

# Beach Monitoring

## Background

Water quality monitoring at New Jersey's beaches has been performed through the Cooperative Coastal Monitoring Program (CCMP) since 1974. The program is administered by the New Jersey Department of Environmental Protection (DEP) with the participation of the New Jersey Department of Health and local environmental health agencies. This beach monitoring program assesses nearshore coastal water quality, investigates sources of water pollution and enables DEP and local health agencies to respond and alert the public to immediate health concerns arising from pollution in coastal recreational areas. Primarily, funding for the CCMP comes from the United States Environmental Protection Agency (EPA) Beaches Environmental Assessment and Coastal Health (BEACH) Act grants.<sup>1</sup> All water quality analysis is conducted by DEP-certified laboratories, and results are available within 24 hours of sampling.

As one component of New Jersey's CCMP, bathing beaches are tested for fecal indicator bacteria on Mondays starting two weeks prior to a beach opening (generally mid-May for ocean beaches) and testing continues until the beach closes for the season. Fecal waste from humans and animals may contain microorganisms that can cause illness if the impacted water is accidentally ingested during bathing or water sport activities. Impacted waters are determined by testing for the presence of enterococci, an indicator bacteria, that is present in untreated human and animal fecal wastes. The presence of enterococci does not by itself indicate that disease-causing organisms are present; it does indicate that fecal waste has impacted the water to some degree, and that disease-causing organisms could be present.

From the inception of the CCMP in 1974 through 2003, samples were analyzed for fecal coliform bacteria. Beginning in 2004, the BEACH Act required samples to be analyzed for enterococcus bacteria. The EPA has found that enterococcus is a better indicator of untreated fecal waste in both marine and fresh waters and has a greater correlation with swimming-associated gastrointestinal illness than other bacterial indicator organisms. The New Jersey State Sanitary Code requires that the concentration of bacteria not exceed 104 colonies of *Enterococci* bacteria per 100 milliliters of sample. Samples that are above this water quality standard indicate an increased risk of illness.



*NJ Coast at Seaside Heights (photo by Steve Jacobus, NJDEP)*

New Jersey has more than 600 public recreational lifeguarded bathing beaches. The CCMP monitored 188 primary ocean beaches and 29 primary bay/river beaches weekly during the recreational bathing season for water quality in 2018. Primary beaches are bracketed with additional monitoring stations (bracket station) in the event a beach exceeds the water quality standard. In total 4,013 water quality samples were collected in 2018. Ocean sampling stations are selected in areas that are close to potential pollution sources, such as stormwater outfalls and coastal lake discharges. By selecting monitoring locations at beaches with nearby potential sources of pollution, New Jersey is taking a conservative approach in monitoring beaches most susceptible to degraded water quality. In areas where there are no pollution sources, monitoring stations are selected to represent water quality at several adjacent beaches. All recreational bay beaches are monitored due to their non-contiguous locations. The locations of monitoring stations are reviewed annually but remain relatively constant.

### Advisories

As of 2014, all counties participating in the CCMP are required to issue swimming advisories following the first exceedance of the bacteria water quality standard. Any initial sample that exceeds the water quality standard of 104 colonies of *Enterococci* bacteria per 100 milliliters of sample requires that the county or local health agency issue a swimming advisory at the bathing beach where the sample was collected. During beach advisories, the county or local health agency must post a "Swimming Advisory" sign at the beach to warn the public of potentially unhealthy water conditions. The day after an initial exceedance, resamples of the primary station and a bracket station on each side are conducted until water quality results are within the water quality standard. In addition, sanitary surveys are performed after every exceedance to identify possible pollution sources and observe water and shoreline conditions.

