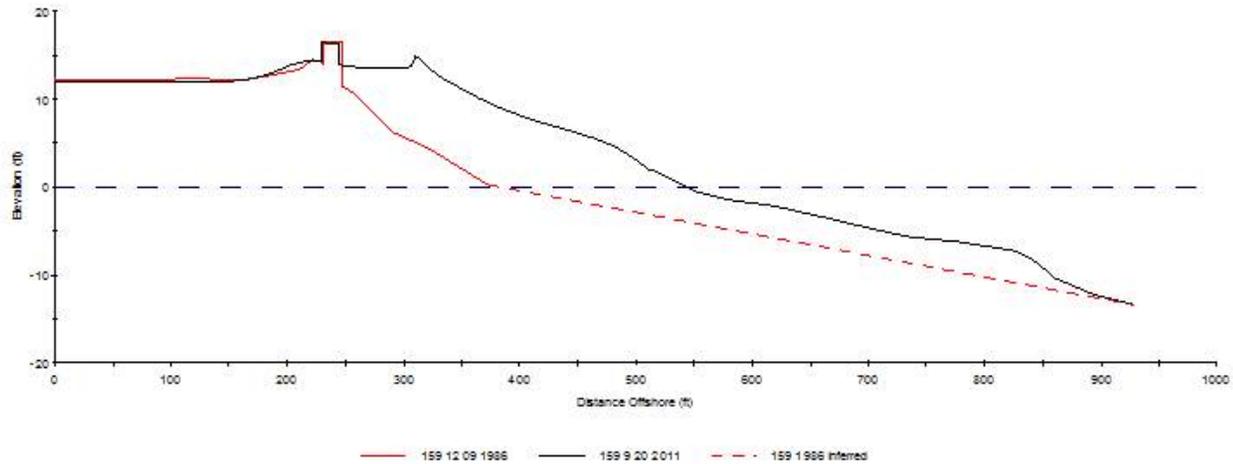


Figure 135. Sand was added to this location during the 1997 Federal beach nourishment project. Minor variations in shoreline position have occurred since then. In recent years, sand fencing was used to create dunes. (Left photo October 9, 1989 [view to the east]; right photo September 20, 2011 [view to the east]).



