2012 NEW JERSEY

State of the Shore

REPORT

Welcome to the 10th Annual State of the Shore Media Event

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In May 2003 on a beach in Spring Lake, New Jersey, the New Jersey Sea Grant Consortium inaugurated its annual State of the Shore media event. The objective was to get the best possible information on the current condition of our beaches out to New Jersey's coastal stakeholders from town planners and policy makers to the beachgoing public just prior to the Memorial Day weekend and traditional start of the summer season. Our Sea Grant scientists and other state agency officials enthusiastically engaged with New Jersey's media in this endeavor and the rest is history.

Now in its tenth year, this pre-summer assessment of our coast and its resources has grown, evolved and matured but the primary aim remains to communicate the best coastal research information about our beaches in ways that are easily understandable and useful to our many constituents.

Communicating science and scientific research to the public is a challenging task. To make beaches the subject surely adds to the challenge given our emotional and economic attachment to them. Year after year this event successfully brings together scientists, environmental managers, members of the media and others who embrace the opportunity to communicate this information to others. As a result, a wealth of information and knowledge about New Jersey's beaches gets passed along to many.

Over the past decade, much progress has been made towards improving, conserving and protecting New Jersey's beaches. Communication about coastal hazards such as rip currents, hurricanes and storm surge has also improved and hopefully made us better prepared to deal with them. As a result, our 127-mile Atlantic shoreline is more beautiful, safe and popular than ever. From Sandy Hook to Cape May, tens of millions of visitors are expected for the summer ahead and, given the record-breaking number of voters in our *New Jersey Top Ten Beaches Survey*, pride in New Jersey's beaches has never been greater. I would like to think that, by promoting greater understanding and appreciation of our beaches, the NJSGC and its State of the Shore partners have made a significant contribution towards that improvement.

Sea Grant
NJ Sea Grant Consortium

STEVENS INSTITUTE of TECHNOLOGY
THE INNOVATION UNIVERSITY

NOAA

State of the Shore Report

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The 2011-2012 winter storm season threatened to start out with a bang this year, as Hurricane Irene tracked directly towards the New Jersey coast in late August. Irene prompted Governor Christie to declare a State of Emergency and call for the evacuation of many coastal communities just a week before the critical Labor Day holiday weekend. Fortunately, a short excursion over the Carolinas sapped Irene of much of her strength and by the time she made landfall in New Jersey near Little Egg Inlet, she was downgraded to a tropical storm and was only a shell of her former self. The remainder of the winter was extremely quiet with only one other storm of note, and as a result, New Jersey's beaches made it through the winter largely unscathed, and in ideal shape heading into the spring and summer.

Data

The Center for Maritime Systems at Stevens Institute of Technology has been compiling and presenting the *State of the Shore Report* for the past 10 years. Data for the report has been collected from a variety of sources including the Stevens Coastal Monitoring Network, and several gauges maintained by the National Oceanographic and Atmospheric Administration (NOAA). NOAA maintains the National Data Buoy Center (NDBC) which operates three real-time wave buoys located within 75 miles of the NJ coast. Buoy 44009 is located of the coast of Delaware Bay, while buoys 44065 and 44025 are located offshore of Sandy Hook. Buoy 44065 is relatively new, and although closest to the coast, lacks a historical record with which to compare the observations. As luck would have it, buoy 44025 was taken out of service for maintenance in August, leaving buoy 44009 as the only gauge with both a historical record and a complete record through the winter.

NOAA also maintains the Center for Operational Oceanographic Products and Services (CO-OPS) which disseminates real-time water level data for select stations, one of which is the tide gauge located on the Steel Pier in Atlantic City. This report utilizes data from both buoy 44009, and the Atlantic City tide gauge.

Coastal Storm Activity

Irene was by far the dominant storm of the season. On August 28, a wave height of 20.9 ft was recorded at buoy 44009 (Figure 1), which was over 4 ft higher than the next highest wave recorded during the winter. The highest wave ever recorded at buoy 44009 was over 27 ft during the Friday the 13th Nor'easter in November of 2009. The maximum water level recorded by the tide gauge in Atlantic City during Irene occurred on August 28 and reached a level of 7.00 ft MLLW, which corresponds to the Moderate Flood Level (Figure 2), as defined by the National Weather Service (NWS).

