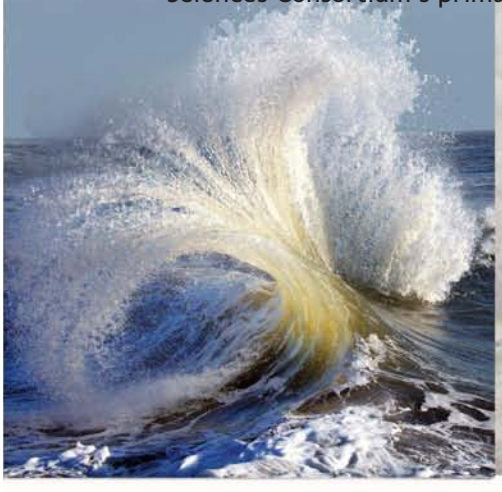
New Jersey STATE of the SHORE & More! 2007

DR. MICHAEL P. WEINSTEIN

The New Jersey Marine Sciences Consortium (NJMSC) presents its 2007 State of the Shore Report, an annual assessment and interpretation of New Jersey's coastal issues. The coastal zone of the U.S. contributes nearly half of the Nation's Gross National Product (GNP), or nearly $4.5 trillion. With 17 of 21 counties bordering on tidal waters, our $50 billion coastal economy - comprised of ports commerce, tourism and fisheries/aquaculture employs more than 1.5 million individuals and serves as the state's largest economic sector. With waterborne trade expected to triple by the end of this century, the value of maritime commerce in the Ports of New Jersey/New York, Salem and Camden will dramatically increase with concomitant increases in size (water area and depth), and land area required for storage terminals and intermodal transportation.

As more people migrate to the Jersey coast, new ocean policies will be required to simultaneously address coastal economic health, public access, resource sustainability including investment in aquaculture, and to facilitate cooperation and consensus among social, cultural, economic, and environmental-ecological interests. The large diversity of economic and natural resources contained within the nation's most densely populated state creates intense competition for coastal lands, waters and resources. Relatively undisturbed regions are under increasing pressure from development and other anthropogenic impacts. New Jersey's coastal communities face enormous pressures to balance growth demand with the protection of its marine and coastal resources. New Jersey's coastline is largely "built", making human safety and coastal hazard mitigation an area of increasing importance to New Jersey.

Recognizing the need for balance between economic vitality and quality of life, the New Jersey Marine Sciences Consortium's primary mission has focused on sustainable coastal management practices and the wise use of coastal capital. NJMSC's mission and activities are clearly in lock-step with New Jersey's interests in the coastal zone. As we welcome the summer of 2007, NJMSC stands poised to do its part and renews its commitment towards contributing solutions to coastal issues by promoting economic growth balanced by a quality of life that is among the best in the nation.



New Jersey State of the Shore Report 2007

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Coastal Storm Activity

The majority of the damage to New Jersey's beaches occurs when large ocean waves are accompanied by extreme water levels. Once again, this past winter New Jersey was fortunate to escape with only minimal damage due to a lack of significant storm activity. In terms of damage, NJ's beaches were benefited by a long period of relative calm that separated the strongest storms of the season.

Water levels measured by the NOAA tide gauge at Atlantic City and wave heights measured by the Stevens/NJ DEP Coastal Monitoring Network (CMN) between September 2006 and April 2007 are shown in Figure 1. The return periods shown on the two plots come from different sources. The water level return periods are based on an extreme value analysis of the Atlantic City record, while the wave return periods are based upon a statistical hindcast performed by the Corps of Engineers. For reference, the maximum wave heights measured at the two CMN sites since 1998 are also shown.

The average significant wave heights recorded by the CMN gauges at Avalon and LBI between September 2006 and April 2007 were 2.30 and 2.60 ft respectively, which is similar to last year and down overall compared to the long term average. The largest wave event of the season occurred in September (H_S = 11.31 ft at LBI), and was associated with Tropical Storm Ernesto. Ernesto made landfall twice, once in Florida and again in North Carolina, and then tracked to the northeast predominantly over land. The timing of the storm was extremely fortuitous for New Jersey's beaches as the 2.5 ft surge created by Ernesto occurred during a neap tide, thereby reducing the storm's damage potential