**25-Year Coastal Changes at Site 159, New York Avenue, Sea Girt, Monmouth Co.**

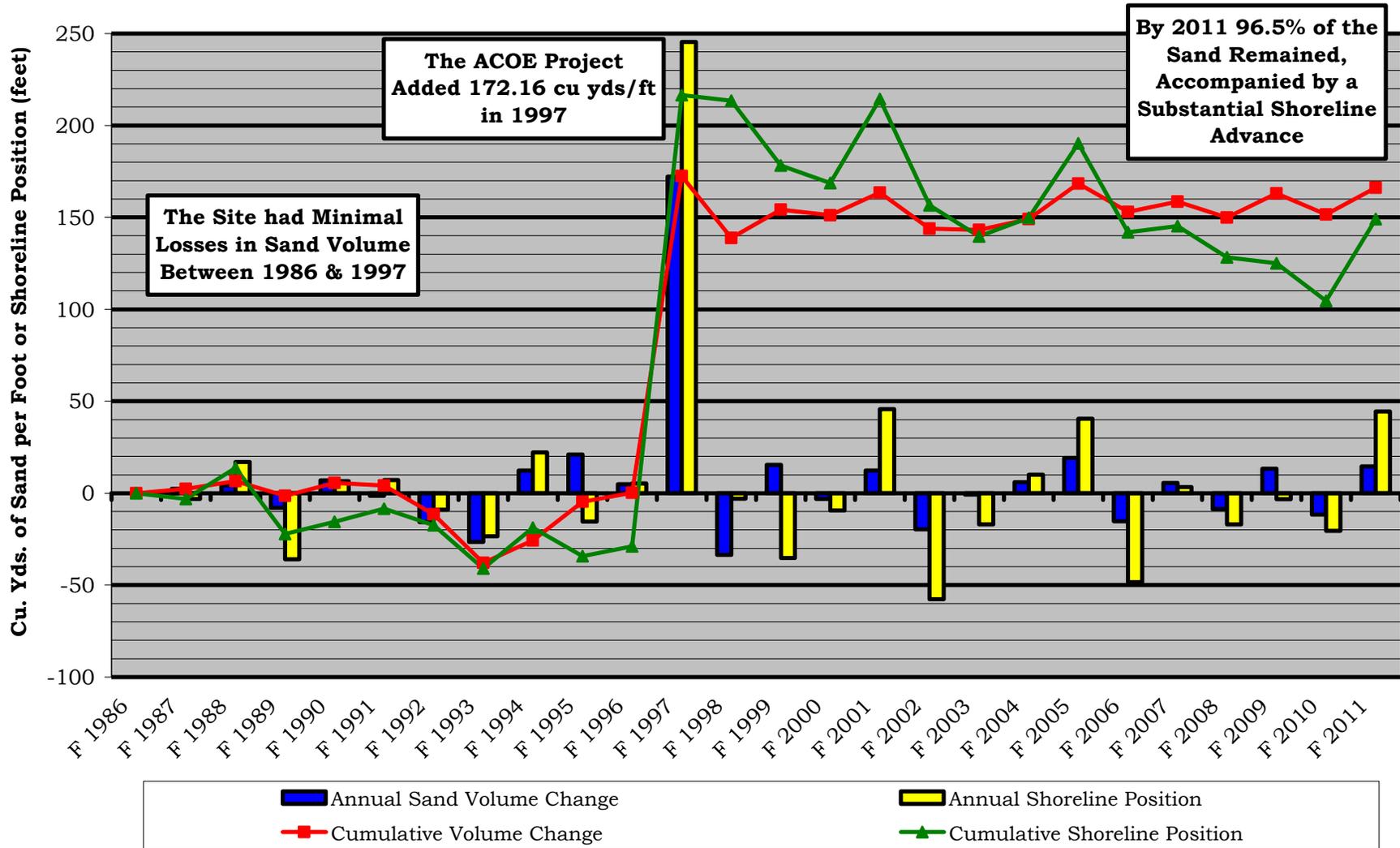


Figure 136. The 1997 fill produced a nearly 250 foot shoreline advance that has remained relatively stable for the last 14 years. By 2011 96.5% of the sand remained since the 1997 fill.

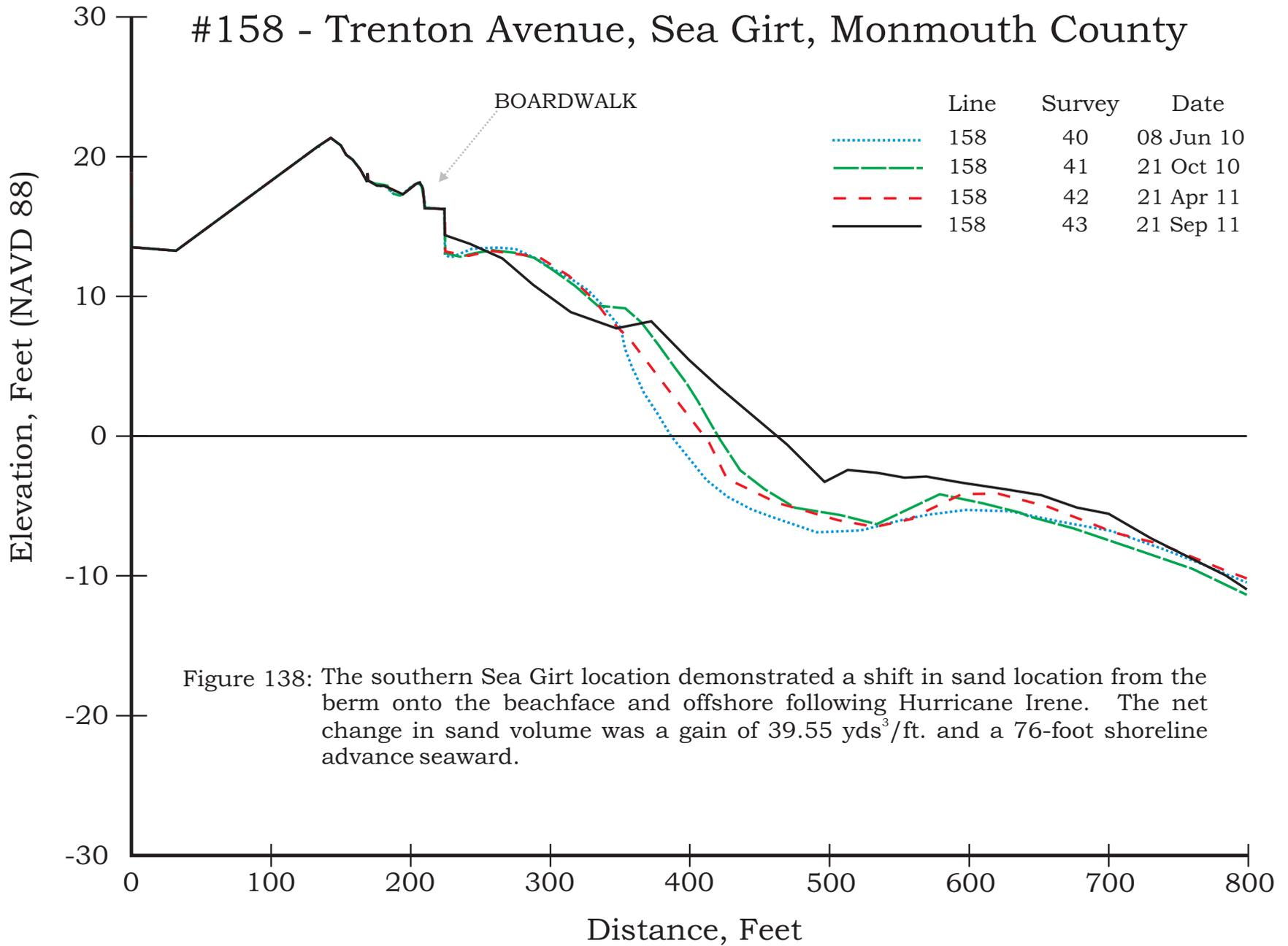
**Site 158, Trenton Avenue, Sea Girt – September 21, 2011**