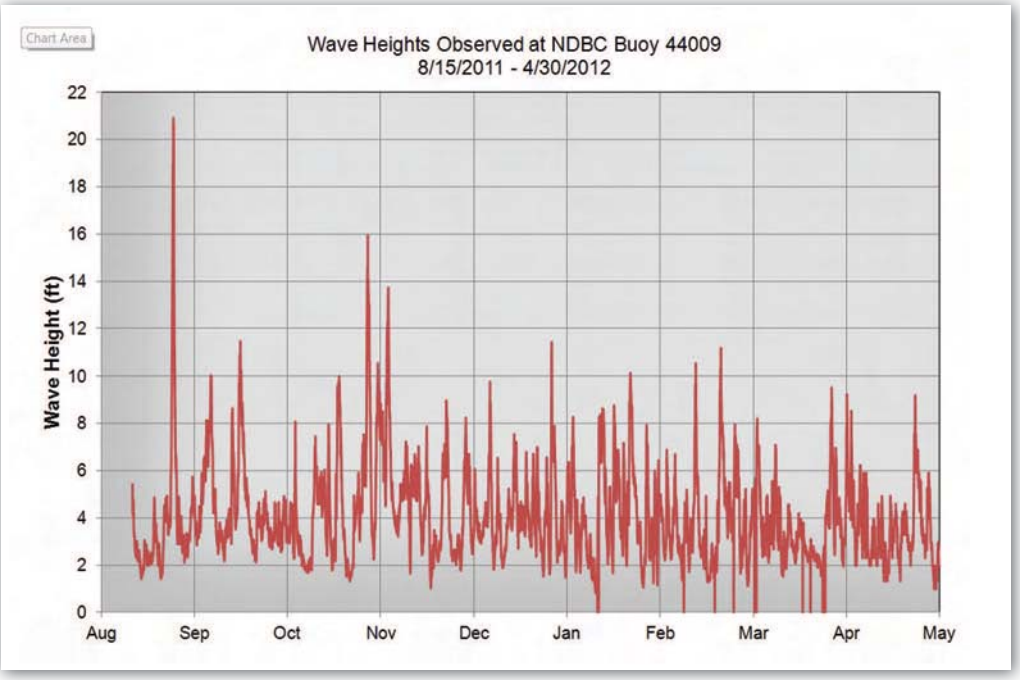
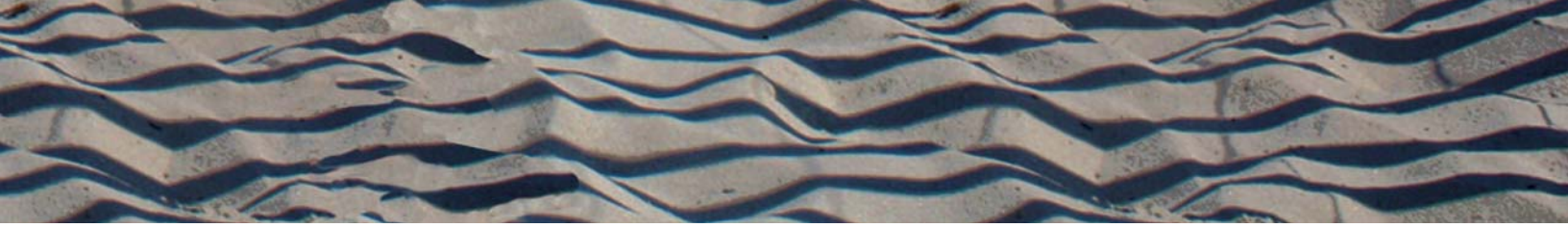


