



New Jersey Beach Profile Network

Ocean County

**Manasquan Inlet
to Little Egg Inlet**

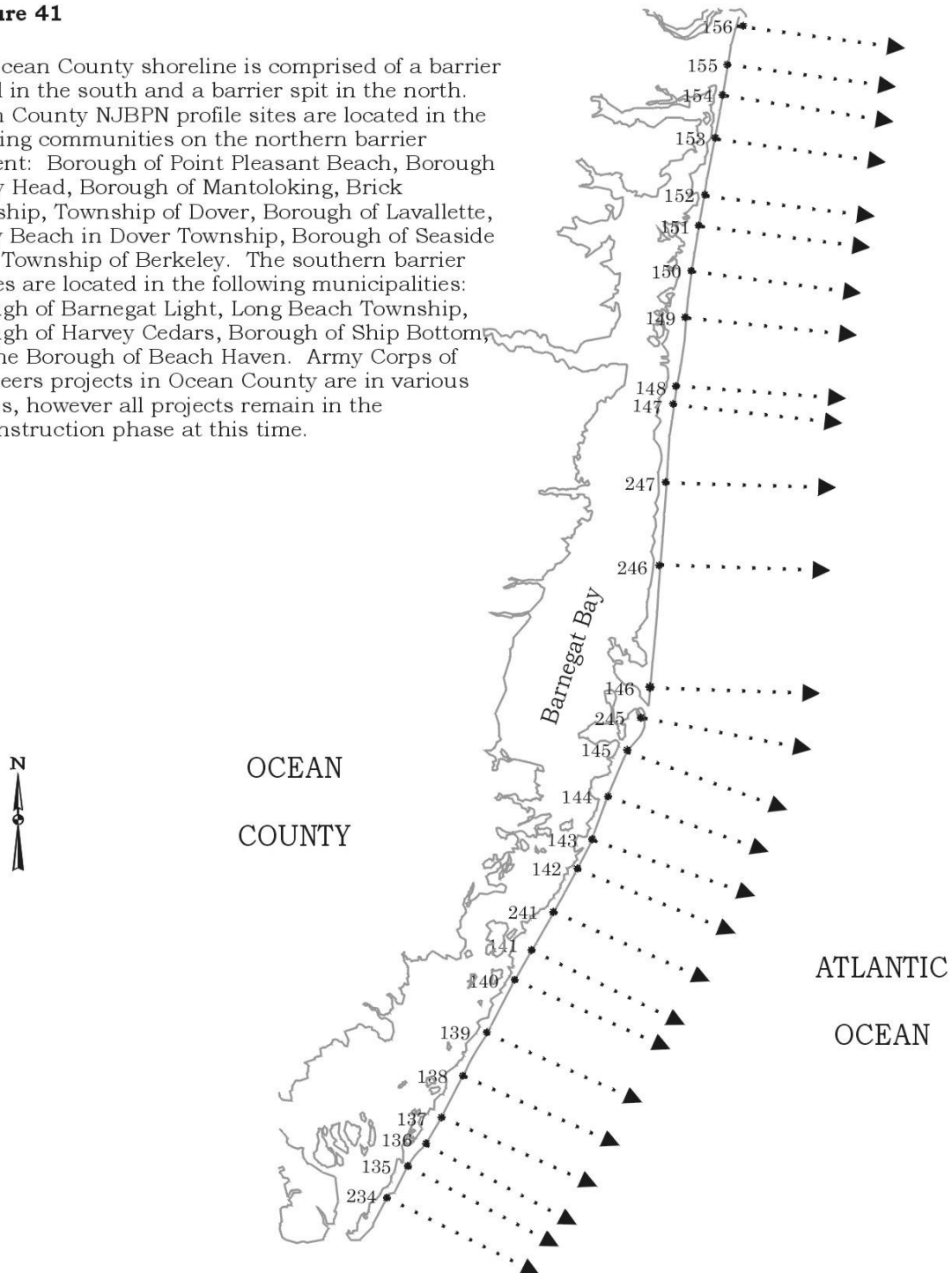
**NJBPN Profile #'s
156 - 234**



New Jersey Beach Profile Network Ocean County Profile Site Locations

Figure 41

The Ocean County shoreline is comprised of a barrier island in the south and a barrier spit in the north. Ocean County NJBPN profile sites are located in the following communities on the northern barrier segment: Borough of Point Pleasant Beach, Borough of Bay Head, Borough of Mantoloking, Brick Township, Township of Dover, Borough of Lavallette, Ortley Beach in Dover Township, Borough of Seaside Park, Township of Berkeley. The southern barrier profiles are located in the following municipalities: Borough of Barnegat Light, Long Beach Township, Borough of Harvey Cedars, Borough of Ship Bottom, and the Borough of Beach Haven. Army Corps of Engineers projects in Ocean County are in various phases, however all projects remain in the preconstruction phase at this time.





Photoplate 3a. Photo taken April 28, 2003 looking north from Johnson Street in Bay Head. Dune grass plugs show in the foreground prior to growth in the spring. Winter storm damage shows in broken dune toe fencing placed low on the slope where wave action easily reached the fragile fence.



Photoplate 3b. In this photo taken August 30, 2004, a year and a half later. The dune grass plugs survived, but did not flourish. The vegetation across the dune did increase in quality however. The fence at the dune toe is again placed where it will be easily destroyed by any type of storm. Placement a third of the distance up the seaward slope is recommended.



Photoplate 4a. Photo taken May 10, 2000 in Barnegat Light Borough. The expansion of the dune field had been on-going for almost a decade since the south jetty was rebuilt. Note the foredune ridge and the little pine tree at the right margin by the house.



Photoplate 4b. By Nov. 18, 2004 the foredune had greatly expanded, growing both horizontally and vertically. Closer to the homes, other vegetation has expanded as the dune stabilized, the pine tree has grown in size.

TABLE 5
OCEAN COUNTY
ANNUAL BEACH VOLUME CHANGES
SPRING 2003 - SPRING 2004 & FALL 2003 - FALL 2004

PROFILE SITE LOCATION	Survey	
	26 - 28	27 - 29
	S2003 - S2004	F2003 - F2004
	(volume expressed as cubic yards per foot)	
156: Point Pleasant, Water St.	36.33	24.11
155: Point Pleasant, Maryland Ave.	-8.41	-17.06
154: Bay Head, Johnson Ave.	4.27	-6.24
153: Mantoloking, 1117 Ocean Ave.	-10.35	-17.38
152: Brick Township, Public Beach	31.97	9.32
151: Normandy Beach, 1st Ave	18.89	-11.38
150: Lavallette, White Ave.	-0.77	-24.90
149: Ortley Beach, 8th Ave.	-7.90	-24.19
148: Seaside Park, 4th Ave.	30.73	23.83
147: Berkeley Township, 6th Ave.	47.15	45.83
247: Island Beach State Park, North	12.21	23.20
246: Island Beach State Park, Middle	-26.89	20.89
146: Island Beach State Park, South	50.48	11.55
245: Barnegat Light, 10th St.	87.37	30.68
145: Barnegat Light, 26th St.	21.17	-15.28
144: Loveladies, La Baia St.	-3.87	10.98
143: Harvey Cedars, 73rd St.	37.86	-2.14
142: Harvey Cedars, Tranquility Drive	3.62	-16.99
241: Surf City, 20th St.	5.91	1.18
141: Ship Bottom, 8th St.	2.77	0.36
140: Long Beach Township, 32nd St.	3.38	47.28
139: Long Beach Township, 81st St.	-6.27	1.38
138: Long Beach Township, Old Whaling Rd.	8.37	20.24
137: Beach Haven, Taylor Ave.	31.36	9.86
136: Beach Haven, Dolphin Ave.	19.69	-1.96
135: Long Beach Township, Webster Ave.	16.02	3.54
234: Long Beach Township, Border w/ Refuge	33.39	-17.34