**Figure 137. View of the berm and a fisherman in Sea Girt, NJ.**

# New Jersey Beach Profile Network

#158 - Trenton Avenue, Sea Girt, Monmouth County



## TRENTON AVENUE, SEA GIRT – SITE 158

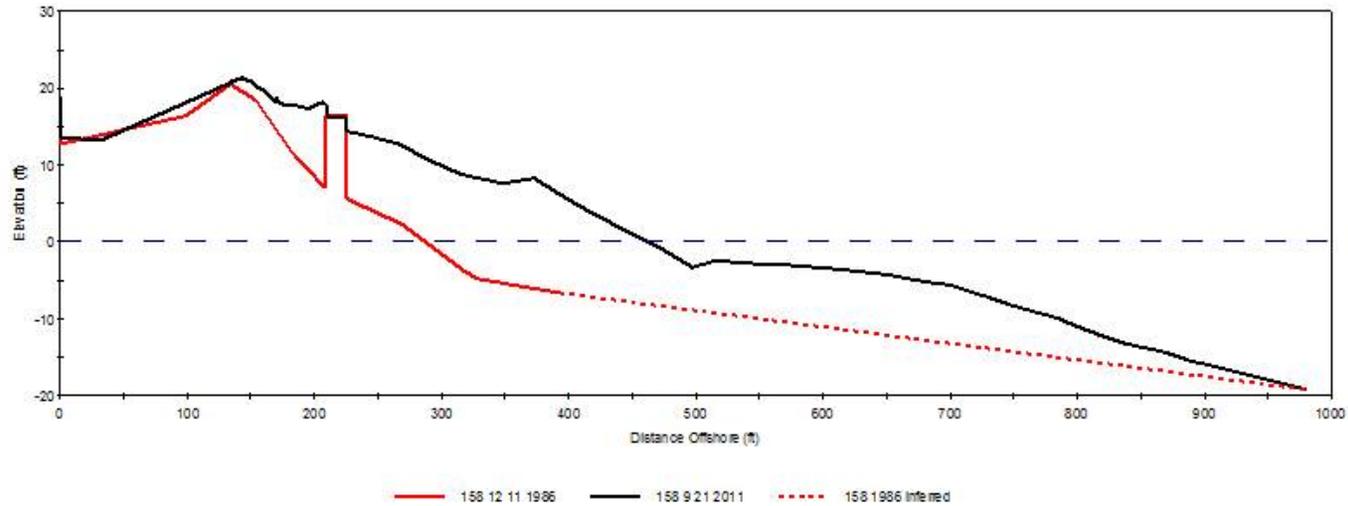


Figure 139. Sand was added to this location in the 1997 Federal beach nourishment project and dunes began to establish. Since the project, the site has experienced shoreline retreat and volume loss. (Left photo October 23, 1991 [view to the northeast]; right photo September 21, 2011 [view to the north]).