Figure 1



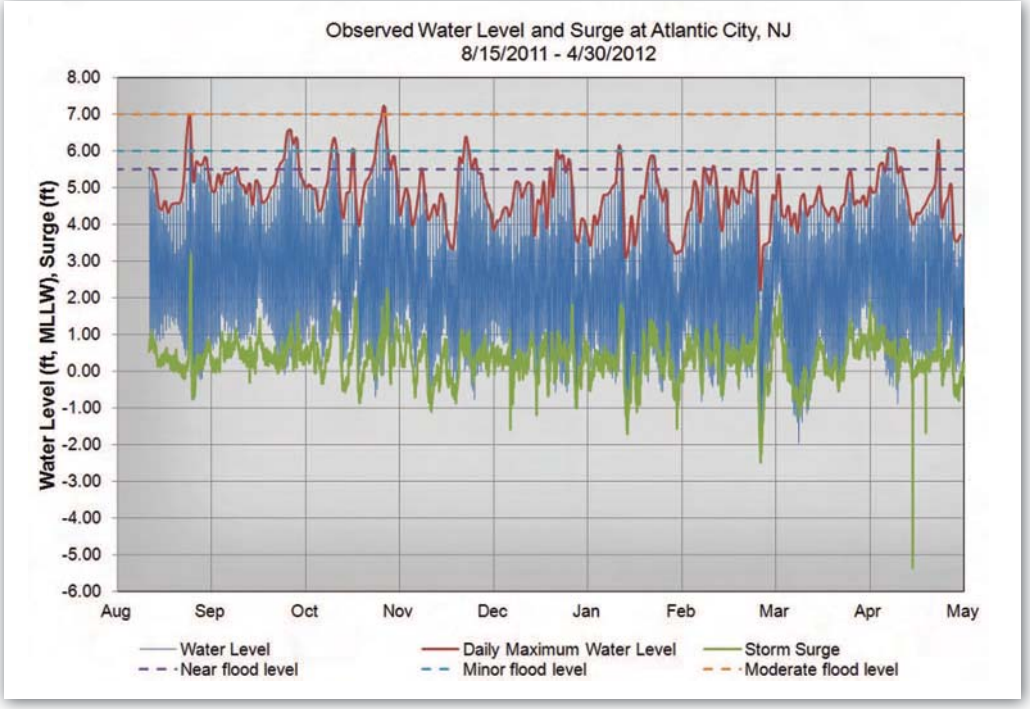


Figure 2

MLLW, which corresponds to the Moderate Flood Level (Figure 2), as defined by the National Weather Service (NWS). The NWS determines the flood levels on the basis of a study of flooding impacts within the community. The maximum storm surge (difference between the observed water level and the astronomically predicted water level) during Irene was 3.21 ft, which while high, failed to reach the potentially devastating levels predicted in advance of the storm. While it's very likely that higher levels were reached elsewhere along the coast, the lack of tide gauges prevents this hypothesis from being verified.

Even though the storm was downgraded to a tropical storm prior to making landfall, the prospect of potentially devastating storm surge and wave impacts caused extreme concern throughout the State. State officials should be commended for taking the necessary precautions. As a result of the high water levels, wave heights, and tropical storm force winds, Irene resulted in a moderate amount of late summer beach erosion. Fortunately in many locations this erosion was limited to the summer beach berm and most dunes made it through the storm unscathed.

The media paid special attention to Irene last summer, calling it the storm of the century, when in fact the hurricane's storm surge, wave heights and beach erosion were comparable to the types of conditions experienced during the much more frequent, but less publicized Nor'easters that impact New Jersey. The difference is that the erosional conditions during Nor'easters can last for several days as opposed to several hours, potentially making them more damaging particularly to features like dunes which lie on the higher, more landward parts of the beach. A recent comparison of the impacts of Irene, with the Friday the 13th Veterans Day Nor'Easter in 2009 shows that overall Irene was much less damaging to New Jersey's beaches. The Friday the 13th storm recorded record-breaking wave heights and produced steeper waves (associated with erosional conditions) over a much longer period of time (Miller et al. 2012). Analyses conducted at Mantoloking by the Coastal Research Center at Richard Stockton College found that while Irene caused more volumetric erosion, the majority of that erosion occurred in less critical areas of the beach. Post-storm assessments conducted by the NJDEP generally concluded that the Nor'easter was more damaging as well.

The only other notable coastal storm of the season was the ice/snow storm that occurred in late October. This storm which had devastating inland impacts throughout the region, produced large wave heights and water levels, while dumping as much as 19 inches of snow on parts of New Jersey. Wave heights recorded during the storm reached 16 ft (Figure 1), while the water levels exceeded those observed during Irene at Atlantic City, topping out at 7.21 ft MLLW (Figure 2). The higher water level was due mostly to timing as the surge during the storm was nearly a foot less than during Irene; however the peak of the surge occurred closer to high tide, and during near spring tide conditions, resulting in a total water level which was higher.

Coastal Impact

While Hurricane Irene generated a maximum wave height of 20.9 ft and elevated water levels reaching 7.00 ft MLLW, the duration of the large waves and elevated water levels was much shorter than during many recent Nor'easters. The shorter storm duration led to reduced coastal impacts and damage. Stevens has been using a newly developed Storm

