

WELCOME TO THE 15TH ANNUAL NEW JERSEY SEA GRANT CONSORTIUM'S STATE OF THE SHORE MEDIA EVENT

As the warm summer months fast approach, most New Jerseyans are reminded of nostalgic moments spent down at the shore. Building sand castles on the beach, splashing through rippling ocean tides, savoring melty ice cream cones after tasty BBQ dinners, or perhaps even catching a glimpse of "The Boss" Bruce Springsteen during a casual stroll on one of the coastline's iconic boardwalks.



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But with every fond memory and tradition that family and friends wish to continue in 2017, we're reminded that Mother Nature still reigns supreme. This upcoming October will mark the fifth anniversary of Superstorm Sandy, and beaches statewide are still recovering from the detrimental impacts of such a powerful storm. Although the natural annual cycle continuously stimulates the rebuilding mode, such conditions greatly affect tourism from near and far, as the Jersey Shore still remains a hotspot for vacationers seeking some "fun in the sun" action and respite.

Thankfully, this past season was relatively calm in regard to inclement weather. New Jersey experienced two major Nor'Easters (including Winter Storm Stella) that did cause some noticeable beach erosion. But what does this mean for the future of the Garden State's beloved seaside?

The 15th annual State of the Shore report will help explain and analyze such ongoing issues. A collaboration of scientists and environmental managers, this report is used by media and tourism representatives throughout New Jersey to illustrate the ever-changing condition of our shoreline. This year's report focuses on observed water levels and coastal wave heights amidst such storms, and what this means in regard to the newly developed Storm Erosion Index (SEI). In preparation of the coming months, we will also examine the tropical outlook for 2017.

And to celebrate the highly anticipated summer season, New Jersey's "Favorite Beaches" poll is back! Winners are chosen from each of the four coastal counties, in addition to an overall victor. Cast your vote at njseagrants.org/njfavoritebeaches2017, and have a great summer!

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State of the Shore Report



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Overall, this past winter was one of relative calm for New Jersey's beaches. This much needed respite came just five years removed from the devastation of Superstorm Sandy and one year after an extremely active winter in which Winter Storm Jonas caused significant damage in Cape May and Atlantic counties. The most impactful storm of the winter occurred in late January and although it left large vertical cliffs known as scarps in several communities, the majority of the eroded sand was deposited offshore in sand bars, which will move back onto the beach during the summer.

STORM SUMMARY

The water levels measured by the National Ocean Service tide gauge at Atlantic City are shown in Figure 1. Hourly observations are shown in gray, the daily high tide is shown in blue and the surge, or difference between the measured and predicted water levels, is shown in red. The data confirm that the moderate flood threshold was only exceeded once this past winter for a single hour, while the minor flooding threshold was exceeded 10 times over a total of 42 hours. For comparison's sake, the minor flooding level was exceeded for a total of 15 hours during Jonas and 20 hours during Sandy. The wave height data collected by the National Oceanic and