## 25-Year Coastal Changes at Site 158, Trenton Avenue, Sea Girt, Monmouth Co.

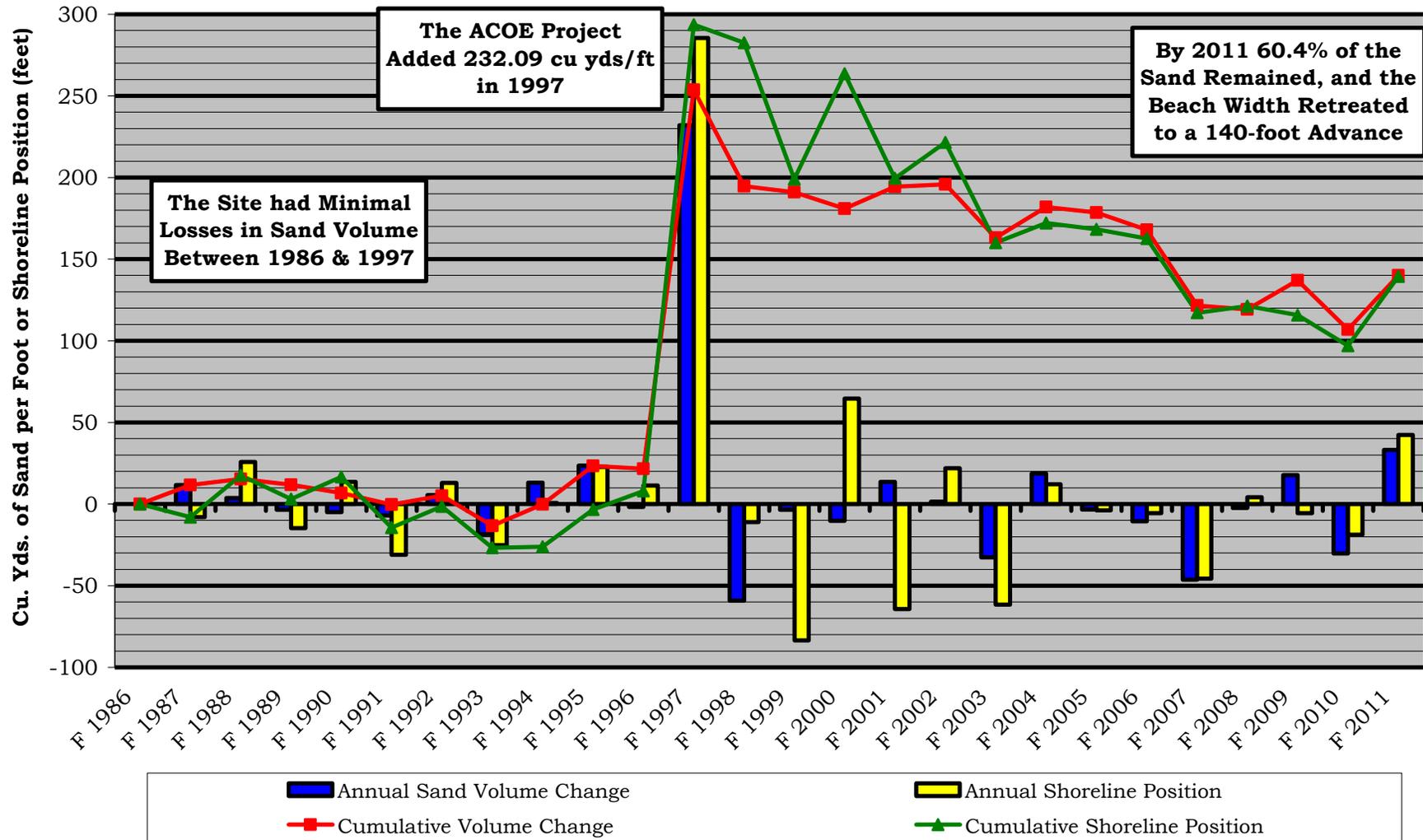


Figure 140. Toward the southern boundary of Sea Girt, the impact of the ACOE shore protection project showed a large shoreline advance of nearly 300 feet. Since the 1997 fill both the shoreline position and the sand volume have slowly declined. By 2011 60.4% of the sand remained while the shoreline had retreated to only a 140 feet shoreline advance relative to the 1997 fill.

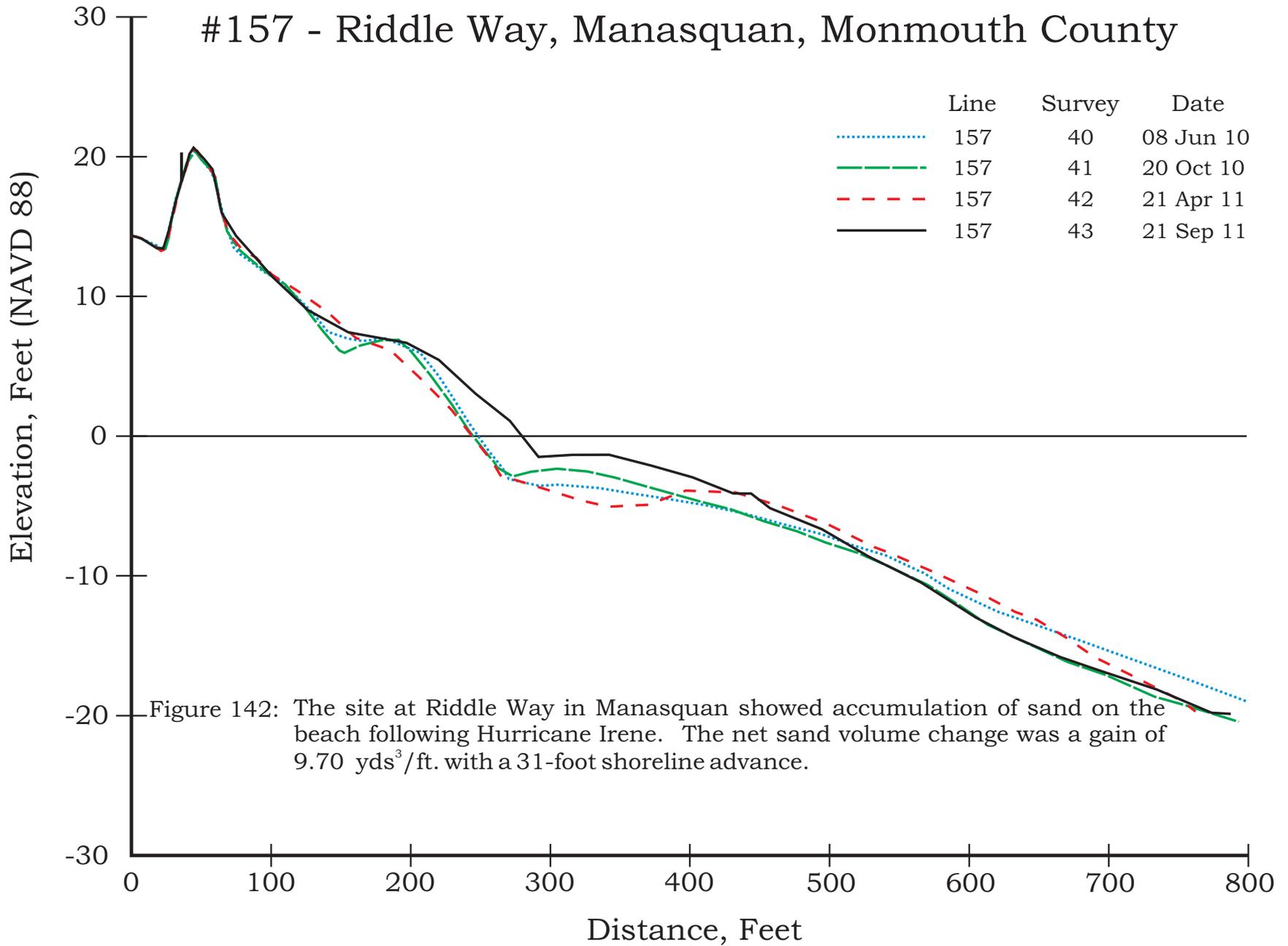
**Site 157, Riddle Way, Manasquan – September 21, 2011**