### Bacteria Exceedance Closings

Beaches are closed if two consecutive samples collected at a bathing beach exceed the water quality standard of 104 colonies of *Enterococci* bacteria per 100 milliliters of sample. The second consecutive exceedance that closes the beach may be at the primary station or bracket station on either side of the primary beach. Samples at bracket stations are also used to determine the extent of the impacted water. During beach closings, the county or local health agency must post a "No Swimming" sign at the beach. Beach closings remain in effect until subsequent sampling at primary and bracket beaches indicate bacteria levels are all within the water quality standard, and the swimming ban is lifted. Beach conditions, advisories, closings, and the reasons for beach closings are posted on the DEP's web page ([www.njbeaches.org](http://www.njbeaches.org)) daily during beach season. The sampling information is also used as part of the recreational use assessment in the DEP's [Integrated Water Quality Assessment Report](#).<sup>2</sup>

### Aerial Surveillance

As part of the CCMP, the DEP also conducts coastal surveillance flights six days per week during the beach season, weather permitting, to get a visual assessment of coastal water and beach conditions. This aerial surveillance of the coast and bathing beaches allows the DEP to determine the extent of potential hazards such as floatable debris, sewer line breaks or fish kills. In addition, the aircraft is equipped

with chlorophyll a sensors that provide the DEP with information on chlorophyll levels in coastal waters and allow the early detection of potential algal blooms. Six flights per week (no flights on Wednesdays) include Raritan Bay, the Lower New York Bay, and the Atlantic coast from Sandy Hook to Little Egg Inlet. Flights on Thursdays and Sundays are extended to include the area from Barnegat Inlet to Cape May Point and up Delaware Bay. [https://njbeaches.org/daily\\_flights/](https://njbeaches.org/daily_flights/)

### **Status and Trends**

- A total of 37,297 recreational bathing beach water quality samples(ocean and bay/river) were collected from 2010-2018, and 97% of these samples were within the bacteria water quality standard (see Figure 1).
- A total of 30,141 ocean recreational bathing beach water quality samples were collected from 2010-2018, and 98% were within the water quality standard.
- A total of 7,156 bay and river recreational bathing beach water quality samples were collected from 2010-2018, and 90% were within the water quality standard.

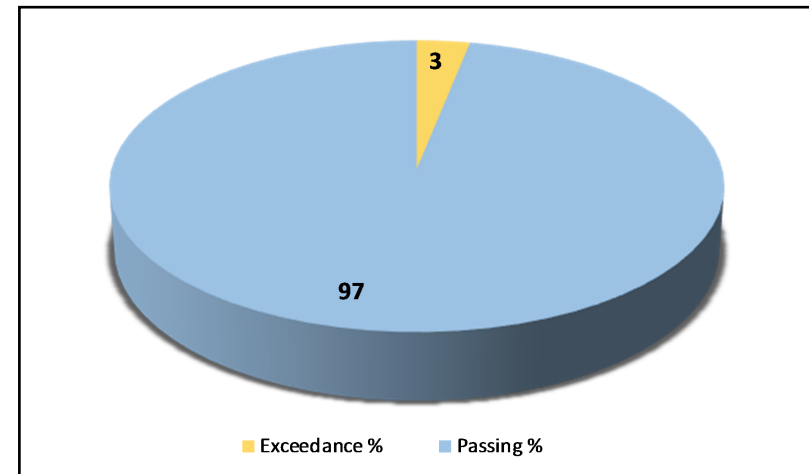


Figure 1. Percent of bathing beach water samples from 2010 to 2018 (including ocean, bay and river beaches) within the bacteria water quality standard vs. percent of samples that exceeded the standard.

Figure 2 depicts the percentage of ocean bathing beach water samples that fell within the bacteria water quality standard each year from 2010-2018. In preparing Figure 2, the DEP reviewed pre-2010 data that was presented in previous versions of this report and found discrepancies that could not be rectified.<sup>A</sup> As a result, this report focuses on data from 2010 to the present. The percentage of ocean samples with results that meet the water quality standard has been consistently above 97% every year since 2010.