Report Photo Courtesy Katie Wisz

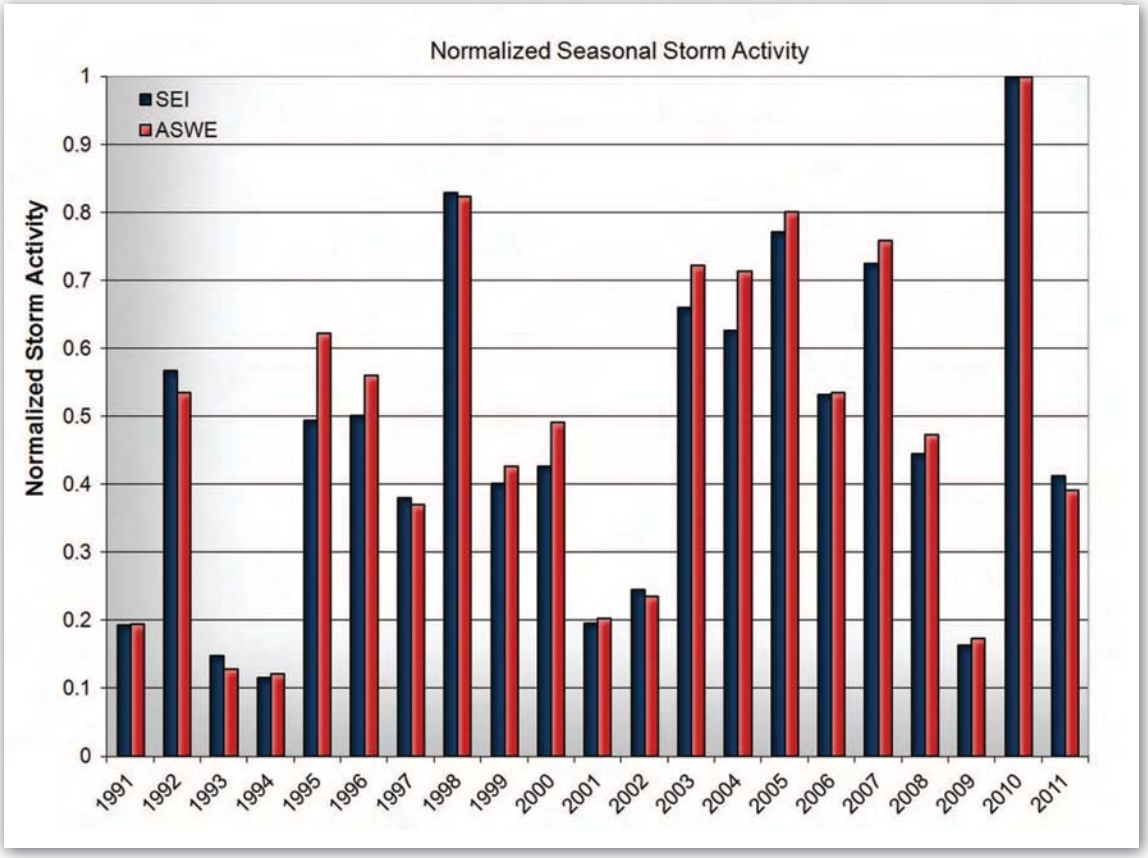


Figure 3

damage. Stevens has been using a newly developed Storm Erosion Index (SEI) to track the potential damage associated with coastal storms. The SEI takes into account the wave heights, water levels, and duration of storm activity, combines the parameters in a physically meaningful way, and results in a single value or index which represents the storm severity. Based on the SEI, Irene only ranked as a strong Category 2 storm, whereas The Friday the 13th Nor'easter ranked as a weak Category 5. Cumulative totals (July through the following June) of the SEI and a second parameter called the Accumulated Storm Wave Energy (ASWE) – which is the wave corollary to "accumulated cyclonic energy" or ACE used by meteorologists to assess the relative severity of individual hurricane seasons – are shown in Figure 3. All the values have been normalized or divided by the largest total which corresponds to the 2009 - 2010 season. The Cumulative totals of both the SEI and ASWE for the 2011 - 2012 season are on pace to be significantly less than in previous years, and currently are less than half the total from 2009 - 2010.

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Summer Storm Outlook

The summer storm outlook, based on the most recent report from The Tropical Meteorology Project at Colorado State University, suggests significantly less storm activity than in recent years, and a return to the long-term average. Released on April 6, 2012, the report predicts a total of 10 named storms for the upcoming 2012 season. The prediction of 10 named storms includes 4 hurricanes and 2 major hurricanes (Category 3, 4 or 5). This is compared to the average number of 9.6 named storms, 5.9 hurricanes, and 2.3 major hurricanes for the last fifty years (1950-2000). The prediction of reduced activity for the 2012 season is due to the cooling of the tropical Atlantic over the past several months, with a relatively high chance of an El Niño event in the summer and fall. There is also an anticipated below-average probability (42%) for major hurricanes to make landfall along the US coastline and in the Caribbean compared to the long-term mean average of 52%. While the probability of these storms hitting the New Jersey coastline is only about 1%, storms skirting the coast can have a significant impact and the probability of the State experiencing potentially damaging tropical storm force winds is significantly higher.

Future Outlook

With the exception of Hurricane Irene and the October snow storm at the beginning of the 2011-2012 winter storm season, the New Jersey Coast experienced lower than average storm activity. Thanks to the relatively calm winter, New Jersey's beaches are generally in excellent condition heading into the summer tourism season. If the mild conditions continue throughout the early summer, it's likely that New Jersey's beaches will reach their maximum summer width slightly earlier in the season than usual.