**Figure 141. View to the south along the Manasquan beachfront.**

# New Jersey Beach Profile Network

#157 - Riddle Way, Manasquan, Monmouth County



## RIDDLE WAY, MANASQUAN – SITE 157

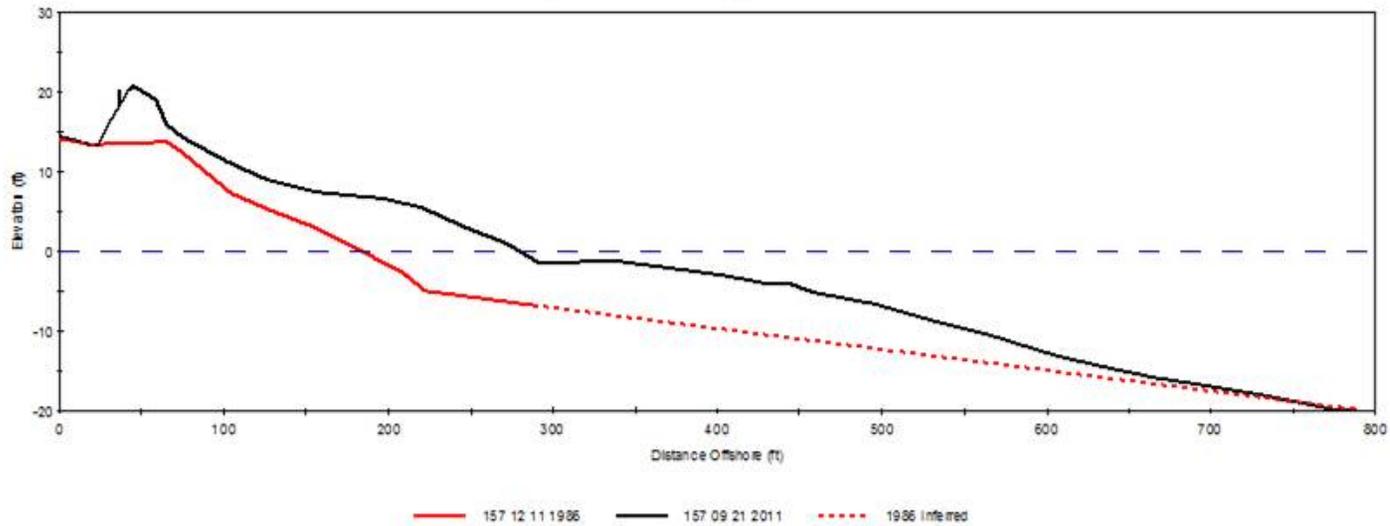


Figure 143. This location lies north of the Manasquan Inlet and within influence of the inlet jetties. Sand was added here in the 1997 Federal beach nourishment project. Since that time, this site has gradually retreated. (Left photo November 23, 1991 [view to the southeast]; right photo September 21, 2011 [view to the southeast]).



