

# New Jersey Sea Grant Consortium 18th Annual State of the Shore Report



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Current times remain daunting and uncertain for most. But take a moment to close your eyes and just imagine - sandy toes, sun-kissed skin, gentle gusts of the warm, salty air . . . That's the epitome of summers spent at the Jersey Shore. Despite the future's unknown, one thing remains for sure. The beaches await our return - under whatever circumstances that might be.

And according to New Jersey Sea Grant Consortium Coastal Processes Specialist Dr. Jon Miller (Stevens Institute of Technology), the Garden State's coastline is ready for just that.

We're conducting the 18th annual State of the Shore event a bit differently for 2020. Over the past several years, media representatives throughout the region have gathered with local experts at Tim McLoone's Supper Club (located on the iconic Asbury Park

boardwalk) to receive accurate, science-based information on current beach issues and outlooks, including preparations for the Jersey Shore's upcoming summer tourism season. But just as with any passing storm, we must change and evolve with the turbulent tides. Although we cannot celebrate the start of summer "together," NJSGC's mission will always be to promote the wise use of New Jersey's marine and coastal resources through research, education, and outreach (whether near, far, or socially distant).

And with that, we present Dr. Miller's official "State of the Shore" report. Due to a relatively mild winter storm season, beaches are found to be in extremely good shape throughout New Jersey. Please read on for more detailed, in-depth analysis of coastal storm impacts (nuisance flooding, beach erosion) and tropical outlooks.

With everything else going on right now, please do not forget that rip currents in the ocean pose a dangerous threat to all swimmers, regardless of age or gender. Please visit the NJSGC website to learn more about our revamped "Ocean Hazards & Beach Safety: Sharks vs. Rip Currents" initiative, including materials on our Rip Current Awareness program.





# State of the Shore Report

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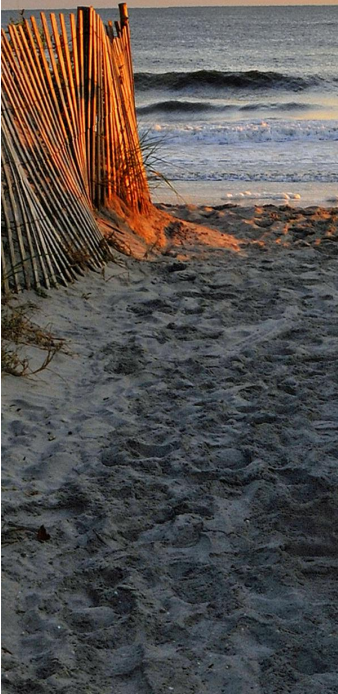
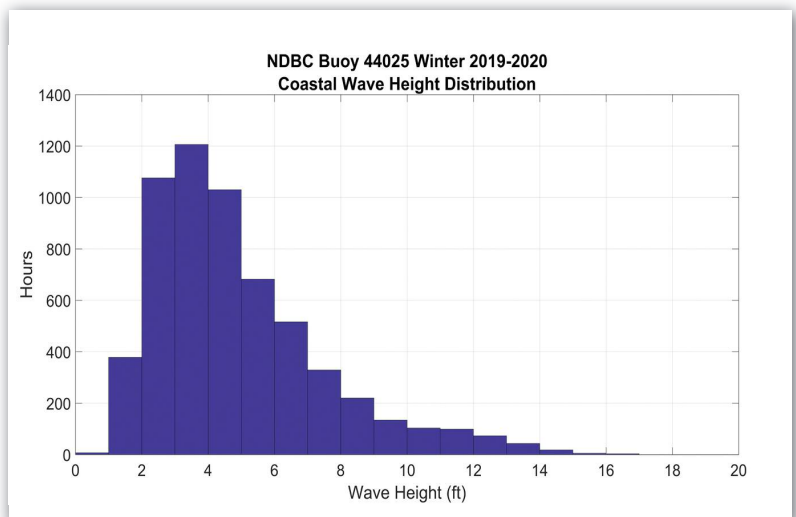
**DR. JON K. MILLER**