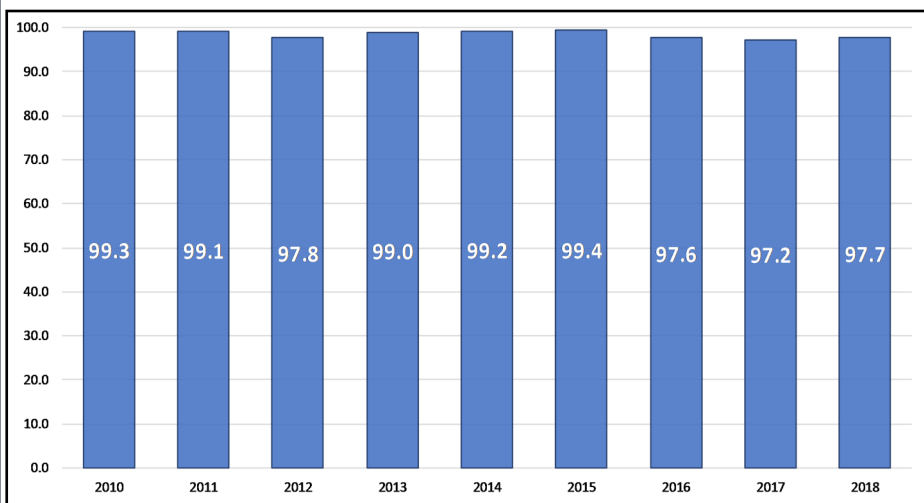


Figure 2. Percentage of ocean bathing beach water samples with bacterial levels below the water quality standard from 2010 to 2018.

Figure 3 indicates the total number of beach actions (advisories, precautionary closures, closures due to floatables, and closures due to exceedance of the water quality standard) at ocean beaches from 2010-2018. *Note that during 2010-2014 and 2018, many of the beach closings were due to precautionary closings.* Beaches may be closed as a precaution for any reason at any time to protect public health and may occur without water testing. Most precautionary closings were a result of beaches with known stormwater pollution problems automatically closing after

<sup>A</sup>Issues such as incorrect station locations and atypical values.

rain events (precautionary rainfall closings). When it rains, water flows across the landscape, over lawns, parking lots, and streets. It travels along gutters, into catchment basins and through storm drain pipes and ditches, usually not treated then flows through a stormwater outfall pipe into local waterbodies. Along the way, the stormwater picks up trash (fast-food wrappers, cigarette butts, styrofoam cups, etc.), toxins, and other pollutants (gas, motor oil, antifreeze, fertilizers, pesticides and wildlife and pet droppings). Thus, rainfall has the potential to increase bacteria in these waters depending on the proximity of stormwater outfall pipes to recreational bathing beaches.

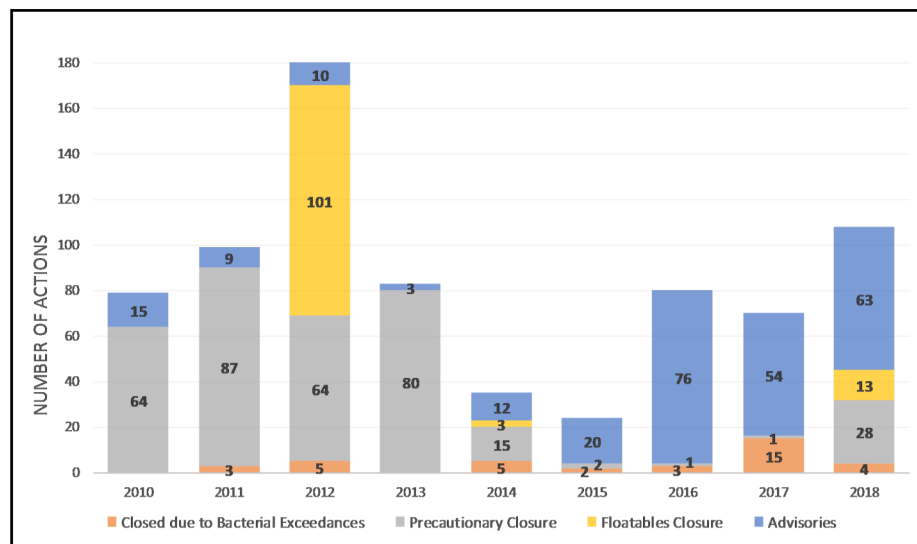


Figure 3. Ocean beach actions taken from 2010 to 2018.