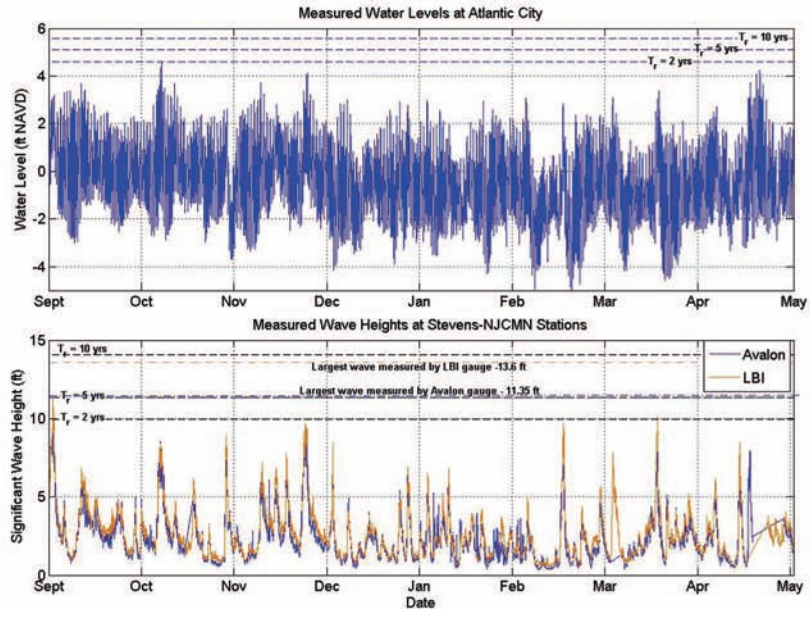

Figure 1

Wrack line left by the extreme water levels experienced during the early October storm at Ocean City. Note the high dunes were successful in preventing overtopping during this 2-yr event.

In early October, strong winds resulting from compressed pressure gradients sandwiched between a low pressure system over North Carolina and a high in southeast Canada, created storm tides at Atlantic City in excess of the 2-yr storm stage elevation (water level for which there is 50% chance of being exceeded in any given year). The surge associated with the October storm was actually less that that associated with Ernesto; however, unlike Ernesto, the October storm occurred during a spring tide when water levels were already elevated. Fortunately, the high water levels generated by the October storm were accompanied by relatively small storm waves, which topped out at 8.4 ft, well below the 2-yr wave height.

A storm in late November which was remarkable for neither its extreme water levels nor major wave activity was the first to deliver the so called one-two punch of high water levels and larger waves. While the storm resulted in some significant beach erosion, particularly in southern New Jersey, it was followed by an extended period of unusually calm weather which lasted until mid-February. This mid winter lull in storm activity provided a much needed respite, allowing the beaches to recover somewhat and prepare for the final storms of the season.

The calm was broken up by a storm in mid-February that generated significant wave activity, but once again failed to cause excessively high water levels. The wave heights measured at Avalon (9.64 ft) approached the 2-yr storm level; however the storm occurred during a period of lower than normal tides, therefore the maximum water level reached during the storm was only 3 ft, which is well short of the 2-yr storm tide elevation.

In mid-March a storm generated the second largest waves (10.12 ft at LBI) of the season, exceeding the 2-yr return period level for the second time. Although this storm also elevated water levels along the coast, the maximum recorded water level recorded (3.38 ft NAVD), was over a foot below that expected during a 2-yr storm (4.6 ft NAVD).

Perhaps the most publicized storm of the season occurred on April 15; however in terms of its impact on the New Jersey coast, the "Tax Day Deluge" was only a weak-moderate storm at best. Due to the prevailing southwest winds during most of the storm, the largest waves and storm surge were directed at coastal Long Island, instead of New Jersey. This fact, combined with what, up until that point, had been a relatively slow winter storm season, left New Jersey's beaches in a good position to absorb whatever blow the storm dished out. The storm generated higher than normal tides up and down the coast however the maximum water level recorded at Atlantic City did not reach the 2-yr flood elevation even though it occurred during perigean spring tide. Unfortunately both wave gauges suffered power interruptions during the storm, resulting in gaps in the wave data during the height of the storm.

Coastal Assessment

New Jersey's beaches are once again in relatively good condition heading into the summer. We were fortunate not to experience a major winter storm or even a series of smaller storms with the potential to cause significant beach erosion. The lull in storm activity during the middle of the winter was also an important factor, as it allowed the beaches time to recover from the storms of the fall season and prepare for those of the spring season. Last, but certainly not least, the State of New Jersey does an excellent job supporting its beaches, whether it be through securing money for federal beach nourishment projects or simply repairing breaches and shoring up dunes after major storms. Given the nature of this past winter's storms it is expected that much of the sand eroded from the beach remains within the littoral system, stored offshore in bars. Given an extended period of calm weather, this sand should eventually work its way back on shore, ensuring everyone a spot on their favorite New Jersey beach as the summer progresses.