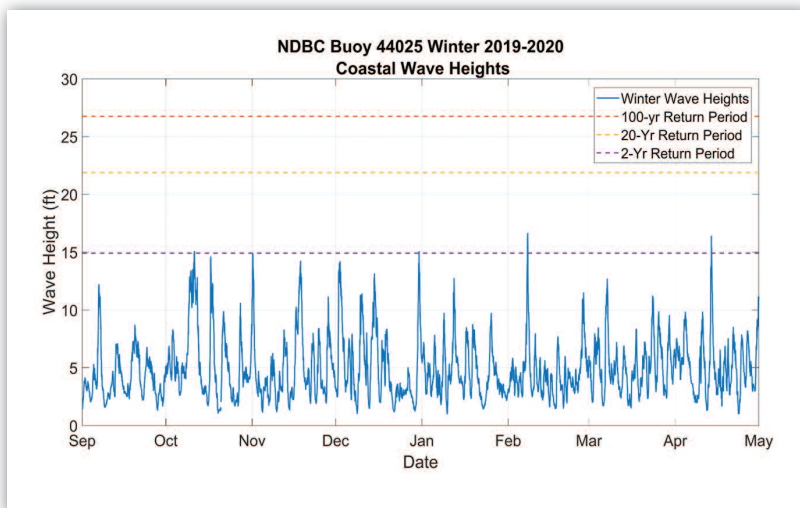
The Summer of 2020 promises to be one we won't soon forget, as we all adjust to a socially distanced Jersey Shore. While none of us can be entirely sure what the future holds, what we can confidently say is that overall, New Jersey's beaches are in excellent condition, thanks to a third straight milder than average winter storm season. Data on storm intensity collected by the National Oceanic and Atmospheric Administration (NOAA) in Atlantic City and off the coast of Long Branch confirm that the winter of 2019-20 only had a few notable storms. Even during the more noteworthy storms, for the most part New Jersey's coastline was spared from significant erosion due to the timing and/or direction of the storms. New Jersey did receive a minor scare early in the season as Hurricane Dorian skirted up the East Coast after battering the Bahamas. Some of the early predictions suggested that the storm might track close enough to the New Jersey coast to cause significant beach erosion; however, the storm ultimately tracked far enough offshore that its only impact was to kick up the surf, much to the delight of New Jersey's surfing community. A storm which received much less publicity, but was actually much more impactful, was a mid-October Nor'easter. That storm, which ultimately intensified into Sub-tropical Storm Melissa, caused an extended period of flooding and significant erosion throughout the state. After a second October storm and a few minor storms in

November, things quieted down, and a calm pattern took hold. The period from December through March was notable for its lack of intense storms. This lack of storm activity has helped to preserve New Jersey's beaches, many of which are in better condition today than they were prior to Superstorm Sandy, thanks to federal, state, and local efforts throughout the state to build and maintain beaches and dunes.

## Coastal Storms

Coastal storms can generate a variety of impacts with consequences ranging from severe (loss of structures, as during Sandy) to minor (nuisance flooding). Two of the more typical impacts commonly associated with coastal storms are flooding and beach erosion. Coastal flooding is typically caused by a combination of precipitation and storm surge. Storm surge is the extra water that piles up along the coast due to either local or distant storms. A key factor in determining the amount of flooding that occurs





during a storm is its timing with respect to the tides. Small storms that occur during periods of higher tides can generate more flooding than larger storms that occur during periods of lower tides. While much of the focus is often placed on the elevation of flood waters, impacts are often also strongly related to flood duration, which can prevent inland areas from draining.