The majority of NJ's beach closings are related to the impacts of stormwater. Typically, beach seasons with greater rainfall amounts will correlate to more advisories and bacterial exceedances. While ocean beaches are normally impacted by stormwater for less than 24 hours, it is not advised to swim near a stormwater outfall pipe or coastal lake outfall pipe during this period.

Detailed beach closing information, including the specific beaches closed and reasons for the closings, can be found in the [CCMP Annual Report](#).<sup>3</sup> Data from the 1980's show much higher yearly rates of beach closings. In 1988, for example, ocean beaches were closed over 800 times. Many of these closings were due to bacteria exceeding the water quality standard. Improvements and upgrades to sewage treatment plants discharging into the ocean have significantly reduced the number of closures over time.

Floatable debris has continued to be responsible for occasional but significant beach closings in New Jersey. Floatables are floating debris such as plastic, paper, and bottles that wash up on the shore. In 1990, there were 10 separate beach closings due to floatable debris washing up along the coast. In the following 12 years, no closings occurred due to floatables. Tighter controls on waste handling, including procedures mandated by New Jersey's 1989 Comprehensive Regulated Medical Waste Management Act, have largely reduced these problems. However, in 2003, 13 separate closings were due to reported wash-ups of trash and debris (following heavy rainfall in the NY/NJ harbor area and suspected combined sewer overflow discharges). In 2007, there were four closings due to floatable debris. A criminal medical waste dumping event in 2008 caused the closing of 120 ocean beaches. In 2009 and 2010, no beaches were closed due to floatable debris washups but, in 2012, a total of 101 ocean beaches were closed on one weekend due to a washup of floatable debris and trash. This debris washup included syringes, following a heavy rain event. In 2014 a small floatables event closed 3 beaches, and in 2018 13 beaches were closed late one afternoon, again following a heavy rainfall in the NY/NJ harbor area and suspected combined sewer overflow discharges.

Figure 4 depicts the percentage of bay and river samples which fell within the bacteria water quality standard each year from 2010-2018. There is a decreasing trend in the percentage of bay and river water samples which fall within the standard. Although this trend seems to indicate poorer water quality at bay and river beaches over time, there has been a reduction in the number of monitored stations from 2010 to 2018. In 2010, 1,245 bay and river beach samples were taken at 61 stations, whereas in 2018, 655 samples were taken at 31 stations. Some environmental stations that were not located at bay or river recreational bathing beaches were dropped while other stations were eliminated when beaches were closed for site-specific reasons, such as staffing issues.