TABLE 6
OCEAN COUNTY
ANNUAL SHORELINE CHANGES
SPRING 2003 - SPRING 2004 & FALL 2003 - FALL 2004

PROFILE SITE LOCATION	Survey	
	26 - 28 S2003 - S2004	27 - 29 F2003 - F2004
	(shoreline change expressed in feet)	
156: Point Pleasant, Water St.	58.6	52.0
155: Point Pleasant, Maryland Ave.	-24.9	-11.1
154: Bay Head, Johnson Ave.	16.5	41.7
153: Mantoloking, 1117 Ocean Ave.	-9.6	0.1
152: Brick Township, Public Beach	41.7	29.1
151: Normandy Beach, 1st Ave	22.5	8.3
150: Lavallette, White Ave.	22.2	-17.2
149: Ortley Beach, 8th Ave.	-1.5	-11.9
148: Seaside Park, 4th Ave.	31.8	58.5
147: Berkeley Township, 6th Ave.	43.3	50.9
247: Island Beach State Park, North	1.7	53.4
246: Island Beach State Park, Middle	-24.0	37.3
146: Island Beach State Park, South	76.0	11.8
245: Barnegat Light, 10th St.	115.6	37.4
145: Barnegat Light, 26th St.	19.2	60.0
144: Loveladies, La Baia St.	-7.6	39.6
143: Harvey Cedars, 73rd St.	25.9	21.6
142: Harvey Cedars, Tranquility Drive	8.3	24.9
241: Surf City, 20th St.	5.2	2.5
141: Ship Bottom, 8th St.	13.5	12.1
140: Long Beach Township, 32nd St.	-6.8	54.2
139: Long Beach Township, 81st St.	-16.1	3.9
138: Long Beach Township, Old Whaling Rd.	-10.5	15.4
137: Beach Haven, Taylor Ave.	16.8	3.0
136: Beach Haven, Dolphin Ave.	35.6	9.7
135: Long Beach Township, Webster Ave.	17.7	-7.6
234: Long Beach Township, Border w/ Refuge	250.9	-11.7

TABLE 7
OCEAN COUNTY
SEASONAL BEACH VOLUME CHANGES

PROFILE SITE LOCATION	Survey	26-27	27-28	28-29	26-29
		S03-F03	F03-S04	S04-F04	S03-F04
		(volume expressed as cubic yards per foot of beachfront)			
156: Point Pleasant, Water St.		38.58	-2.05	26.33	62.80
155: Point Pleasant, Maryland Ave.		-2.75	-5.60	-11.58	-19.49
154: Bay Head, Johnson Ave.		11.27	-7.12	0.92	5.20
153: Mantoloking, 1117 Ocean Ave.		2.54	-12.90	-4.64	-14.57
152: Brick Township, Public Beach		29.44	1.68	5.80	39.61
151: Normandy Beach, 1st Ave		22.29	-3.82	-7.44	12.94
150: Lavallette, White Ave.		4.39	-5.82	-19.27	-19.87
149: Ortley Beach, 8th Ave.		24.49	-27.88	4.54	1.96
148: Seaside Park, 4th Ave.		32.38	1.77	20.15	49.28
147: Berkeley Township, 6th Ave.		15.22	28.26	19.72	62.67
247: Island Beach State Park, North		-1.19	12.29	11.49	22.13
246: Island Beach State Park, Middle		-22.09	-6.63	27.84	1.10
146: Island Beach State Park, South		19.98	30.22	-18.63	31.13
245: Barnegat Light, 10th St.		22.52	64.46	-33.63	53.82
145: Barnegat Light, 26th St.		33.87	-12.63	-2.05	19.04
144: Loveladies, La Baia St.		0.29	-3.06	18.97	13.86
143: Harvey Cedars, 73rd St.		21.50	16.48	-18.18	19.79
142: Harvey Cedars, Tranquility Drive		-6.73	9.60	-25.78	-19.42
241: Surf City, 20th St.		-9.72	15.63	-14.38	-8.20
141: Ship Bottom, 8th St.		-13.51	14.02	-11.21	-3.71
140: Long Beach Township, 32nd St.		-42.60	47.51	0.34	6.43
139: Long Beach Township, 81st St.		3.32	-9.92	11.67	4.68
138: Long Beach Township, Old Whaling Rd.		5.14	3.35	16.26	24.58
137: Beach Haven, Taylor Ave.		21.35	10.98	-0.65	31.62
136: Beach Haven, Dolphin Ave.		21.95	-2.34	0.10	21.84
135: Long Beach Township, Webster Ave.		21.92	-5.85	9.28	25.66
234: Long Beach Township, Border w/ Refuge		37.42	-2.69	-13.78	21.24

TABLE 8
OCEAN COUNTY
SEASONAL SHORELINE CHANGES

PROFILE SITE LOCATION	Survey	26-27	27-28	28-29	26-29
		S03-F03	F03-S04	S04-F04	S03-F04
		(shoreline change expressed in feet)			
156: Point Pleasant, Water St.		45.4	13.2	38.8	97.4
155: Point Pleasant, Maryland Ave.		-15.9	-9.0	-2.1	-27.0
154: Bay Head, Johnson Ave.		-17.7	34.2	7.5	23.9
153: Mantoloking, 1117 Ocean Ave.		-17.5	7.9	-7.8	-17.3
152: Brick Township, Public Beach		12.7	29.1	0.1	41.8
151: Normandy Beach, 1st Ave		22.6	-0.1	8.4	30.9
150: Lavallette, White Ave.		39.5	-17.3	0.1	22.3
149: Ortley Beach, 8th Ave.		18.6	-20.1	8.2	6.7
148: Seaside Park, 4th Ave.		9.5	22.3	36.2	68.0
147: Berkeley Township, 6th Ave.		0.1	43.2	7.7	51.0
247: Island Beach State Park, North		-19.8	21.5	31.9	33.6
246: Island Beach State Park, Middle		-7.8	-16.2	53.5	29.6
146: Island Beach State Park, South		28.8	47.2	-35.4	40.6
245: Barnegat Light, 10th St.		15.9	99.7	-62.2	53.3
145: Barnegat Light, 26th St.		63.9	-44.7	104.8	124.0
144: Loveladies, La Baia St.		-2.9	-4.7	44.2	36.7
143: Harvey Cedars, 73rd St.		9.6	16.3	5.3	31.2
142: Harvey Cedars, Tranquility Drive		-7.9	16.2	8.7	17.0
241: Surf City, 20th St.		-18.0	23.2	-20.7	-15.6
141: Ship Bottom, 8th St.		-18.2	31.7	-19.6	-6.1
140: Long Beach Township, 32nd St.		-80.2	73.5	-19.3	-26.0
139: Long Beach Township, 81st St.		-7.5	-8.6	12.5	-3.6
138: Long Beach Township, Old Whaling Rd.		8.5	-19.0	34.3	23.8
137: Beach Haven, Taylor Ave.		7.0	9.8	-6.8	10.0
136: Beach Haven, Dolphin Ave.		46.3	-10.8	20.5	56.1
135: Long Beach Township, Webster Ave.		53.9	-36.2	28.6	46.3
234: Long Beach Township, Border w/Refuge		274.4	-23.5	11.8	262.7