Summer Outlook - 2007

The most recent (as of May 2nd) extended range forecast released by the Colorado State University Tropical Meteorology Project calls for an active 2007 hurricane season, with a total of 17 named storms (9.6 is the long term average), including 9 hurricanes (5.9 is the long term average) with 5 forecast to become intense (Category 3 or higher) storms (2.3 is the long term average). Key indicators in the most recent forecast are neutral ENSO (El Niño Southern Oscillation) conditions which are forecast to change to weak to moderate La Niña conditions over the summer, and tropical and north Atlantic sea surface temperatures which remain well above their long-term average. While a direct impact from a major hurricane remains fairly unlikely, there is a relatively high probability that coastal New Jersey will be impacted by tropical storm force winds (40-75 mph). Based on the latest forecast, the probability of tropical storm force winds affecting Cape May, Atlantic, and Cumberland counties is 7.9%, down from 11.1% last year, while Ocean, Monmouth, and Burlington Counties again have a slightly higher probability of being impacted (10.1% compared to 14.1% last year).

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Shore Issues-in-Brief

Public Access

A tide of demographic and economic change is moving through coastal towns, harbors, and communities throughout the United States. With nowhere to swim and nowhere to land, recreational, commercial, and industrial users of the coast are competing for access. Multiple factors are driving these changes, including increasing population and development, rising coastal property values, declines in fishing and other industries, and shifting land ownership patterns. Resulting pressure on remaining public areas and infrastructure also means increased stress on fragile coastal habitat, and coastal managers have limited resources to address this pressure.

Public access to the shores and tidal waters of New Jersey is a basic principle in law, coming from the ancient Public Trust Doctrine. The rights of public access belong to all citizens of the state. Public access is also a major and longstanding issue dealt with by so many of the Atlantic coast communities, heavily dependent on beachgoers for tourist revenues. In contrast are towns bordering the tidal rivers, where the riverfronts were long parts of private farms and estates and public access issues receive little attention.

While the State has policies to protect and enhance public access, municipal control of beaches and private property developments often make it difficult for members of the public to get to and enjoy the beaches and waterfront.

The New Jersey Sea Grant Public Access Study

In 2002 a study was launched focusing on the coastal communities of New Jersey's northeastern corner, the "Bayshore" region, the Shrewsbury and Navesink area, and adjacent Atlantic coast "shore" towns. The goal was to better understand what is happening to those communities. In particular, the study examined the changes occurring in each of the region's municipalities as they affected the way that the waterfront is being developed. How do those changes affect traditional commercial uses of the waterfront, such as fishing and boat-building? How do they enhance or diminish public access to the beaches and waters, which are held by the State as public trust for New Jersey's citizens?

The full reports are available in "PDF" format, accessible with Acrobat Reader™ at http://www.nynjbaykeeper.org/news/86

Event Experts: Dr. Bonnie McCay, Department of Human Ecology, Rutgers University
Anthony McDonald, Esq., Director of The Monmouth University Urban Coast Institute

Please visit the Public Access Issue Station
for Additional Resources and Interview Opportunities

Water Quality

The quality of New Jersey's coastal waters affects a wide variety of issues including the ability to harvest shellfish as well as to swim at the beach. When problems occur that affect these activities, especially pollution resulting from non-point sources, it is important to be able to track the sources of the pollution with the overall goal of fixing the problems and restoring water quality to acceptable, healthy levels.

New Jersey is one of the largest shellfish producing states in the country. In fact, the shellfish industry represents a significant portion of New Jersey's coastal economy, with an estimated dockside value of over $100,000,000 per year. New Jersey has been very successful in improving water quality for shellfish harvesting. Over the past 15 consecutive years, New Jersey has upgraded more waters than it has downgraded. Currently, 90% of the state's shellfish waters are harvestable.

Good water quality is also important for safe recreation at ocean and bay bathing beaches. New Jersey's beach monitoring program assesses nearshore coastal water quality by routinely monitoring concentrations of *enterococci* bacteria at 188 ocean and 137 bay beaches, with the majority of New Jersey's beaches never experiencing a closure. The beach monitoring program also investigates sources of water pollution. When bacteria levels exceed, or have the potential to exceed standards, beaches are closed. These closures are directly related to rainfall and related stormwater contaminants.