## 25-Year Coastal Changes at Site 157, Riddle Way, Manasquan, Monmouth Co.

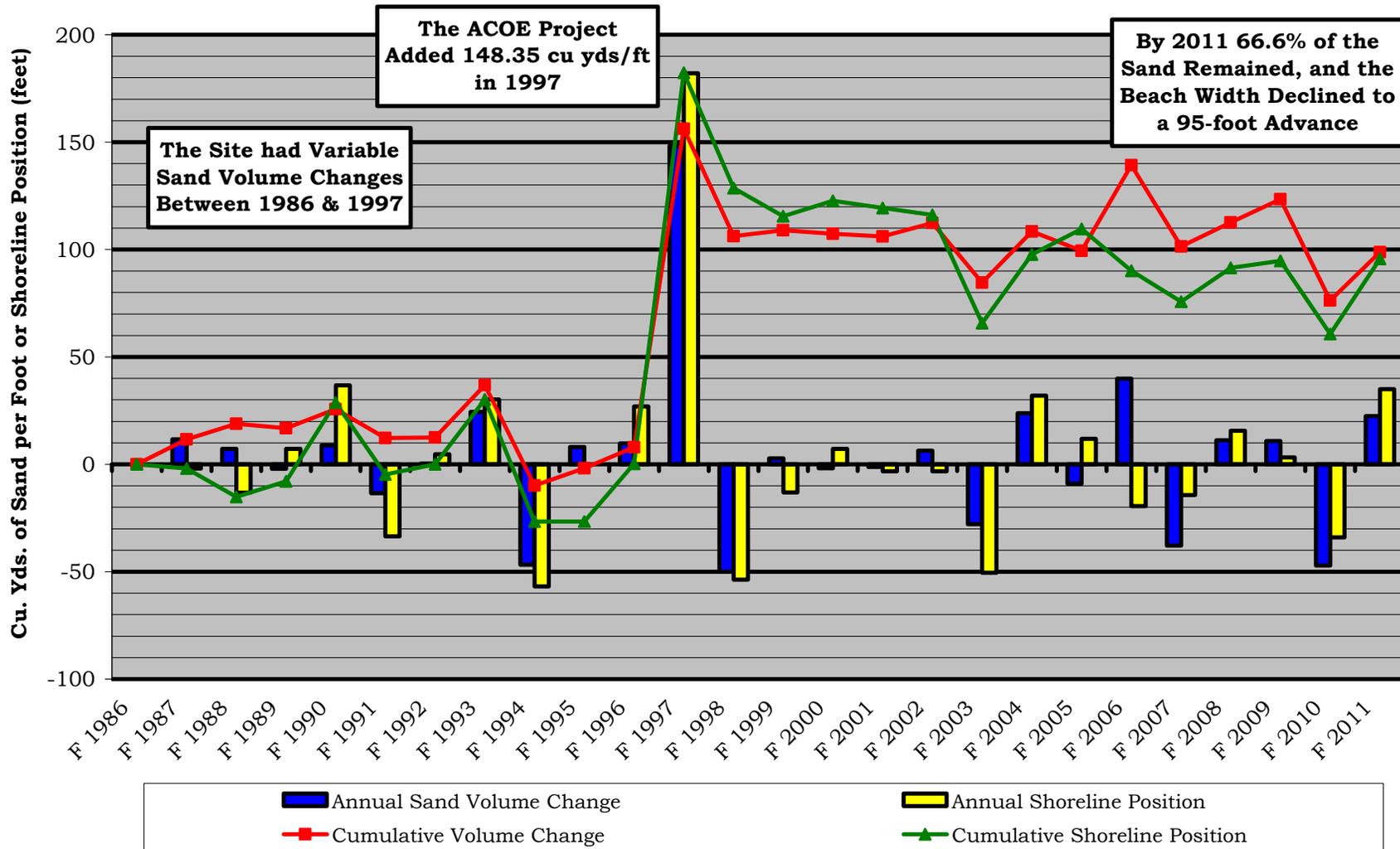


Figure 144. The Borough of Manasquan beach lies just north of the Manasquan Inlet. The two jetties produce substantial shoreline variations annually dependant on northeast storm frequency. The big spike in 1997 is the ACOE beach nourishment project that produced a 175-foot advance in the shoreline with 148.35 cu yds/ft in sand being added to the beach. Immediately following the fill the shoreline and sand volume retreated but then stabilized in the years following. Between 2003 and 2011 there were considerable oscillations in sand volume and in the shoreline position. Despite these oscillations the overall trend is that of stability. By 2011 66.6% of the sand remained and the beach had declined to a 95 feet advance in comparison the 1997 fill.