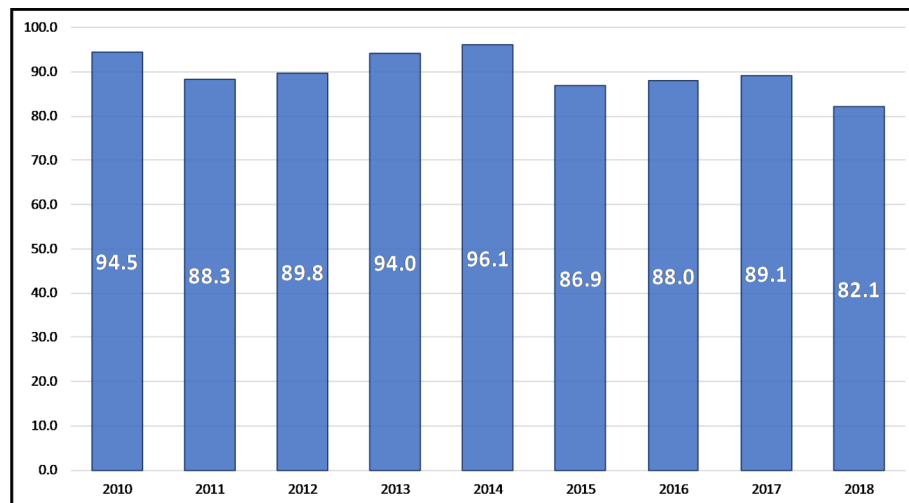


Figure 4. Percentage of bay and river bathing beach water samples with bacterial levels below the bacteria water quality standard from 2010 to 2018.

Figure 5 indicates the total number of beach actions (advisories, precautionary closures, closures due to floatables and closures due to exceedances) at bay and river beaches from 2010-2018. The majority of bay and river beach closings are also due to nonpoint source/stormwater impacts. Bay and river beaches have a slightly higher exceedance rate as a result of stormwater impacts lasting longer at these locations. Stormwater can impact a bay or river beach for greater than 24 hours depending on the tide, wind, current and geographical features of the beach. There are a small number of river and bay beaches that are prone to water quality issues after rainfall. The DEP has committed to an active source tracking and mitigation program designed to identify and eliminate sources of bacteria. Resources in the form of wet-weather monitoring, source track-down and, when necessary, infrastructure surveys and repair are being allocated for these beaches.

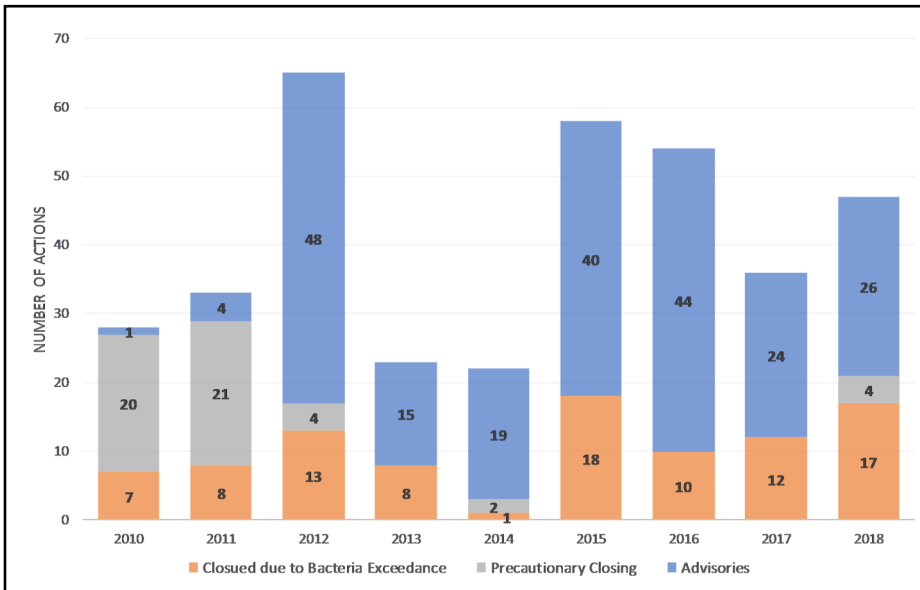


Figure 5. Bay and river actions taken from 2010 to 2018.