Ocean County Beach Volume & Shoreline Changes - Spring 2003 to Spring 2004

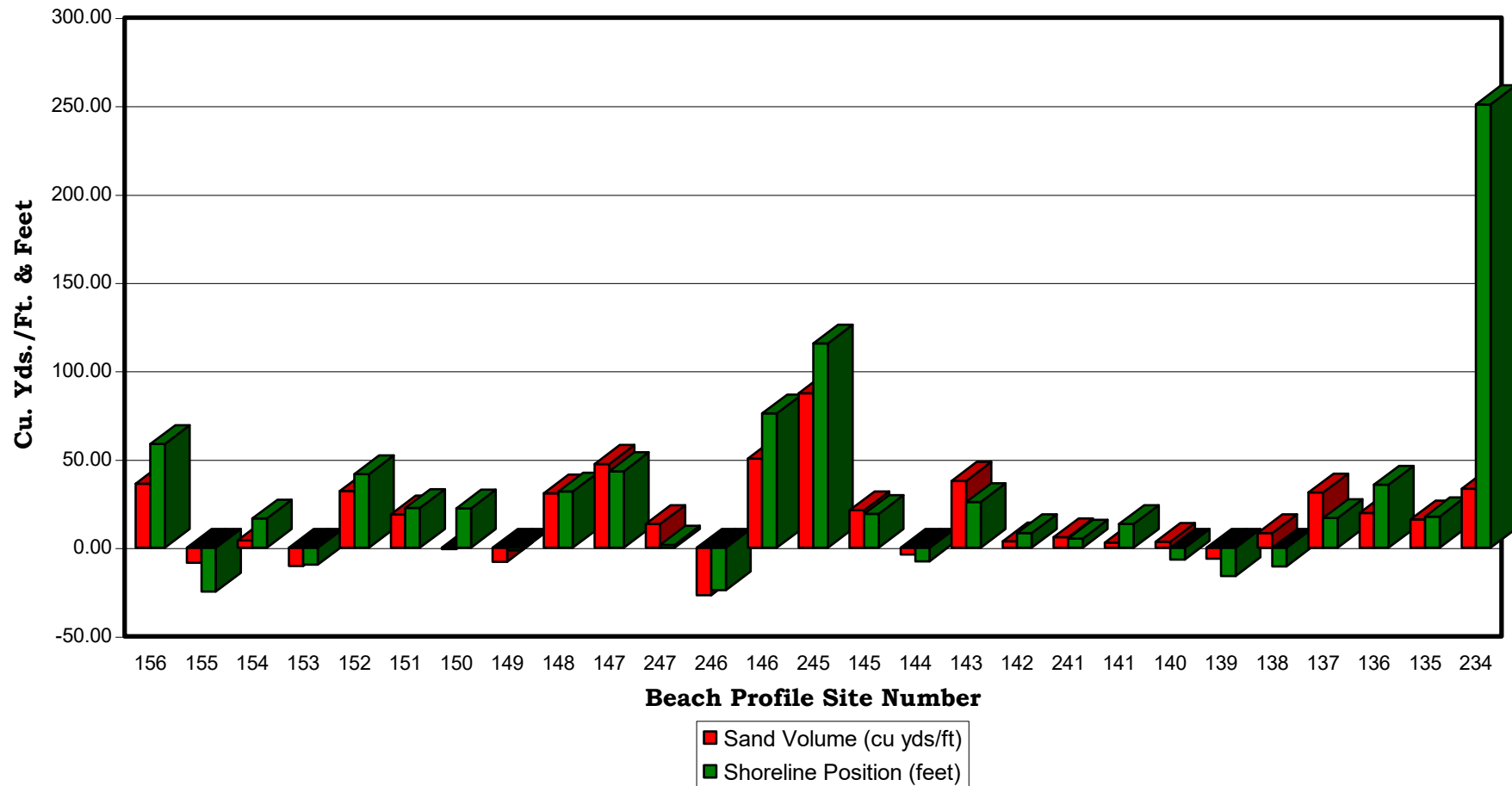


Figure 42a. The comparison of each beach's cross section sand volume from spring 2003 to spring 2004 shows a trend toward accretion combined with shoreline advance. The southernmost cross section is located in the Forsythe Wildlife Refuge south of all development. Moderate sand volume added produced a huge advance in the shoreline

Ocean County Beach Volume & Shoreline Position Changes - Fall 2003 to Fall 2004

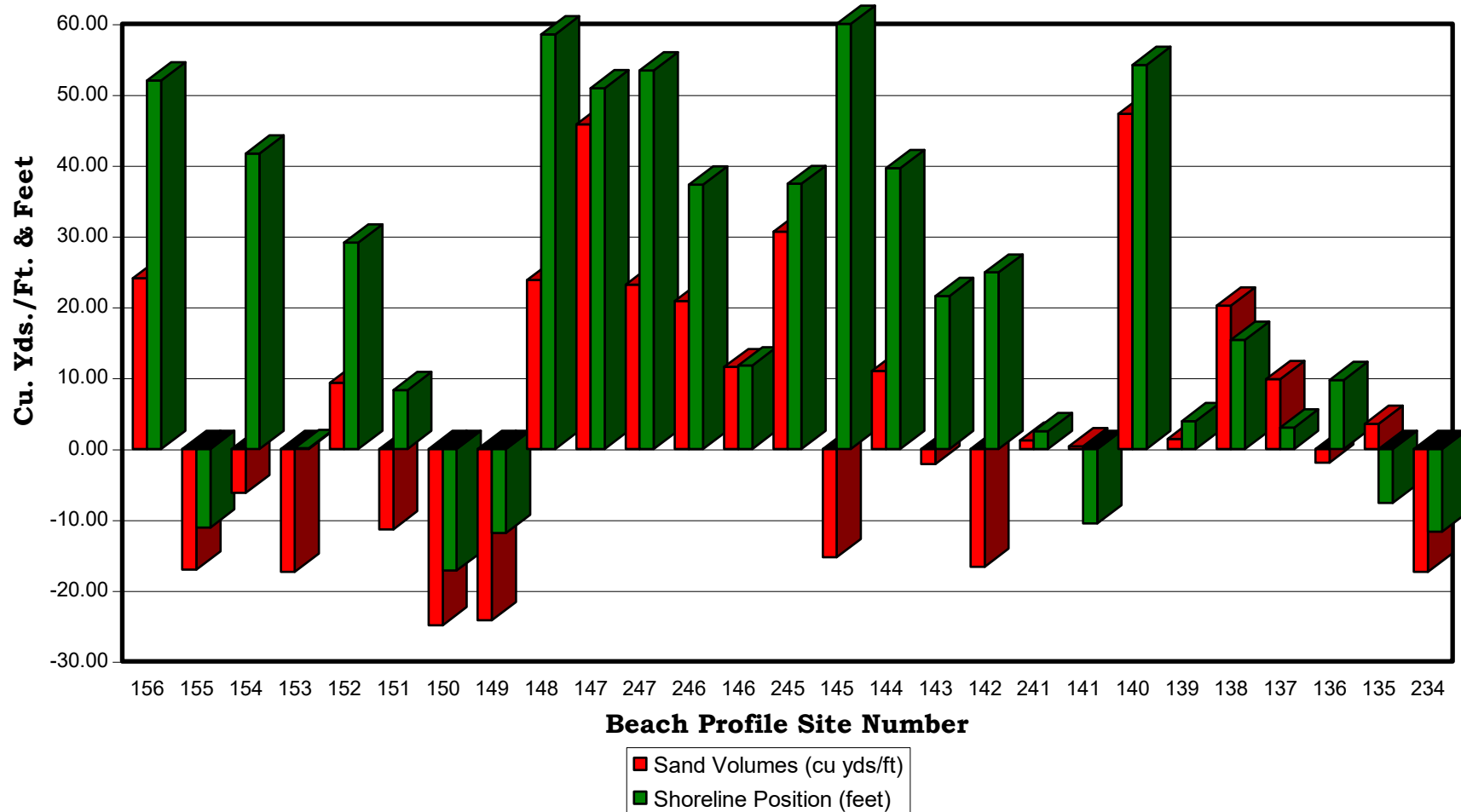


Figure 42b. A similar annual comparison for the Fall of 2003 to the Fall of 2004 shows the impact of a milder winter and a more accretional summer. Long Beach Island recovered considerable sand on the beach producing substantial shoreline advances without large sand volume increases. This means that the sand moved offshore over the past 12 months moved back onto the beach mostly from within the area surveyed each time.

Seasonal Ocean County Beach Sand Volume Changes - Fall 2003, Spring 2004 & Fall 2004