Tracking sources of pollution is one way of improving the state's coastal water quality in areas where problems exist. Several projects have been performed or are being planned in various areas of the state to uncover the sources of pollution that are causing degraded water quality. These projects include: Maurice River Cove, Upper Navesink River, Wildwood, Atlantic City, Seaside Heights, Parvin State Park, and Spring Lake and Sea Girt Beaches. In some of these cases, the results of the monitoring have already led to improved water quality.

Event Experts: Leslie McGeorge, NJ Department of Environmental Protection
Virginia Loftin, NJ Department of Environmental Protection

Please visit the Water Quality Issue Station
for Additional Resources and Interview Opportunities

Rip Currents

Rip currents are defined as a strong current of water flowing away from the shoreline. Reports show that over 80 percent of water rescues are attributed to these dangerous currents (United States Lifesaving Association, 2005), which pose a serious threat to beachgoers, both in New Jersey and nationwide. Coordinated efforts at local, state, regional and national levels have improved public education of the dangers associated with potentially deadly rip currents, but more education and awareness is needed.

Rip currents can be very difficult to predict because they are caused by complex interactions between waves, currents, water levels and the shape of the ocean bottom near the shore, and can occur on any beach with breaking waves. Different mechanisms can dominate on different beaches at different times and it is certainly possible that more than one mechanism can be at work at a given time. This has led to the development of a daily rip current warning issued by NOAA's National Weather Service (NWS) in areas most often at risk.

Inputs to the rip current warning system typically include estimates of nearshore environmental parameters such as the wave height, period and direction, the wind speed and direction, and the alongshore current. Long term monitoring of local waves and currents in many different locations are needed to get stable statistics on the potential mechanisms to drive models. CODAR High Frequency (HF) radar remotely measures waves and currents providing the means to monitor surface currents and waves remotely near the coast. These data can be collected continuously over a large range of environmental conditions. At present, over 65 CODAR HF radars are deployed nationally, and the current plan is to expand to a national network of over 200. Most applications have focused on the current measurements the system provides. Systems deployed along the New Jersey coast have supported scientific research, Coast Guard search and rescue, pollution spill response, and fisheries research.

Event Experts: Dr. Tom Herrington,
Stevens Institute of Technology
Dr. Josh Kohut, Rutgers University

Please visit the Rip Current Issue Station for Additional Resources and Interview Opportunities

Dunes & Beach Erosion

Until recently, the emphasis on dune management in New Jersey has been on their role in storm protection, in part because the amount of beach seaward of human infrastructure was too small to provide adequate protection. The large scale beach nourishment projects now being implemented provide a source of sand for dune building and protection from wave erosion for the dunes that form. The wider beach increases the dimensions of the gradient of processes and landforms between the shoreline and the more stable inland environments, providing the potential for a greater number of distinctive habitats, from pioneer species on the seaward side to woody shrubs on the landward side. This potential for a wider environmental gradient may be achieved or not, depending on the way the beach is subsequently maintained. Often, dunes are prevented from forming to retain views of the sea from lots or boardwalks or they are prevented as a byproduct of attempts to clean the beaches of the natural litter (wrack). If a nourished beach is allowed to evolve naturally, wind blown sand will accumulate near the seaward-most vegetated surface, at the upper storm wrack line on the beach, and at the base of existing dunes. Beach raking eliminates the potential for dunes to form and evolve in these locations.

The earliest addition of sand to the quantity already present on a New Jersey beach was in 1950 when trucks hauled surplus sand accumulating on the south side of the south jetty to Shark River Inlet to the north side of the north jetty where erosion was occurring. In 1952 the Army Corps pumped 2.52 million cubic yards of sand onto Ocean City, New Jersey beaches to restore damage from erosion. Between then and 1978 other minor projects were undertaken, but the majority of the shore protection funding went to jetties, groins and rock revetments and bulkheads along the coastline. Starting in 1988, the Federal government began to focus on large-scale projects that examined entire barrier islands and unique reaches of the New Jersey coast to restore accumulated erosion impacts. Funding was established at 65% Federal and 35% local partner cost for the project. Projects were implemented in Cape May City, Ocean City, and eventually the largest-ever project along 21 miles of the Monmouth County shoreline. Repetitive surveys have shown high retention rates at most locations nourished with isolated erosional hot spots.

Event Experts: Dr. Karl Nordstrom, Rutgers Institute of Marine and Coastal Science
Dr. Stewart Farrell, Stockton College

Please visit the Dunes and Beach Replenishment Issue Station for Additional Resources and Interview Opportunities