THE RICHARD STOCKTON COLLEGE OF NEW JERSEY
COASTAL RESEARCH CENTER

The southern Long Branch beach maintenance work was nearly complete when this photograph was taken March 20, 2009. End-effect losses had greatly reduced the sand quantity present south of Morris Avenue and this project replaced the lost sand. This picture was taken after the Fall 2008 data presented in this report.

New Jersey Beach Profile Network Annual Report on Shoreline Changes in New Jersey Coastal Reaches One Through Fifteen Raritan Bay to Delaware Bay

Prepared for:
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On
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Coastal Reaches One Through Fifteen
Raritan Bay to Delaware Bay

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EXECUTIVE SUMMARY

The New Jersey Beach Profile Network (NJBPN) was authorized by the New Jersey Department of Environmental Protection (NJDEP) in 1986. This report displays the individual site data together so that the reader will easily find photographs, explanation text and the summary cross section plots for each location. The sites are arranged from north to south numerically and by county. Each county's section starts with a summary of beach changes, performance of major projects, and a discussion of issues and pending project work in the county. These observations on beach changes along the New Jersey coastline provide a means to determine both rapid seasonal changes and follow long-term trends in shoreline position or beach volume. The advent of major shore protection projects resulting in the addition of millions of cubic yards of new sand has given a performance monitoring aspect to the report. The 100 sites extend from the lower Raritan Bay, along the four oceanfront county shorelines and into Delaware Bay along the western shore of Cape May Co.

The photographs, graphics and text display and discuss the seasonal and year to year changes observed since the previous report. This pattern of data presentation is followed on the website as well www.stockton.edu/crc . Past reports are linked to the site so comparisons can be made to the present observations along the New Jersey coastline. The focus of these reports is designed to show the following:

- The enormous positive impact of beach nourishment over the past 22 years.
- The beneficial results of the low incidence of serious storm events impacting the NJ coast.
- The enhanced shoreline protection benefits of 22 years of dune growth in height and width.
- The importance of the inlet processes and their relationship to change on adjacent beaches.
- The ability to analyze causes of extreme variations at specific sites on the coast.
- The pattern of sand distribution along barrier islands as determined by the island's profiles.

This reporting interval covers the time between the spring of 2007 and the fall of 2008. The average beach in New Jersey gained 2.01 cubic yards of sand per foot of shoreline as the zero-elevation shoreline position advanced 9.51 feet seaward. The winter of 2007 to 2008 did not produce significant storms. By March the beaches were showing considerable accretion of sand between the dune toe slope and the water line. There were no northeast events until a series of four commenced in early April 2008. The fourth in the series on May 12th produced minor dune toe erosion and some media concern that the summer season might suffer because of the storm impact on the beaches. However, the weather pattern reverted to conditions favorable for an extensive period of accretional activity. By September 2008 the beaches were in outstanding condition. The winter continued mild into 2009 and for the first time in several years the communities who favor the use of bulldozing of sand from the beach berm back into the dune toe area found that it was not required. The need for beach maintenance was limited to a few erosional hot spots.

The survey data was analyzed and evaluated to show changes in the four county shorelines and sand volume changes for the 18-month study interval. The three seasonal average sand volume changes for each county

plus the 18-month summary are shown below. Monmouth County was the only county showing an average loss for all three seasonal intervals. For the other three counties, the winter of 2007 to 2008 showed minor winter erosion followed by recovery the following summer. The total change for Ocean, Atlantic and Cape May Counties was a gain in sand volume.

	S 07 – F 07 Cu. yds/ft.	**F 07 – S 08 Cu. yds/ft.**	**S 08 – F 08 Cu. yds/ft.**	**S 07 – F 08 Cu. yds/ft.**
Monmouth County	-0.63	-2.61	-2.61	-6.02
Ocean County	2.28	-0.17	6.25	8.36
Atlantic County	5.45	-7.35	4.22	2.68
Cape May County	4.90	-3.51	4.89	6.61

The shoreline response for Cape May and Ocean Counties was seasonal with advances during the summers and general shoreline retreat over the winter. Atlantic County experienced a general shoreline retreat for the study interval with Monmouth County having a nearly neutral shoreline position over the 18 months.