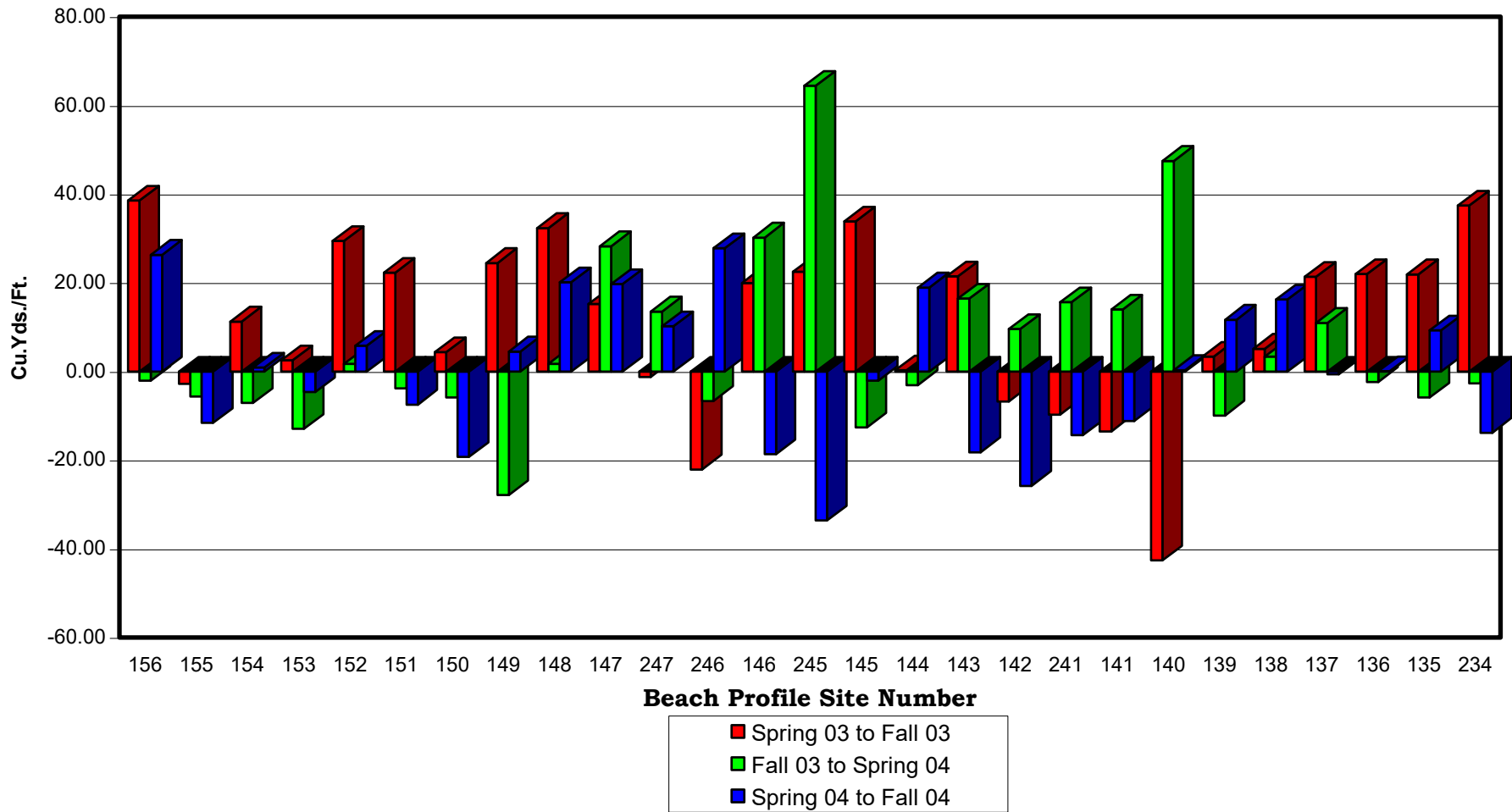


Figure 42c. The seasonal display of sand volume gains shows more gain than loss during this time interval. The largest changes occurred just south of Barnegat Inlet. Most volumes added were modest as were any losses.

Seasonal Ocean County Beach Shoreline Changes - Fall 2003, Spring 2004 & Fall 2004

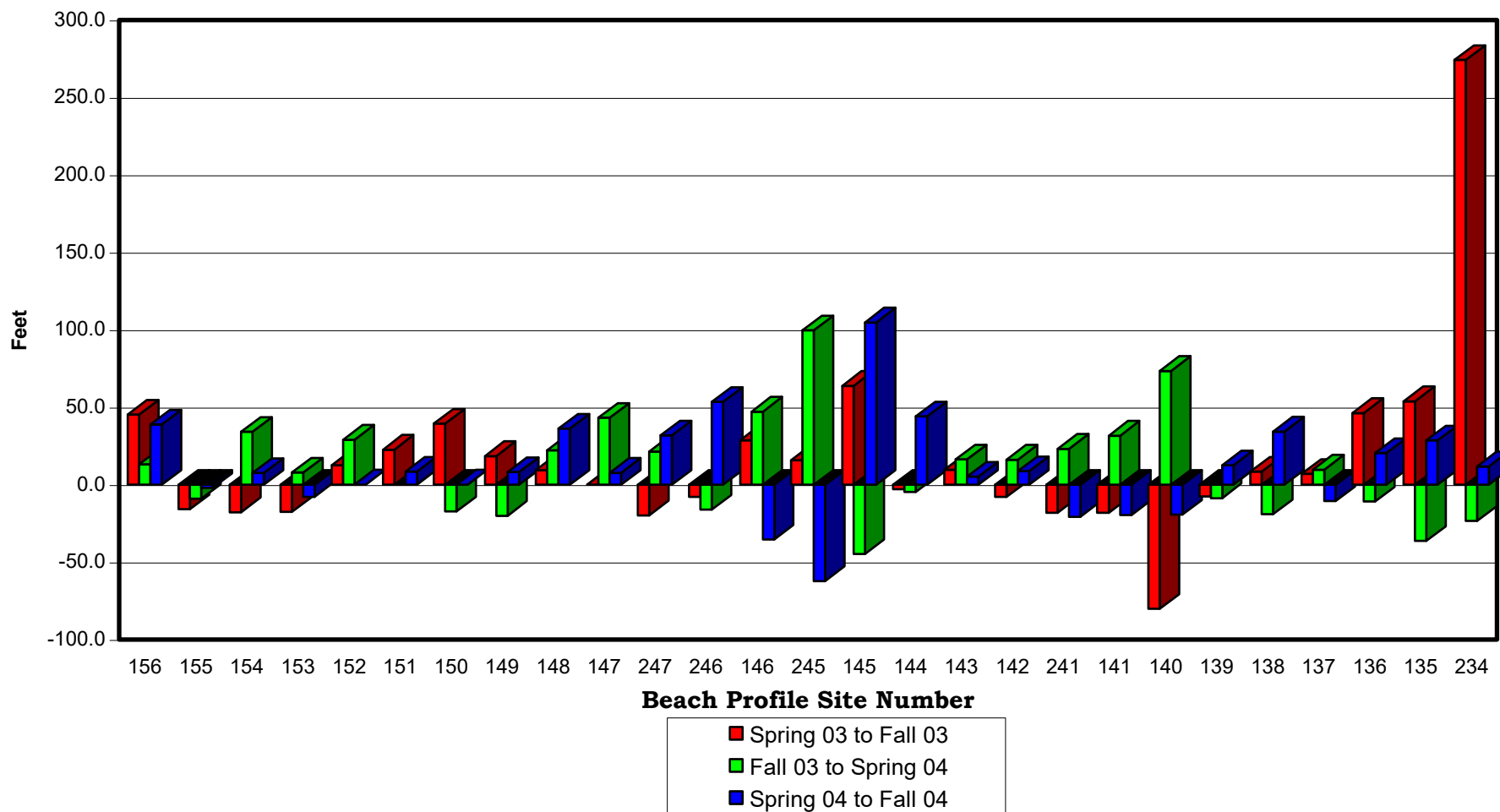


Figure 42d. The shoreline data ranged within a 50-foot gain or loss. This level of change reflects seasonal shifting of beachface slopes, not aggressive erosion or deposition. The exception was the Forsythe Wildlife Refuge site just south of the Beach Haven terminal groin. Sand returned advancing the Spring 2003 position following a winter of multiple storm impacts.

Ocean County Beach Volume & Shoreline Position Changes - Spring 2003 to Fall 2004