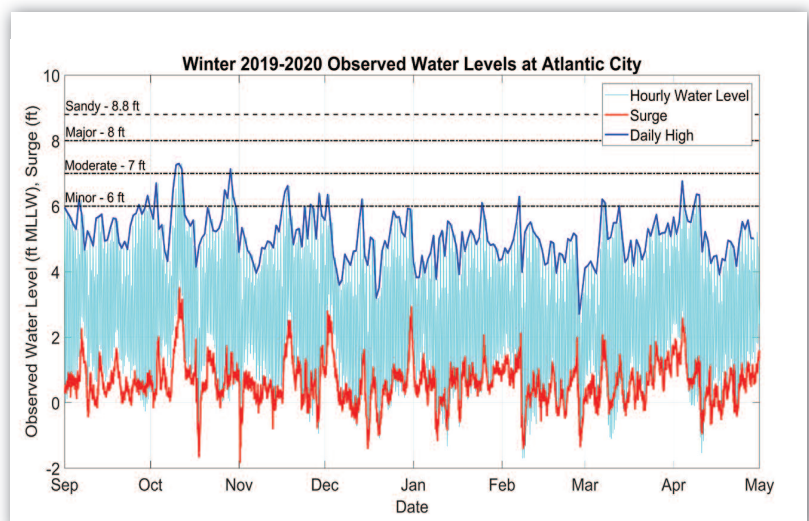
In coastal communities, beach erosion is often a major concern due to the protection beaches provide during the winter, and the revenue they generate through tourism in the summer. Beach erosion is related to the total water level along the coast (storm surge + tides) as well as the energy of the waves and the duration of a storm. The total water level influences what portion of the beach will be impacted during a storm, while the size of waves determines the erosion potential. Although often overlooked, storm duration is important because it determines how much of a storm's erosion potential is realized. According to a storm erosion index recently developed at Stevens Institute of Technology, erosion potential in New Jersey peaks in October, with southern beaches being slightly more vulnerable than those in the northern part of the state.

The majority of the coastal flood events this past winter failed to reach the moderate flood level (7 ft above mean lower low water) defined by the National Weather Service for Atlantic City. This is not to say the state escaped without any impacts, as 14 separate storm events exceeded the minor flooding threshold (6 ft above mean lower low water). In total, water levels exceeded the minor flooding threshold for 63 hours this past winter and the moderate flooding threshold for 5 hours. The most significant events tended to occur in the early part of the winter, with nine of the minor flooding events occurring before Christmas and both of the moderate events occurring before Halloween. The period from early December through the end of March was particularly quiet, as only four events resulted in minor flooding, and those barely reached the threshold and quickly subsided once they did. In early April things picked up a bit, as two storms occurred in rapid succession, but things quieted down once again in the mid-to-latter part of the month.

After dodging the threat of Hurricane Dorian in September, a strong low-pressure system stalled off the Mid-Atlantic coast between the 9th and the 13th of October. The storm churned up the waters offshore generating a storm surge that persisted over several days, and peaked at 3.5 ft at Atlantic City. Fortunately, the storm occurred during a period of relatively benign tides, which kept the maximum water level from reaching even higher than the observed peak of 7.38 ft above mean lower low water. Offshore wave heights in excess of 10 ft were measured for 75 hours straight, topping out at just over 15 ft. This single storm accounted for 75% of the total wave observations over 10 ft over the entire winter. The prolonged period of elevated water levels and relatively strong waves created the perfect conditions for beach erosion, and the storm did not disappoint as communities up and down the New Jersey coast reported significant erosion. Fortunately, most of the erosion was limited to minor/moderate amounts, with most of the eroded material remaining within the littoral system, relatively close to shore. Stevens' storm erosion index classified the storm as a Category 1 storm (relatively minor), with a return period of less than 5 years in many communities.

Later in the month, a much smaller storm which coincided with a high spring tide caused the water level at Atlantic City to peak at 7.1 ft, slightly above the moderate flooding threshold. Unlike the storm earlier in the month, the event was relatively short-lived and did not coincide with a period of strong wave activity, limiting its erosion potential. Persistent onshore winds in mid-November caused minor coastal flooding on November 17th and 18th. However, the event coincided with a period of lower than normal tides, reducing the storm's overall impact. Even though waves in excess of 10 ft were measured for approximately 30 consecutive hours during the height of the storm, the relatively low storm water levels limited the erosion impact. The only other storms to generate a storm surge in excess of 2.5 ft were two storms, which bookended the month of December, and an early April squall. In each case, relatively low tides during each storm limited the amount of flooding and erosion that was observed.