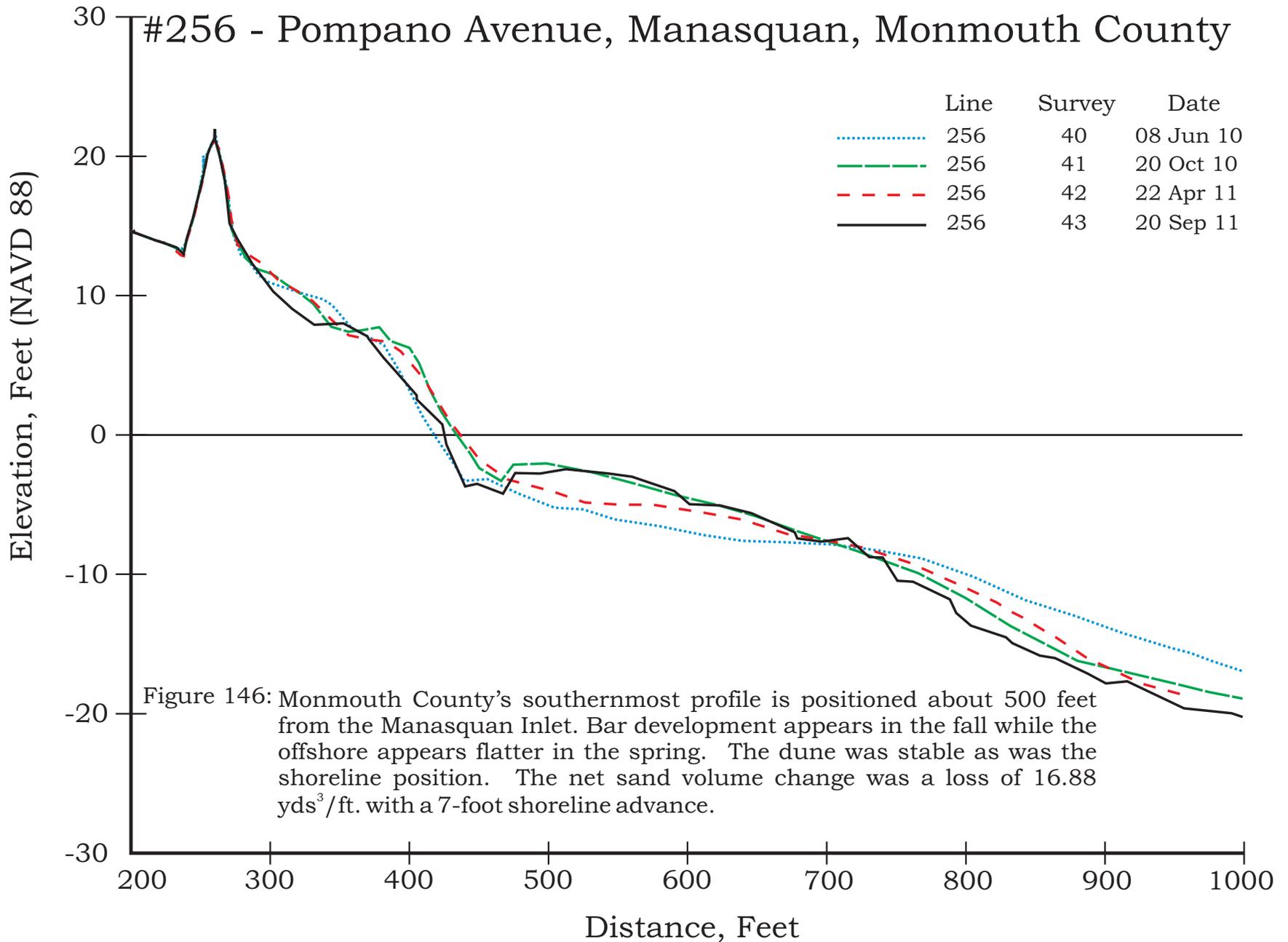
**Site 256, Pompano Avenue, Manasquan – September 20, 2011**



**Figure 145. View of the beach looking toward Manasquan Inlet, NJ.**

# New Jersey Beach Profile Network

#256 - Pompano Avenue, Manasquan, Monmouth County



## POMPANO AVENUE, MANASQUAN – SITE 256

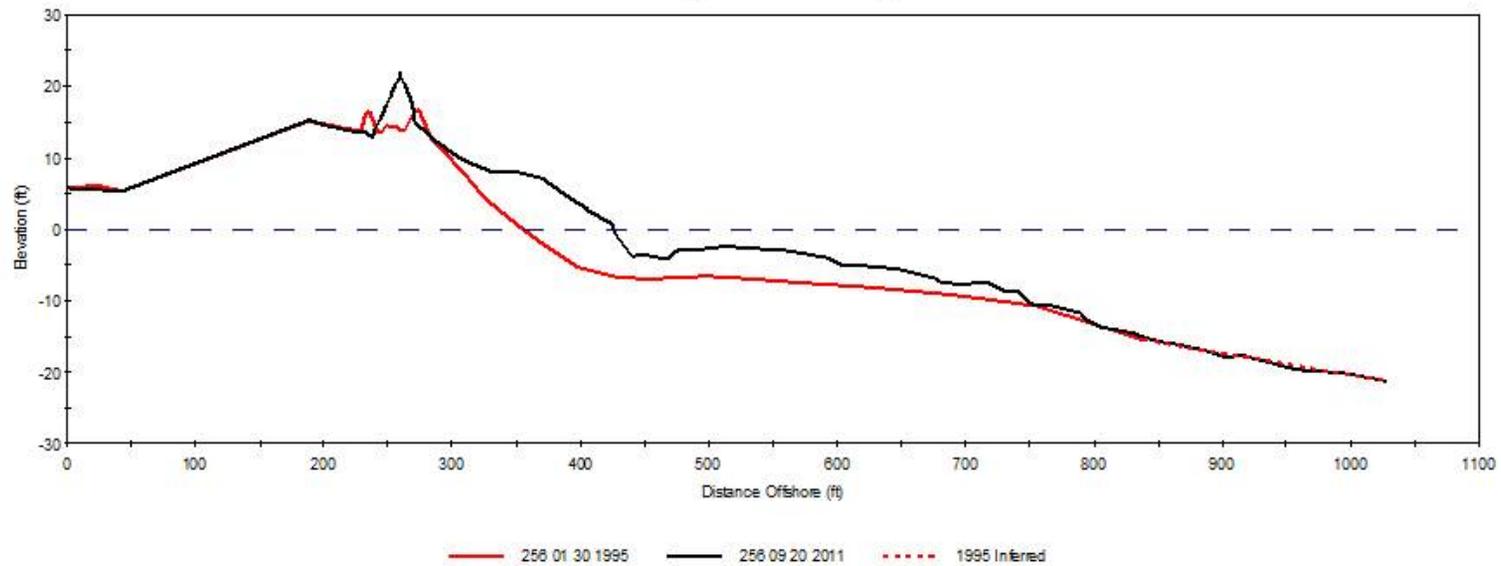


Figure 147. This site is located just north of Manasquan Inlet and the influence of its jetties. Sand was added here in the 1997 Federal beach nourishment project and the shoreline location has fluctuated since that time. Sand volumes have gradually decreased since the Federal project. (Left photo January 30, 1995 [view to the north]; right photo September 20, 2011 [view to the north]).