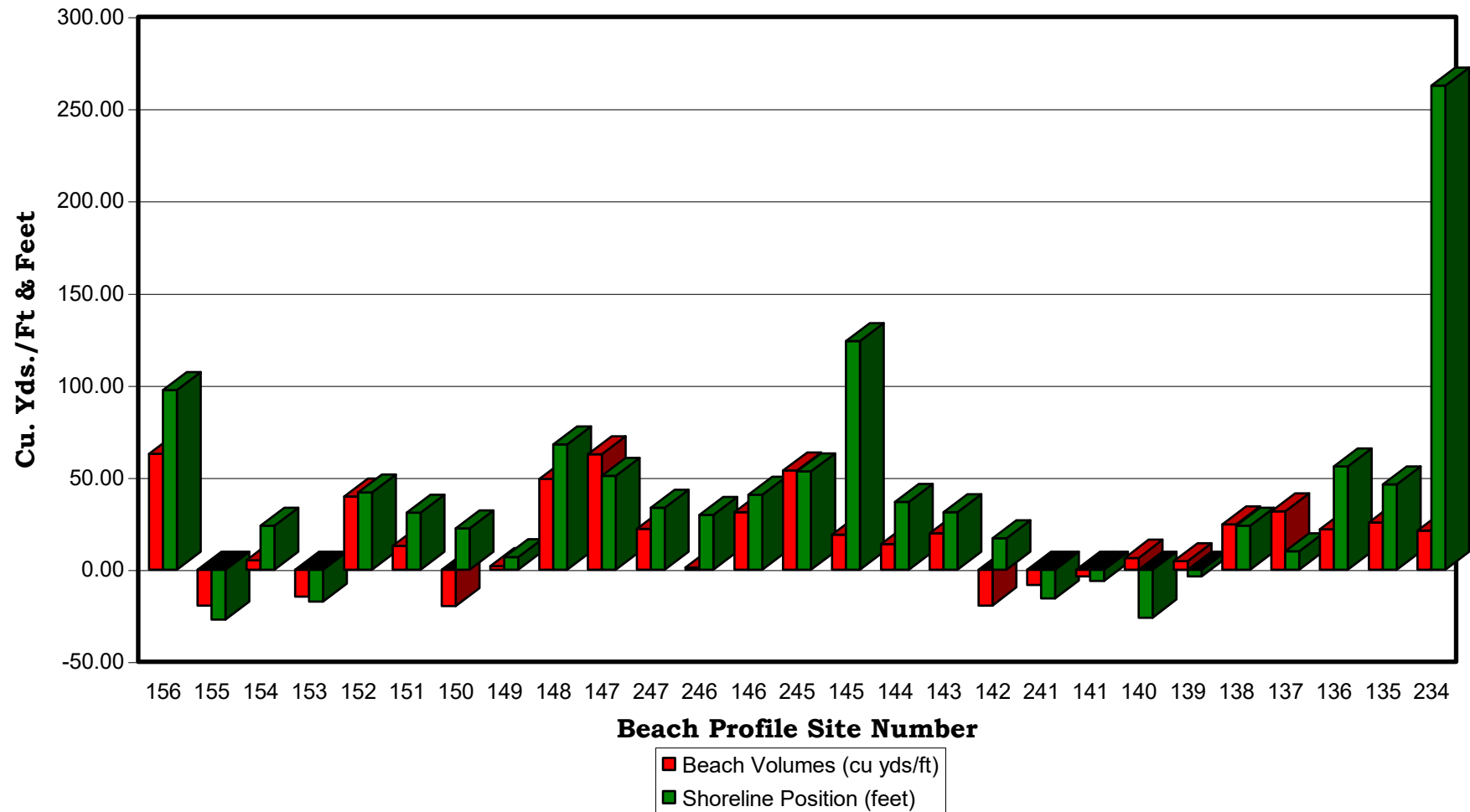


Figure 42e. Over 18 months of study, the Ocean County shoreline managed a modest gain in sand volume and three outstanding sites with over 100-foot shoreline advances as material returned to the beach berm.

SUMMARY OF INDIVIDUAL SURVEY STATIONS LOCATED IN OCEAN COUNTY

- **Profile #156 - Water Street, Point Pleasant, Ocean County** (fig. 43)

This profile begins along Water Street and includes the Point Pleasant Beach boardwalk, which is located along this section of beach. The Water Street beach is extensively used for recreation but is privately owned. Aeolian processes blow sand across the wide, dry beach that accumulates along the seaward side of the boardwalk but these accumulations are subsequently removed during maintenance activities.

The wide, upper beach extends seaward of the boardwalk 225 feet before reaching any recent position of the berm. The widest berm extended 390 feet from the boardwalk in the fall of 2004. The trend is one of sizable advance since April 2003 (175 feet). The extensive width of this beach formed from long-term deposition of sand as a wedge, retained by the Manasquan Inlet jetties. This wedge tapers to zero near the southern boundary of Point Pleasant Beach, but varies slightly from year to year as the average longshore transport direction shifts within the limits seen over years of time.

During the 18-month interval spring 2003 to fall 2004, the sand volume in the berm accumulated 65.20 yds³/ft., a quantity that amounted to all change seen at this site. Very little occurred offshore as seen in the plots. The shoreline advanced 97 feet.

- **Profile #155 – Maryland Avenue, Point Pleasant, Ocean County** (fig. 44)

The Maryland Avenue profile starts along the road and includes a street end bulkhead located at the landward dune toe. The profile is set along a public beach access path through the dune located between the homes on either side of the street end. The landward dune slope and crest have been stable for years with slow advance of the seaward slope to the situation that existed by 2004. A relatively narrow beach merges into the seaward slope of this massive dune. The berm retreated in each of the three surveys as sand was removed. Minor bar and trough topography appeared offshore, but the net change was a -19.49 yds³/ft. with a 27-foot retreat in the shoreline.

- **Profile #154 – Johnson Avenue, Bay Head, Ocean County** (fig. 45)

The Johnson Avenue profile reference position is located on a utility pole along Johnson Avenue. The profile includes the pole, street end and dune feature as well as the beach and offshore. This dune is relatively unique for Ocean County because of the rock seawall that forms the dune's core, and is presently buried beneath a veneer of sand. This seawall was exposed during a few storm events in the early 1990's, including the December 11-12, 1992 northeast storm. Sand was replaced over the rocks then dune grass and other plant species flourished to help stabilize the sand.

Sequential advances in the berm position acted to create a substantial 18-month increase in sand volume at Johnson Avenue (21.87 yds³/ft. in the berm), but since the majority of the sand came from the offshore region, the net increase at the profile was only 5.20 yds³/ft. with a 24-foot shoreline advance.

- **Profile #153 – 1117 Ocean Avenue, Mantoloking, Ocean County** (fig. 46)

This profile is located on private property and begins near the northeast corner of the home. A well-established dune, 80 feet in width with a crest elevation of 19 feet NGVD protects the home. Although each oceanfront home owns the dune and dry beach in

front of it, the Borough of Mantoloking orchestrates scarp repair using sand harvested from the berm after it begins to recover following the storm season. The Borough moves between 2.5 and 4 yds³/ft. from the beach up to the dune grading the sand up to the top of the scarp. This program restores the dune volume and width to pre-storm conditions maintaining the level of storm protection for oceanfront homes and public access ramp sites.

Storm activity during the winter of 2003 left a near-vertical scarp at this location. The Borough orchestrated community-wide sand bulldozing along most of the beachfront to create the wedge of sand seen at the dune toe in the June 2004 profile. This sand has remained in place since due to a lack of further storms. Sand migrates onto and off of the beach to the bar system frequently and rapidly along the Mantoloking shoreline.

- **Profile #152 – Public Beach #3, Brick Township, Ocean County** (fig. 47)

At public beach #3 in Brick Township the profile includes the pavilion deck and continues over a dune system that has grown significantly since the monitoring program began in 1986. The dune width has expanded to 140 feet at the toe with a current dune crest elevation of 22 feet NGVD. The landward slope and crest are covered by an abundance of dune grass, sporadic goldenrod and a flourishing ground cover consisting of mostly beach pea, all of these help to stabilize the dune system. Along the seaward slope plant coverage is sparse but a dune fence installed along the seaward dune toe helps to stabilize the slope. Sometime in the summer of 2003 the township built a substantial foredune with a volume of 2.58 yds³/ft. This new feature is readily apparent on the profile plot, but was re-graded by June 2004 to the original dune toe slope.

Sand moved onto the profile area surveyed during the summer of 2003 (29.44 yds³/ft.) and migrated up the beachface to advance the berm seaward. The fall 2004 cross section shows a beach without a bar present, so most of the sand available was on the beach at that time.

- **Profile #151 – 1st Street, Normandy Beach, Ocean County** (fig. 48)

This profile is set along the public beach access path located at the seaward end of 1st Street in Normandy Beach. The profile begins at the landward dune toe, which is intact on this open public lot set between homes built on the landward dune slope north and south of the profile line. Consequently, the profile shows a natural dune configuration for this region and does not represent the more typical truncated configuration caused by excavation into the back of the dune for the footprint of the homes built along this stretch of shorefront. The dune width is approximately 120 feet with a crest elevation at 20 feet NGVD. The dune width seaward of the homes is less than 50 feet because the home occupies the landward slope up to the landward crest reducing the dune's shore protection benefits dramatically. On the profile line the landward toe and slope are well established and stable demonstrated by the pine trees and bayberry plants that inhabit the area. Along the dune crest a thick stand of dune grass mixed with sporadic goldenrod flourish. Dune grass along the seaward slope is sparse but some rhizomes and recently planted plugs are colonizing this area.

A 22.29 yds³/ft. advance in the berm position occurred during the summer of 2003, with minor losses since that time. About half of the increase in sand volume eroded away by the fall of 2004. There was little bar activity offshore and little change in the elevation beyond the shoreline over the 18-months of study. The net sand volume change was 12.94 yds³/ft. with a 31-foot shoreline advance.

- **Profile #150 – White Avenue, Lavellette, Ocean County** (fig. 49)

The White Avenue profile starts at the street end and includes the boardwalk constructed at the same elevation as the dry beach, but landward of the dune and above the street. The dune has grown steadily over the history of the monitoring program to its current configuration 75 feet wide at the base with a crest elevation of 24 feet NGVD. Vegetation is very sparse on both slopes with a limited number of goldenrod and dune grass plants colonizing the crest.

Sizable volumes of sand switch between the beach and offshore as winter follows summer accretion. The bar was well developed each spring survey combined with some retreat in the berm position. By summer's end the berm had advanced and the sand elevation offshore had declined. The net change over 18 months was $-19.87 \text{ yds}^3/\text{ft}$. with a 22-foot shoreline advance.

- **Profile #149 – 8th Avenue, Ortley Beach, Ocean County** (fig. 50)

This profile begins at the seaward end of 8th Avenue and includes the street end parking area and boardwalk. A small dune is located seaward of the boardwalk and is the major shore protection feature for the property and public infrastructure located landward of the boardwalk. The dune width is 40 feet at the base and the crest elevation is 18.5 feet NGVD.