	S 07 – F 07 Feet	**F 07 – S 08 Feet**	**S 08 – F 08 Feet**	**S 07 – F 08 Feet**
Monmouth County	15.85	-17.80	2.30	0.36
Ocean County	21.70	-16.71	9.49	14.48
Atlantic County	14.76	-28.81	-0.17	-14.22
Cape May County	16.18	-15.03	22.95	24.10

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INTRODUCTION:

The New Jersey Beach Profile Network (NJBPN) provides local and regional information on coastal zone changes and is designed to document storm-related damage assessments to the New Jersey shoreline. The report is focused on long-term trends at sites to develop statistically meaningful information for State and local coastal zone managers. The database consists of 100 locations between Raritan Bay (three sites in the lower bay), the Atlantic Ocean coastline, and Delaware Bay (four sites on the western shoreline of Cape May County). Each site has been visited annually in the fall since 1986. Semiannual visits, each spring and fall, began in 1994 following the passage of the bill establishing the New Jersey shore protection funding through the NJ real estate transfer tax. The program was expanded to take surveys every spring following the winter northeasters and in the fall following the summer beach accretion. In addition, new sites were established in the gaps of coverage and adjacent tidal inlet shorelines. Information collected consists of photographs of the beach/dune system at each site, a topographic profile of the dune, beach and seafloor to a minimum depth of 12 feet, and field notes on significant geologic change in progress. Any construction activity is noted and necessary information regarding quantity and duration of such activity is gathered. The field data is used to generate graphical cross section plots, which compare profiles across the width of the active coastal zone. The cross section is also used to calculate sand volume and shoreline position changes. This report is the latest in a series of annual reports prepared for the New Jersey Department of Environmental Protection (NJDEP) that began in 1987. The information is grouped by profile site location so that the survey cross section, the site photographs, and the description of significant change for each site is together in sequential pages for each site grouped by county. The tables of data are found at the end of the county site descriptions for Cape May County. A summary of each county's coastal zone activities precedes the individual site descriptions following the county profile site location diagram.

THE NEW JERSEY COASTAL ZONE:

All of the New Jersey ocean-facing shoreline is built upon older, unconsolidated terrestrial sediments composed of gravel, sand, silt or clay. The northern coast in Monmouth County has a beach carved into these sedimentary units originally generating a sandy beach backed by a bluff of the older sediments that eroded during serious storm events. The erosion provided new sand and some gravel to the beach system, but the bluff retreat produced by the storm quickly became a serious problem following extensive human development along the coastal bluff during the last third of the 19th Century. Two major sand spits developed, one to the north from Long Branch (Sandy Hook), and the other to the south from Bay Head (Mantoloking to Barnegat Inlet). Continuation of the barrier island segmented shoreline covers the remainder of the coastline where individual islands, separated from the mainland by a series of bays and tidal lagoons. These islands have no local sand sediment source to supply the beach and slowly developed following the rise in sea level to its present elevation. These islands continue to be an on-going equilibrium between storms, waves, sea level and tidal currents in spite of all human efforts to enforce stability and continuity for man-made development.