In addition to the aforementioned coastal flooding events, two storms of note occurred which generated large waves offshore. A rapidly



moving squall line moved through the state on February 7th, generating the largest waves of the winter season. During this event, NDBC buoy 44025 recorded significant wave heights of 16.7 ft off the northern New Jersey coast. While big, such waves are fairly typical off the coast of New Jersey during winter storms. Fortunately, due to the nature of the storm, the waves were both short-lived and directed offshore, limiting any potential erosion. The second largest wave event of the season was recorded more recently on April 13th and was associated with a gravity wave, bringing strong winds from several thousand feet aloft to the surface. Gusts of over 80 mph were measured at several locations along the coast, and offshore they generated waves measuring 16.4 ft. Although in this case the waves were directed onshore, the relatively short duration of the event, combined with the lack of a significant storm surge, limited storm-related erosion. The April storm did cause some of the most notable damage of the season, however, as winds during the storm peeled away a section of Wildwood's recently restored boardwalk, and blew the roof off of a recently completed building in Somers Point.

## Tropical Outlook

This summer is projected to be an extremely active hurricane season, as leading models from Colorado State University, Pennsylvania State University, the University of Arizona, Accuweather, and the Weather Channel all predict a higher than average number of storms. The latest forecast from Colorado State's Tropical Meteorology Project calls for an active Atlantic-basin hurricane season, as current warm neutral ENSO conditions are likely to transition to cool neutral ENSO or possibly even weak La Niña conditions by late summer/fall. La Niña conditions in the Pacific influence hurricane activity in the Atlantic by lowering wind shear in the upper atmosphere, making it easier for tropical disturbances to intensify into hurricanes. The current warmer than average water temperatures across the tropical Atlantic also factor into this prediction, as they provide the fuel to intensify developing storms. The net result is a seasonal forecast, which is up from last year and above the long-term average, with a projected 16 named storms, 8 hurricanes, and 4 major hurricanes. The long-term averages are for 12.1 named storms, 6.4 hurricanes, and 2.7 major hurricanes. The probability of a major hurricane making landfall along the U.S. East Coast is 45%, which is significantly above the long-term average of 31%.

Closer to home, the forecasted probability of a hurricane making landfall in New Jersey during the 2020 hurricane season is 3%, which is slightly higher than the long-term average of 2%. The likelihood of a major hurricane making landfall, however, remains low, at less than 1%. Even so, New Jersey residents would be wise to remember that it only takes a single storm to create catastrophic impacts. The public is urged to keep the devastation experienced in recent storms such as Dorian, Harvey, Irma, Maria, and Michael – as well as the dramatic impacts of Superstorm Sandy – in mind, and to 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 New Jersey Office of Emergency Management website (<http://www.ready.nj.gov/plan-prepare/hurricanes.shtml>).

## Current Conditions

Overall, New Jersey enters this summer season with its beaches in extremely good shape. The past three winter storm seasons have been relatively mild, which has allowed the beaches to remain fairly robust. Many communities have benefited from the addition of sand through beach nourishment projects since Sandy, and the majority of that sand remains in the system, ready to absorb the impact of future storms. This summer, the additional beach width will be even more appreciated, as social distancing measures will likely require shore residents and visitors to spread out. As is typical in the late spring/early summer, the beaches are currently in their most narrow configuration; however, they will likely regain their width in the coming months as offshore sand bars migrate towards the coastline and reattach. New Jersey shore residents and visitors are urged to be especially wary of rip currents during this time, and to consult the New Jersey Sea Grant Consortium website for important safety tips (<http://njseagrant.org/extension/coastal-concerns/ripcurrentawareness/>). Due to the relatively mild winter, it is likely that the beaches will regain their full width early on in the summer season, which is good news for coastal residents, businesses, and visitors. During this unique summer, New Jersey shore residents and visitors are advised to consult the state's COVID-19 guidelines (<https://covid19.nj.gov/as>) as well as information provided on the CDC website (<https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/visitors.html>) to determine the safest and most appropriate ways to enjoy New Jersey's spectacular beaches this summer.

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Photo - Dan Myers