Considerable changes occurred from the dune toe to the offshore limit of surveying this past time of study. The berm advanced substantially during the summer of 2004 gaining $26.87 \text{ yds}^3/\text{ft}$. as one large fill of sand, while the offshore bar migrated landward from a distant position in April 2004. The shoreline advanced 7 feet in 18 months.

- **Profile #148 – 4th Avenue, Seaside Park, Ocean County** (fig. 51)

At 4th Avenue the profile includes the road, an access ramp between the street and boardwalk, which is constructed on the landward dune slope. The boardwalk is at least 5 feet higher than the road and occupies a niche on the upper landward dune slope. This large dune provides significant storm protection for the property and infrastructure located west of the dune including the boardwalk. The dune sand has been encroaching on the boardwalk as it grew, especially the occasional gazebo structures located seaward of the boardwalk alignment. From the landward toe at the street to its seaward toe, the dune is 175 feet wide and was stable during the current report interval. A narrow berm defines the beach, but the apparently steeper beach slope seen on the plot is really due to the greater horizontal distance used to accommodate the 1000-foot length of the cross section.

Cross shore transport dominated 2004 as the April survey showed a well developed offshore bar and a narrow berm, which was followed by accretion of a generous berm as the bar material moved onto the shoreline. The berm gained $40.83 \text{ yds}^3/\text{ft}$. as the bar lost $21.20 \text{ yds}^3/\text{ft}$. The difference came from outside the profile envelope as new sand moved onto the cross section. The 18-month net change was a gain of $49.28 \text{ yds}^3/\text{ft}$. with a 68-foot shoreline advance.

- **Profile #147 – 6th Lane, Midway Beach, Ocean County** (fig. 52)

The Midway Beach profile begins at the seaward end of 6th Lane and includes an open sandy lot where the beach access path is located between oceanfront homes. The dune here has grown significantly during the monitoring history with sand accumulating

around a series of dune fence installations. Initially there was no dune, just a bare sand hill about 6 feet lower than the present crest elevation. The dune width as of November 2004 had reached 130 feet between the landward fence and seaward toe with a maximum crest elevation of 22.3 feet NGVD. An abundance of dune grass mixed with seaside goldenrod over most of the dune helps produce a stable shore protection feature that shelters the property and infrastructure located landward of the dune from storm damage and wave overwash flooding. During the last four surveys the seaward crest and seaward slope gained 2.97 yds³/ft. of wind-deposited sand.

Continuing the trend started at site #148, the deposition of sand on the berm was outstanding in outcome between September 2003 and November 2004. Just this section of the beach gained 37.85 yds³/ft. as the berm advanced 51 feet across a 15-foot elevation change from the berm crest out into 5 feet of water. Much of this new material had to come from outside of the profile envelope, either parallel to the shoreline or from further offshore than the survey goes (1056 feet from the reference).

- **Profile #247 – North End, Island Beach State Park, Ocean County** (fig. 53)

Profile #247 is located at the north end of Island Beach State Park set several hundred feet north of the northern limit to public vehicle beach access. This site was established on a completely natural dune system that has been subject to a variety of influences that have produced considerable changes over the history of monitoring here. Island Beach State Park is a wildlife area with a wide variety of native plant species. The back dune area is a stable environment where pine and bayberry are abundant. The forward dune ridges are more susceptible to changes and are covered with dune grass, seaside goldenrod and other early colonizing plant species. The profile starts on a secondary dune ridge and continues through a swale. This feature has continued to change, influenced by wind scour and transport, which is responsible for the seaward movement of the primary dune's landward slope. This natural site illustrates that westerly winds also impact dune development as the cross sections show a relatively steady erosion of sand from the upper slope. This western slope impact is seldom seen on developed shorelines since oceanfront homes tend to block west winds and the owner efforts to vegetate the landward slope of the dune limits the west wind scour.

The berm accretion pattern continued into the State Park with a large gain during the summer of 2004 on the berm and into the dune (18.52 yds³/ft.). Additional sand was added to the crest of the offshore bar as well, coming in from off the profile line. The 18-month change was 22.13 yds³/ft. with a 34-foot shoreline advance.

- **Profile #246 – Island Beach State Park, Ocean County** (fig. 54)

Profile #246 is located midway along the recreationally accessible beach area just north of the second beach vehicle access path. This site is set on a natural dune system with bayberry and pine trees inhabiting the back dune area. The profile starts on the secondary dune ridge and crosses a wide flat dune swale not shown on the plot. Dune grass mixed with seaside goldenrod and other species flourish from the secondary ridge across the swale and over the primary dune to the seaward crest. The seaward slope has been subjected to past erosional events and dune grass is sporadic but a dune fence was installed to help collect sand and stabilize the slope. During the report period sand accumulated in patches from the landward slope to seaward dune toe.

The berm developed substantially during the summer of 2004 with a very well defined offshore bar present at the 350-foot distance. This bar contained 42 yds³/ft. and included the sand found in the berm.

- **Profile #146 – South End, Island Beach State Park, Ocean County** (fig. 55)

Profile #146 is located approximately 1000 feet south of the southern beach vehicle access path, positioned on the large natural dune system. At the southern end of Island Beach State Park there is no road or other development, the dune naturally tapers landward into the bayside environment. Bayberry and other native shrubs and plants flourish on the back dune area creating a dense stand of flora. The profile begins at the landward toe of the primary dune. During the last four surveys the primary dune was relatively stable. Seaward of the primary dune a foredune ridge developed during the last ten years, which continued to accumulate sand on its seaward crest and slope during this report interval. The overall width of both features is about 280 feet with crest elevations of 24.5 feet for the primary dune and 18.5 feet for the foredune. Abundant stands of dune grass mixed with seaside goldenrod cover both features.

The trend of berm advance during 2004 disappeared by this cross section. The beach remained essentially the same following the transfer of some sand onto the berm, but included a small retreat in the beachface position. The net change over 18 months included filling in a deep scour trough seaward of the beachface present in May 2003 resulting in an accretion of 31.13 yds³/ft. and a 42-foot shoreline advance.

- **Profile #245 – 10th Street, Barnegat Light, Ocean County** (fig. 56)

This is the longest profile in the State resulting from the new southern Barnegat Inlet jetty that was reconstructed in 1990. The new orientation of the jetty allowed millions of cubic yards of sand to be contained between the Barnegat Light Borough shoreline and the jetty. As a result the beach grew seaward by hundreds of feet. The region on the original back dune's landward slope is becoming a maritime forest and is fully vegetated. The dune positioned between 300 and 600 feet from the reference was the former primary dune at the beach prior to 1990. Dune grass, seaside goldenrod and other native species are flourishing on this dune system from the new primary dune crest to the seaward dune toe. The old primary dune width extends approximately 450 feet from the street end to the swale, while the developing "foredune" system continues seaward another 600 feet forming a dune field that now covers a distance of over 1200 feet seaward of the street end. The primary crest elevation is 24 feet NGVD while the foredune crest elevation grew to 16 feet NGVD by November 2004. Surveying this complex region is difficult and the sand volume changes in the dunes are perhaps attributed as much to the variability in the choice of data points as it is to the change in sand distribution. Clearly sand has been added to the seaward slope and crest of the foredune where winds move beach sand into the dune system. One would assume that little new sand is transported over 600 feet landward to the former primary dune by "normal" winter storm activity. Approximately three cubic yards of sand per foot of ocean frontage was added to this seaward dune section in the course of 18 months. This dune field is now 14 years old and will continue to mature as plants are introduced and become established. The grass plants will be replaced by cedar, cherry and bayberry trees creating the climax maritime forest setting seen on Sandy Hook, Island Beach State Park, Little Beach and other similar natural areas.

The berm advanced several times followed by recession, but not entirely related to the seasonal changes. The most extensive berm was seen in the May 2004 survey. By the summer's end the shoreline retreated 60 feet during the summer as the berm lost sand, some of which was deposited higher up on the beach profile. Sediment distribution is highly influenced by tidal currents and wave refraction around Barnegat Inlet, so seasonal influences could easily be secondary to these forces. The potential for continued accumulation of high volumes of new sand due to the new jetty location has

declined substantially; so future changes will depend on variations in the tidal channel and associated ebb-tidal delta deposition. This interval saw a gain of 53.82 yds³/ft. and a 53-foot shoreline advance, 90% attributed to the gains in the berm and beachface.