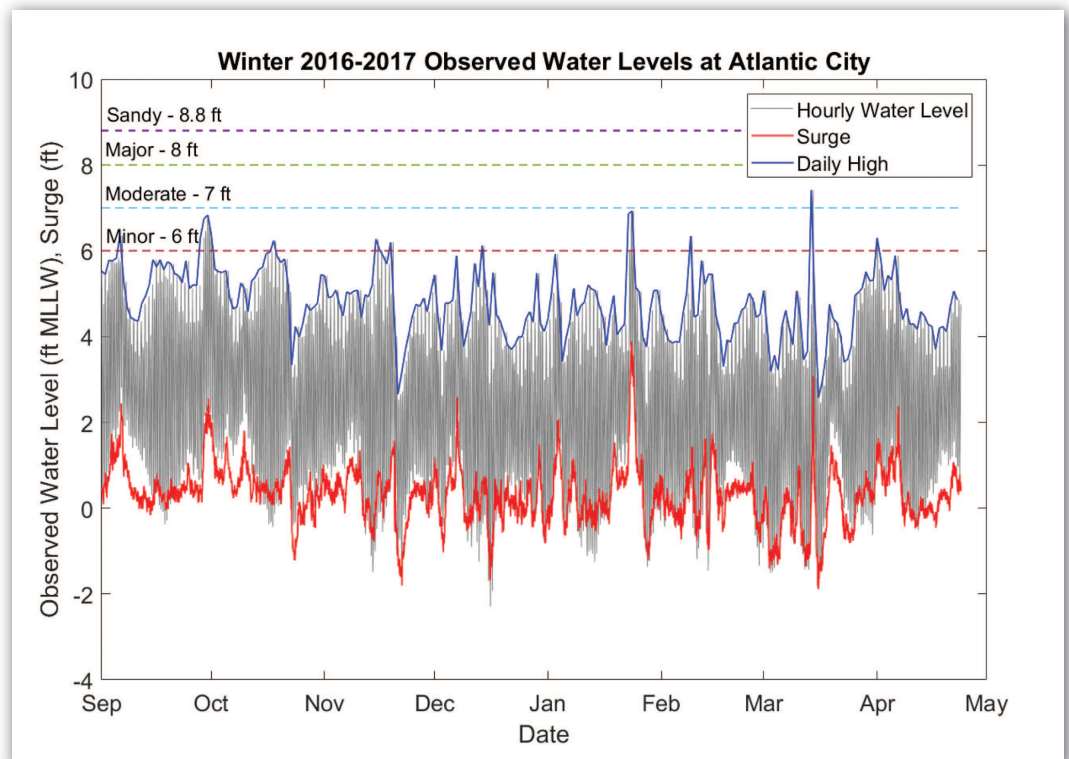


Figure 1

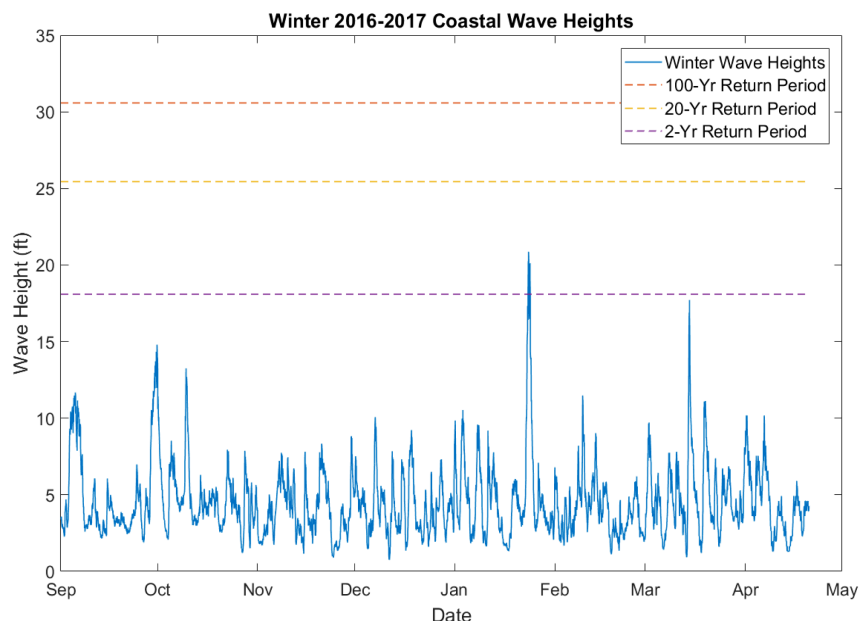


Figure 2

Atmospheric Administration's New Jersey buoys tell a similar story. The wave heights measured off the central New Jersey coast at buoy 44091 are shown in Figure 2. To help put the wave heights in context, design levels associated with the 2, 20, and 100-yr storms based on a U.S. Army Corps of Engineers wave hindcast (WIS) are also shown. The largest wave at buoy 44091 topped out at just shy of 21 feet. According to the return periods calculated by the Corps of Engineers, a wave of this magnitude has somewhere between a 10 and 20 percent chance of occurring in any given year.

JANUARY NOR'EASTER

The two most notable storms of the winter from a coastal erosion standpoint were a late January Nor'Easter which caused moderate to major erosion on several New Jersey beaches and a winter storm in early-mid March (Stella) that caused some additional erosion. The January Nor'Easter began its coastal odyssey as a moderately strong low-pressure system that brought heavy rain and thunderstorms to portions of the Southeast. The storm brought significant precipitation in the form of rain, snow and sleet to the New Jersey coast, with some areas reporting over 3 inches. The strong onshore winds associated with the storm which peaked at over 50 mph in many locations provided the necessary energy to elevate coastal water levels and generate large storm waves. In terms of coastal flooding, storm water levels reached 6.93 ft above Mean Lower Low Water (MLLW), which is 0.93 ft above the minor flooding threshold and just 0.07 ft below the moderate flooding threshold set by the National Weather Service (NWS) for the location. The storm surge (which is a measure of the "extra" water associated with the occurrence of the storm) topped out at 3.9 ft. Wave heights measured during the storm peaked