### Beachwood Beach West

Beachwood Beach West is a recreational bathing beach in Beachwood Borough, Ocean County located on the Toms River and has had frequent beach closures due to bacteria exceedances. These closures have been associated with rainfall conditions and the waters of this beach are impacted by as little as 0.1 inch of rain. The DEP conducted a sanitary survey to identify potential sources of pollution, and sampling stations were strategically picked to represent potential problem sources identified in the sanitary survey. Fourteen (14) stations were sampled over ten (10) sampling events during dry weather, tide cycles, and intensive wet weather storm events. The results identified two nearby stormwater outfalls as the main contributors of bacterial pollution at the beach. In addition, it was found that the tidal movement and shoreline configuration held the water near the beach area resulting in a longer duration for closures. Working with local stakeholders, infrastructure repairs were completed and the two nearby stormwater outfalls were combined and relocated away from the

recreational bathing beach. This resulted in a reduction in the number of beach closures during rain events with 0.5 inches of rain or less.

### Highlands Recreational Center

During the 2017 beach season, Highlands Recreational Center beach in Monmouth County experienced abnormally high exceedances of the water quality standard, and was closed until further investigation. Analysis found an association between enterococcus levels and rainfall intensity. The DEP conducted a sanitary survey and began monitoring. Results indicated elevated levels of bacteria near the stormwater outfall. Using Antibiotic Resistance Analysis (ARA) it was determined that a human source was contributing to the bacterial pollution. In collaboration with local stakeholders, dye testing and video of the storm and sanitary infrastructure was completed and found to be compromised. Repairs were completed and follow up samples confirmed the fix was effective. The beach was then able to be reopened with no additional exceedances in 2017. In 2018 water quality results indicated a need for additional investigation. The infrastructure survey revealed compromised sanitary sewer lines. Replacement of these lines is scheduled for completion prior to the 2019 beach season.

### **Outlook and Implications**

The DEP will continue to monitor New Jersey’s beaches to ensure this valuable resource is preserved for all to enjoy. Current programs, such as the Clean Shores Program<sup>4</sup>, “Adopt-a-Beach<sup>5</sup>” under New Jersey Clean Communities and the DEP “Clean Marina<sup>6</sup>” are in place to continually maintain and improve the water quality found at New Jersey Beaches. In addition, the control of non-point source pollution through the State rules and guidance<sup>7</sup> for stormwater management are expected to provide increasing improvements to all of New Jersey’s waterways.

### **More Information**

If you are interested in learning more about the Cooperative Coastal Monitoring Program or about the water quality at your favorite beach, please visit the DEP’s beach information web page at [www.njbeaches.org](http://www.njbeaches.org). For more information on source tracking go to: <http://www.nj.gov/dep/bmw/pollutiontracking.html>.



## References

<sup>1</sup>Beaches Environmental Assessment and Coastal Health (BEACH) Act, October 10, 2000 (which amended the Clean Water Act), <https://www.epa.gov/beach-tech/about-beach-act> Accessed 3/4/2019.

<sup>2</sup>NJDEP, 2012. 2012 New Jersey Integrated Water Quality Assessment Report. Water Monitoring & Standards. The report is available at <http://www.state.nj.us/dep/wms/bears/assessment.htm>.

<sup>3</sup>NJDEP. 2016. Cooperative Coastal Monitoring Program - Summary Report for 2016. Water Monitoring & Standards. The report is available at [https://njbeaches.org/njdep\\_public\\_files/CCMP%20Summary%20Report%202016.pdf](https://njbeaches.org/njdep_public_files/CCMP%20Summary%20Report%202016.pdf)

<sup>4</sup>NJDEP, Clean Shores Program, 2018, <https://www.state.nj.us/dep/wms/cleanshores.html> Accessed 10/09/2018.

<sup>5</sup>New Jersey Clean Communities, 2017, <http://www.njclean.org/aab/AAB-FAQ.html> Accessed 12/13/2017.

<sup>6</sup>NJDEP, 2013, State of New Jersey Clean Marina Program: <http://www.njcleanmarina.org/> Accessed 12/13/2017.

<sup>7</sup>NJDEP, 2017, NJ Stormwater.org: <http://www.njstormwater.org/> Accessed 12/13/2017.