- **Profile #145 – 26th Street, Barnegat Light, Ocean County** (fig. 57)

Profile #145 is located at the seaward end of 26th Street in Barnegat Light. The profile includes the road end and continues over a wide dune that continued to grow during each of the recent surveys. The seaward crest and associated dune volume has been added to since 1990, also due to sand accretion along several thousand feet of Barnegat Light Borough shoreline beginning a short distance south of 26th Street north to the new jetty. By the end of November 2004, the dune width measured 182 feet between the landward and seaward dune toe. The growth occurred on the seaward slope where sand accumulated from the crest to the toe expanding the dune width and increasing the foredune height. The foredune crest is higher than that of the former primary dune elevation (22.5 feet).

Sand redistribution was particularly active on the beach and just offshore. The berm grew vertically and expanded seaward by 124 feet at the shoreline elevation. Sand was carried onto the beach from offshore (18.62 yds³/ft.) as the offshore region lost 21.18 yds³/ft. during the summer of 2004. Sand volume gained 19.04 yds³/ft. for 18 months.

- **Profile #144 – La Baia Street, Loveladies, Ocean County** (fig. 58)

Footprints of the homes essentially occupy the natural landward slope of the dune in Loveladies. The profile at La Baia Street is set along the beach access path over the dune but starts at the base of a utility pole located along a driveway to the adjacent oceanfront property. This reference position is located about midway on what should be the natural landward slope of this dune. The crest of the dune is at an elevation of 20 feet NGVD and is about 20 feet wide on the crest while between the driveway edge and seaward slope the dune width is about 60 feet. The landward slope just south of the site is undeveloped where pine and bayberry flourish. On the crest and seaward slope dune grass growth is modest to sparse mixed with sporadic seaside goldenrod plants. The dune was relatively stable during this study period.

The offshore region was active during 2003 into the spring of 2004 as bars formed and migrated landward. The spring survey saw material moved farther seaward than previously, followed by considerable transport landward to the berm adding 29.49 yds³/ft. in sand volume plus a 44-foot shoreline advance during the following summer. The net change was a 13.66 yds³/ft. volume increase with a 37-foot shoreline advance.

- **Profile #143 – 73rd Street, Harvey Cedars, Ocean County** (fig. 59)

The oceanfront homes and seaward street end in Harvey Cedars also intrude upon the natural position of the landward dune slope as previously mentioned in Loveladies. Profile #143 starts at the seaward end of 73rd Street and continues over the street end dune. The dune width is 80 feet from the seaward edge of 73rd street to the seaward dune toe. Dune grass is abundant on the landward slope and mixed with seaside goldenrod but the plant coverage tapers toward significantly sparser conditions from the crest seaward to the toe.

Very little material made it onto the dune in this 18-month study, but shifts onto and off the beach were considerable. This beach concluded this study interval at a minimum position actually losing sand during the summer of 2004 (-12.61 yds³/ft.).

The net change was positive largely due to filling a deep trough near the base of the June 2003 beachface position. (19.79 yds³/ft. with a 31-foot shoreline advance)

- **Profile #142 – Tranquility Drive, Harvey Cedars, Ocean County** (fig. 60)

Profile #142 is set on a private access called Tranquility Drive. The profile includes the drive and a small retaining wall at the landward dune toe. The retaining wall confines the landward dune toe and prevents sand from spilling onto the oceanfront property. The range of changes declined at this site as minor berm shifts occurred seasonally with corresponding elevation changes offshore. There was a 19.42 yds³/ft. sand volume loss, but a 17-foot shoreline advance due to a gentler slope on the beachface.

- **Profile #241 – 20th Street, Surf City, Ocean County** (fig. 61)

This profile starts along the seaward end of 20th Street and includes the road end at the landward toe of the dune. A large dune protects the seaward end of the road, nearly 150 feet in width at the base and 80 feet across the crest with a top elevation of 25 feet NGVD. Dune grass mixed with seaside goldenrod is present in modest amounts helping to promote a stable dune environment.

Low rates of cross-shore transport added or removed sand seasonally from the relatively narrow beach. The seaward dune slope gained modestly, but the net change was -8.20 yds³/ft. with a 16-foot shoreline retreat.

- **Profile #141 – 8th Street, Ship Bottom, Ocean County** (fig. 62)

At 8th Street the profile begins at the landward toe of the dune at the seaward end of the street. The width of this dune is nearly 150 feet at the base and 40 feet across the crest with a top elevation of 21 feet NGVD. The early stages in the formation of a small foredune can be seen by May 2003 but was redistributed onto the dune slope by May 2004, then eroded away by the end of the summer. The crest and landward slope is covered by dune grass mixed with some other species including bay berry and seaside goldenrod. All the changes observed occurred on the lower dune slope.

A 30-foot variation in the beachface slope position corresponded with offshore bar creation and subsequent migration toward the shoreline. Each of the four surveys crossed an offshore bar that ranged between 400 and 750 feet distant from the reference position. The net change was 6.43 yds³/ft. in sand volume gain, with a 26-foot shoreline retreat related to the shifts in the position of the berm.

- **Profile #140 – 32nd Street, Long Beach Township, Ocean County** (fig. 63)

Profile line #140 begins at the landward toe of the dune located at the seaward end of 32nd Street, set along the south edge of the beach access path between oceanfront properties. The dune is approximately 120 feet wide at the base with a crest elevation of 24.5 feet NGVD, and is about 10 feet wide at the top. The landward slope and crest are relatively stable and are covered with dune grass, mixed with seaside goldenrod and some beach rose. On the seaward crest the vegetation density and diversity decreases and the dune grass and goldenrod become more sporadic on the seaward slope. Almost no change occurred in the dune during the report interval. The dune toe gradually merges with the beach and is subject to erosion because the beach is very narrow.

The berm varied within an 80-foot range of positions, oddly reversing the “normal” summer advance and winter retreat pattern. The May to August 2003 change on the

beach amounted to a loss of 42.46 yds³/ft. followed by a winter of 2003 – 2004 gain of 37.00 yds³/ft., then a summer 2004 loss of 7.43 yds³/ft. Offshore, the bars ranged in height by 4.5 feet and a 200-foot width on the seabed. Therefore, the net change across the entire profile only amounted to a 6.43 yds³/ft. gain with a 26-foot shoreline retreat as the berm shifted within the 80-foot range of positions.

- **Profile #139 – 81st Street, Long Beach Township, Ocean County** (fig. 64)

This site is located at the seaward end of 81st Street set along the north edge of the beach access path. The profile begins at the landward toe of the dune. The dune width is marginal due the encroachment of oceanfront homes developed on the landward slope north and south of the profile line. The dune north of the site is extremely narrow and low while south of the site the dune width and elevation are slightly greater. Dune grass and seaside goldenrod are present but very sparse on this stretch of dune. The dune width was approximately 50 feet with a crest elevation of 18.7 NGVD. Sand added to the seaward crest in May 2003 vanished by September 2003, then returned between May and September 2004 (0.89 yds³/ft. at a 15-foot elevation).

The summer of 2004 produced a sizable berm on the beach as sand in offshore bars migrated right to the base of the beachface. The berm volume was about half of the 37.86 yds³/ft. in sand volume because over half filled in the trough present immediately seaward of the beachface in May 2004. The majority of this sand volume came from the bar offshore as it moved toward the beach (-26.75 yds³/ft. transferred from between 400 and 700 feet distant from the reference position).

- **Profile #138 – Old Whaling Road, Long Beach Township, Ocean County** (fig. 65)

The profile at Whaling Road starts at the landward dune toe and was set along the north side of the beach access path through the dune between oceanfront properties. As seen at several other sites on Long Beach Island the oceanfront homes were built on the landward dune slope north and south of the profile line and the foundation footprints reduce the overall dune width shown on the plot for this open lot. On the line, the dune width is about 140 feet at the base with a crest elevation of 24 feet NGVD and a width of 10 feet. Little sand was added to the dune during these four surveys.

The summer of 2004 produced a huge berm by September adding 40.76 yds³/ft. to the beach and dramatically changing the look of the profile. Over half of the new sand came from the offshore bar system as migration toward the beach is seen just beyond the shoreline. The addition of this berm did leave a net gain in sand of 24.58 yds³/ft. and a 24-foot shoreline advance.

- **Profile #137 – Taylor Avenue, Beach Haven, Ocean County** (fig. 66)

Profile line #137 is set on the open lot at the seaward end of Taylor Avenue. The dune width is approximately 115 feet wide at the base with a crest elevation of 19 feet NGVD. The seaward slope was truncated during the winter preceding the May 2003 survey and very little sand was recovered that summer. The next winter more sand actually accumulated on the dune slope as of the May 2004 survey with additional material accumulating during the 2004 summer months. The bar system migrated landward during 2004 and added 2.80 yds³/ft. to the berm and 22.76 yds³/ft. in filling the trough just seaward of the beachface. The net change was a gain of 31.62 yds³/ft. with a 10-foot shoreline advance.