Historically, development first focused on the widest, most vegetated segments of these NJ barrier islands driven by the quest for safety from storms and a search for shallow fresh water wells best located in these parts of the sand coastal environment. The Monmouth County shoreline benefited from growth made possible as the rail system spread from the metropolitan centers where interests in New York City created the New York & Long Branch Railroad in the 1870's following the Camden & Atlantic City Railroad's construction to Atlantic City on Absecon Island in the late 1850's. None of this growth really moved rapidly until the last 20

years of the 19th Century. Previously, visitors had been coming to the NJ shore by boat or overland to small "resorts" in Cape May City, Tucker's Beach and points along the Monmouth County shoreline. Each major conflict and/or financial crisis curtailed the rate of development. First it was World War I, then a burst of development where major new hotels were built at all the, then developed sites. The Great Depression followed by World War II nearly eliminated growth until the late 1940's. Between 1950 and 2000 the rush to the shore was on. Multi-lane highways replaced the railroads to give the public access and the purchase of a second home became the way to go to the beach to vacation. Today visitors generate $27.7 billion in tourist revenue; create 500,000 jobs at small to moderate businesses, which pay $5.5 billion in taxes to the NJ treasury making the Jersey shore and tourism the second largest state industry.

Naturally, defending this investment against storms, tidal currents, and sea level rise has also become a highly advanced industry. Early efforts relied on local products primarily the Eastern White Cedar to create bulkheads, jetties and groins along the coast. Big errors made during the early years were:
1) Not reserving the dry beach and dune system as publicly held real estate.
2) In many cases plowing large dune systems flat to make more room for development.
3) Building on tidal inlet channel margins and failing to recognize the rapid rates of channel migration.

The arrival of the railroad meant that other products could be brought in to hold back the sea. Concrete, stone and steel made their impact as all structures facing the ocean got higher, longer, and tougher. Better roads and the heavy truck brought all these commodities directly to any coastal site in crisis. As a result many segments of the coast have continuous bulkheads, groins spaced about every 750 feet and all but 3 of the 11 inlets are confined within jetties.

The earliest attempt at sand supplies came in the form of trucking sand from Belmar beaches across the Shark River Inlet and dumping it on the Avon side to effectively "by-pass" the inlet. In 1952 the Corps of Engineers conducted a 2.54 million cubic yard beach fill in Ocean City in Cape May County. Beach restoration followed the devastating March 1962 northeast storm as any source of sand was employed to replace the beaches torn away by the event. Beach nourishment got a boost in the 1970's as the State passed two multi-million dollar bond issues to finance projects at a variety of places. Congressman William Hughes guided an initial Federal project in Ocean City at the same time the restoration was advancing to construction in Cape May City (this project was initiated following successful litigation that showed that the Cold Spring Inlet jetty system completed in 1911 had created a serious negative impact on the Cape May City beaches. The ACOE was required to pay 90% of the restoration costs due to specifics in Federal public works policies regarding the mitigation of negative impacts). These successes generated interest in undertaking the restoration of the entire Monmouth County oceanfront shoreline. Five years, 25 million cubic yards of sand and $250 million dollars later, the largest beach restoration project ever in Monmouth County was completed by 2000. Additional Federal beach projects were approved and constructed in Surf City, Brigantine, Atlantic City, Ventnor City, Ocean City, Avalon, Stone Harbor, Cape May City and Cape May Point. Federal projects are pending for the Northern Ocean County shoreline, Ludlam Island and North Wildwood, but lack sufficient funding to go to construction. State and local sponsorship carried this effort to other sites as well. Today, this effort has moved the State of New Jersey to number one in the nation in terms of the percentage of the shoreline under nourishment contracts and in terms of taking the majority of all Federal dollars spent on beach restoration.

Allowing private ownership of the beach has proved to be a thorn in the side of future beach nourishment in areas pending because private ownership may extend to the Mean High Tide Line in New Jersey. The original private owners usually held up to a thousand feet of shoreline property, but with subdivisions to create 50 to 100-foot wide lots for individual homes, the number of properties that occupy a prospective beach restoration project makes the obtaining signed easement documents nearly impossible. Owner resistance varies from benign to militantly opposed to allowing the project to proceed on their piece of the beach. Experience has shown that a few militant property owners can sabotage a major project in spite of the enormous economic benefit to the municipality as a whole. Litigation takes time and money and the Federal agency (ACOE) insists that real estate problems are the responsibility of the local sponsor of a project.