at just over 20 ft off the central Jersey coast, however they dropped rapidly as the storm moved away. The result was a storm that was fairly intense, but not of a long enough duration to cause the type of erosion that has long term consequences. Healthy beaches and dunes readily absorb impacts from these types of storms although they may look dramatically altered. Often the intensity of the storms leads to dramatic scarping or vertical cliffs in the beach face or at the dune line, but generally does not lead to breaching. The impacts can look particularly dramatic if beaches have recently been nourished and are still in their oversteep, pre-equilibration phase. Barring further storms, beaches typically recover from these types of intense, but short-lived storms over the following spring/summer.

STELLA

The second noteworthy storm of the 2016-2017 winter season, Stella, took a track that spared most of New Jersey from its most dramatic impact. While portions of New England experienced 3-5 ft of snow falling at rates of up to 7 in/hr,

the most notable impacts in New Jersey were related to coastal flooding. Strong wind gusts of up to 60 mph along the New Jersey coast were enough to generate a 3-ft storm surge that when added to the already high water levels associated with a waning spring tide, resulted in the highest recorded water level of the season at Atlantic City. The storm tide elevation of 7.42 ft above MLLW was nearly 6 in above that experienced during the January Nor'Easter exceeding the moderate flooding threshold. Fortunately the water levels dropped rapidly as the storm pulled away from the New Jersey coast and within 3 hrs of the peak of the storm, the waters dropped below the minor flooding threshold. In terms of wave heights, the largest waves were measured off the Northern New Jersey coastline during Stella. This was the opposite of what was observed in January where the central New Jersey coast was impacted more severely. Waves peaked at just over 20 ft, but like the storm surge, the wave heights dropped off quickly as the storm moved offshore. The result was a storm that was less intense, shorter in duration, and of much less significance in terms of coastal erosion than the January Nor'Easter.

STORM EROSION INDEX

To assess the intensity of storms in terms of their potential to cause beach erosion, Stevens Institute of Technology has recently developed a Storm Erosion Index (SEI). The SEI combines wave height, water level, and storm duration in a physically meaningful way to estimate a storm's intensity and erosion potential. It is hoped that the SEI will become a valuable resource for the State and its coastal communities for raising the awareness of coastal storms, particularly Nor'Easters which often get overlooked. Based on the SEI, the most intense storm of the 2016-2017 season was the January 2017 Nor'Easter which is consistent with the analysis described above and with post-storm impact analyses conducted by the NJ DEP among others. When compared to a 34-year climatology (1980-2013) developed by Stevens for New Jersey, the storm ranks 11th in terms of erosion potential. Winter Storm Stella ranks outside of the top 50; however the SEI identified two less intense but of longer duration in September with significant erosional potential. The ability to identify these types of storms is considered one of the major assets of the SEI.

TROPICAL OUTLOOK

The latest forecast from Colorado State University's Tropical Meteorology Project calls for an average Atlantic basin hurricane season with 11 named storms, 4 hurricanes, and 2 major hurricanes. This compares to long term averages of 12 named storms, 6.5 hurricanes, and 2 major hurricanes, and is down slightly from last year's predictions. The probability of a major hurricane making landfall along the U.S. coastline is 42% which is below the long-term average, while closer to home, the probability of a major hurricane making landfall in New Jersey remains low at less than 1%. There is however a 14% chance that a storm brings tropical storm force wind gusts to the Jersey shore. October 2017 marks the 5-yr anniversary of Superstorm Sandy. The public is urged to keep Sandy in mind and be prepared to heed the advice of the National Weather Service and State and local officials when a storm is approaching. Information on hurricane preparedness can be found on the NJ Office of Emergency Management website at: <http://www.state.nj.us/njoem/plan/hurricanes.html>.

CURRENT CONDITIONS

Currently many New Jersey beaches are in a rebuilding mode. This rebuilding is part of the natural annual cycle in which beaches erode and bars form during the winter, then recover in the spring/summer as the bars migrate onshore. Presently, New Jersey's beaches are beginning to recover as the storm bars are working their way back onshore. It is expected that most New Jersey beaches will recover the majority of their beach width by the end of the summer. While the beaches are recovering, it is important that beach goers be aware of the potential for dangerous rip currents. Rip currents generally form adjacent to jetties and groins or near gaps in sand bars. More information on rip currents is available at: <http://njseagrant.org/extension/coastal-concerns/rip-current-awareness/>.



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