- **Profile #136 – Dolphin Avenue, Beach Haven, Ocean County** (fig. 67)

Profile #136 is located at the seaward end of Dolphin Avenue and begins at the landward dune toe where a wooden retaining wall was constructed to prevent sand from spilling onto the road. On the line and to the south of the profile the dune is undeveloped. In this region the dune width at the base is approximately 75 feet with a crest elevation of 18.2 feet NGVD. North of the line this dune is encroached upon by oceanfront home development and is significantly reduced both in width and elevation. Dune grasses mixed with sporadic seaside goldenrod produced modest ground cover to the landward slope and crest providing added dune stability. The plant coverage diminishes along the seaward slope becoming sparse on the foredune ridge.

The beach recovered from the winter of 2002 – 2003 and added substantial volumes of sand to the berm during both summers with a near complete removal during the winter of 2003 – 2004, again without loss to the dune toe. This narrow beach would not prevent a moderate northeast storm from cutting into the dune, but the site escaped damage thus far. The net change was 25.66 yds³/ft. added to the entire profile with a 46-foot advance in the shoreline due to berm growth and bar migration toward the shoreline.

- **Profile #135 – Webster Avenue, Long Beach Township, Ocean County** (fig. 68)

This profile is located along one of the narrowest sections of developed shorefront on Long Beach Island. The site is set south of the intersection of Long Beach Boulevard and Webster Avenue. Along this stretch of Long Beach Blvd. the road is flanked by a single row of homes with no cross streets on the seaward side. Immediately southwest of the site marshland borders the road along the bay side. Homes were built on the landward dune slope, affecting the dune configuration north and south of the profile line. The profile line was established along a beach access path between the oceanfront properties, on an undeveloped area that represents a more natural dune configuration. The profile starts on the landward side of Long Beach Blvd. and includes the road. The dune width is about 140 feet at the base with a crest elevation of 21 feet NGVD. Dune grass is mixed with some planted pine and bayberry that inhabit the landward slope between and in front of the properties, the dune grass mixed with a few goldenrod plants continued over the crest. On the seaward slope the plant density is sparser.

The steep seaward slope was produced during the 2002 – 2003 winter as waves eroded the dune slope to the crest position. The recovery since then has been modest with a filling in of a narrow beach with a late summer berm surveyed in September 2004. The sand migrated back onto the beach adding 39.34 yds³/ft. between April 2003 and September 2004. Most of this sand came from elsewhere along the shoreline because the offshore region contributed just 13.27 yds³/ft. The dune width has not returned to the dimensions it had in the fall of 2002.

- **Profile #234 – Holgate Wildlife Reserve, Long Beach Township, Ocean County** (fig. 69)

This site is located at the south end of Long Beach Island between the Holgate Wildlife Area and the development on the island. This is a narrow strip of undeveloped dune. The back dune area is covered by bayberry, pine, dune grass and other native species that flourish in this natural region. From the secondary ridge seaward dune grass is the dominant species that flourishes over the swale and is mixed with goldenrod on the landward slope. From the crest seaward the plant coverage quickly diminishes to just a few sparse dune grass rhizomes and sea rocket near the dune toe. The profile starts on the secondary ridge and continues across a swale to the primary dune ridge. This

feature is only 60 feet wide at the base. A small volume of sand reached the dune system over the 18 months of study.

Storm damage affected this site as well during the 2002 – 2003 winter but sand moving south and in from offshore restored the beach by September 2003 with a substantial berm. Winter erosion removed less than half than was taken the winter previous, leaving a narrow berm and abundant sand stored offshore in a bar. By September 2004 the berm had re-grown, but not to the extent seen the summer earlier. The net change amounted to 25.66 yds³/ft. gained in sand volume with a 46-foot shoreline advance.

SUMMARY OF OCEAN COUNTY:

The northern Ocean County shoreline extends from Manasquan Inlet where the uplands sedimentary bluff disappears from exposure at the modern beach in Bay Head and continues south as the geologically modern sand spit to Barnegat Inlet, located at the southern end of the magnificently natural 13-mile Island Beach State Park. The thirteen NJBPN monitoring sites in the northern segment indicate this shoreline has been remarkably stable, a determination supported by a 1999 erosion hazard study done for the Federal Emergency Management Agency (FEMA) (Farrell, et al, 1999) that revealed a relatively stable shoreline over the past century. Between 1899 and 1994, 53% of this shoreline actually advanced seaward by an average of 0.5 feet per year. There is a pronounced absence of groins with a small field in Bay Head and from Lavallette to Sea Side Park. Much of the shoreline is open to free littoral sand transport and is positioned on the New Jersey coast where the average northerly and southerly littoral transport rates essentially balance over time. Northeast storms tend to move sand south toward the Barnegat Inlet jetty, while southeast events tend to move the sand north toward the Manasquan Inlet. Large depositional fillets at both the southern jetty at Manasquan Inlet and at the northern jetty of Barnegat Inlet tend to document this sand transport balance. Sand might move north for extended time intervals, but any northeast storm will rapidly adjust the transport rate to the south to balance the equation. This is a zone of near-equilibrium in littoral transport processes and relatively long-term beach stability appears to be the result.

The southern 18-mile section of Ocean County is known as Long Beach Island that possesses fourteen NJBPN monitoring sites that record beach changes on the northern most barrier island in New Jersey. It is the longest barrier island in New Jersey and historically has been divided by storm events in up to three separate islands. Today it is a highly developed region made up of one township and four municipalities. The dune system varies in width from very narrow to truly vast. The most extreme case of the latter is the northernmost site on the island at 10th Street in Barnegat Light where as of October 2004 the dune width had reached 1285 feet as a direct result of the southern jetty re-orientation at Barnegat Inlet (completed in 1991, Philadelphia District Corps of Engineers). Conversely, the profile at Dolphin Avenue in Beach Haven, located at the southern portion of the island, has a dune width of only 90 feet and the Webster Avenue dune eroded by 20 feet during a relatively mild winter with multiple northeast storms, none especially severe during early 2003.

The undeveloped area in Holgate is under management by the Forsythe Wildlife Refuge with the main office in Atlantic County. Long-term shoreline changes have impacted this area more than other regions because the shoreline has no shore protection structures and lies in a down-drift direction from the 97-groin field along the rest of Long Beach Island. There is a 700 to 900-foot westward offset in the shoreline position between 1899 and 1994, by far the largest in Ocean County. This was due to the opening of “Beach Haven” Inlet in 1920 followed by the southern migration of this new

inlet over the next 30 years effectively erasing the detached segment of Long Beach Island. This truncated segment of Long Beach Island became known as Tucker's Island, which vanished by 1950, but the northern side of the new inlet migrated south as well, into a position considerably landward of the shoreline prior to the inlet opening. The comparison of the 1899 pre-inlet opening shoreline with the post-migration position in 1994 yields a progressively greater landward displacement from Dolphin Avenue south to the tip of the spit.

The 27 cross sections showed that seasonal changes vary considerably with storm climates and summer accretion. The first summer (2003) produced a reasonable recovery from a stormy winter that did not have a single violent storm, but made up for it with multiple minor events, some only a week apart. The average gain was 10.79 yds³/ft. for all 27 sites. The average shoreline position advanced 16.42 feet. The 2003 – 2004 winter was not as severe with fewer storms largely concentrated in the mid- to late-spring. Recovery must have been rapid because the surveys showed a 5.53 yds³/ft. net sand volume gain and a 10.33-foot shoreline advance in spite of the winter. The 2004 summer saw little further gain (-0.34 yds³/ft. and a -9.11-foot shoreline retreat).

The 18-month comparison of the data showed a 16.52 yds³/ft. sand volume gain averaged across both segments of the Ocean County shoreline with a 37.45-foot average shoreline advance. Clearly, the conditions have favored gain and advance in the county's beaches.

As this report is being written, the US Congress has inserted funding for going to construction on the Long Beach Island Shore Protection project developed by the US Army Corps of Engineers (ACOE) Philadelphia District. This funding is part of the Water Resources Development Act of 2005 (WRDA) working through Congress in late August. If passed and signed into law, the ACOE will be in position to begin to undertake the restoration of the developed portion of the Long Beach Island shoreline. The project will not include the wide segment from the Barnegat Inlet jetty to about 26th Street in Barnegat Light Borough and will stop at the end of development in Beach Haven at the border with the Forsythe Refuge.

The WRDA bill of 2005 also continues funding to move the Northern Ocean County Shore Protection project closer to a Planning and Engineering Design (PED) document to be submitted to the US Army Corps of Engineers Commander in Washington, DC. This document is required prior to proceeding to seeking construction funding. This step will need to wait for a subsequent WRDA bill in Congress.