### 17-Year Coastal Changes at Site 256, Pompano Avenue, Manasquan, Monmouth Co.

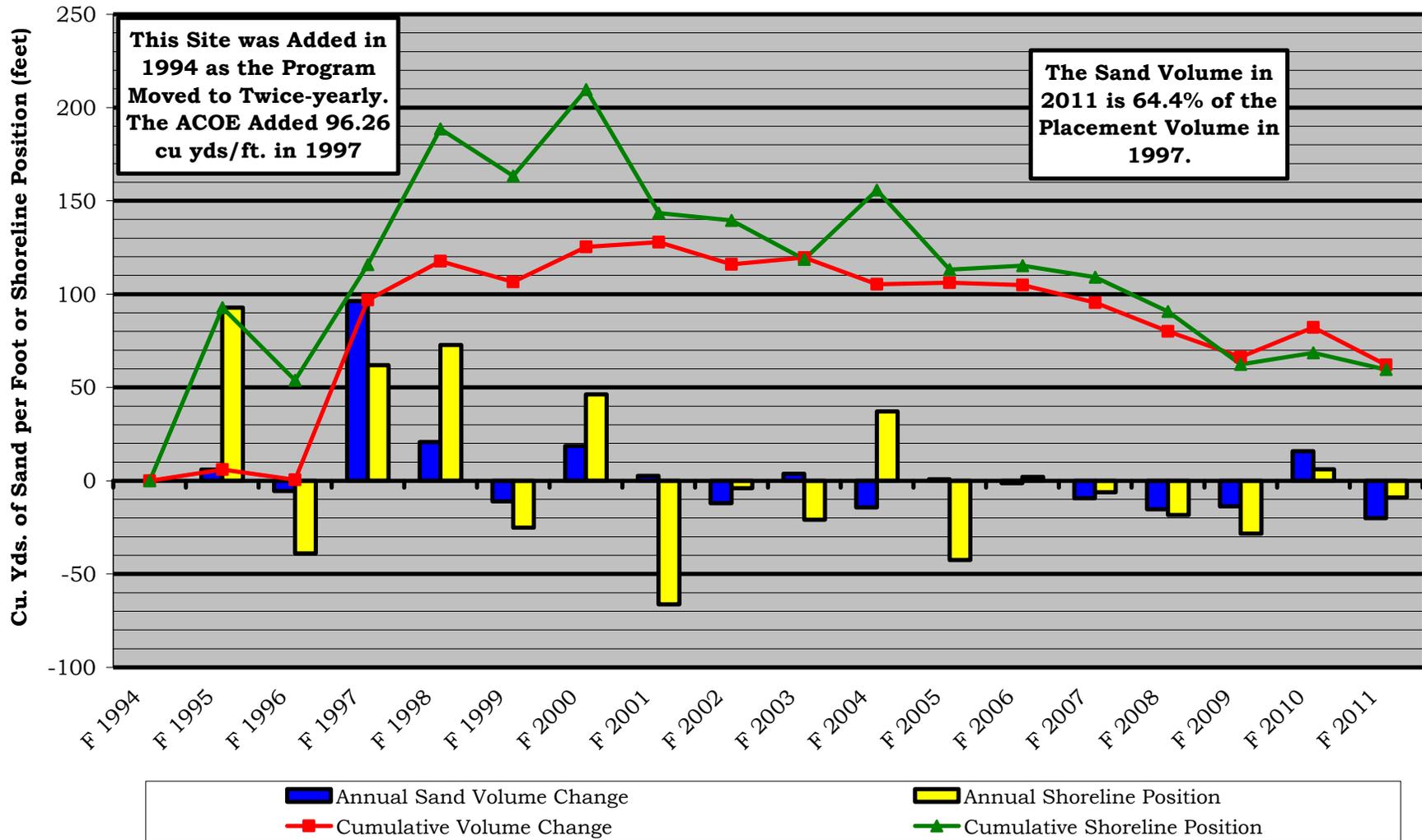


Figure 148. This profile was added in 1994 to provide closer coverage of the shoreline and sand volume changes on the north side of Manasquan Inlet. Sand was added to this site in the 1997 ACOE fill project. The sand volume added was reduced at the inlet because the jetties were shorter than necessary to retain the normal volume being added elsewhere. Despite the taper in width, sand readily moves into the Manasquan Inlet channel requiring more frequent dredging. Since 2001 both the shoreline and sand volume have been steadily declining. When comparing the 2011 fill to the post-fill 1997 survey 64.4% of the sand volume placed still remains.