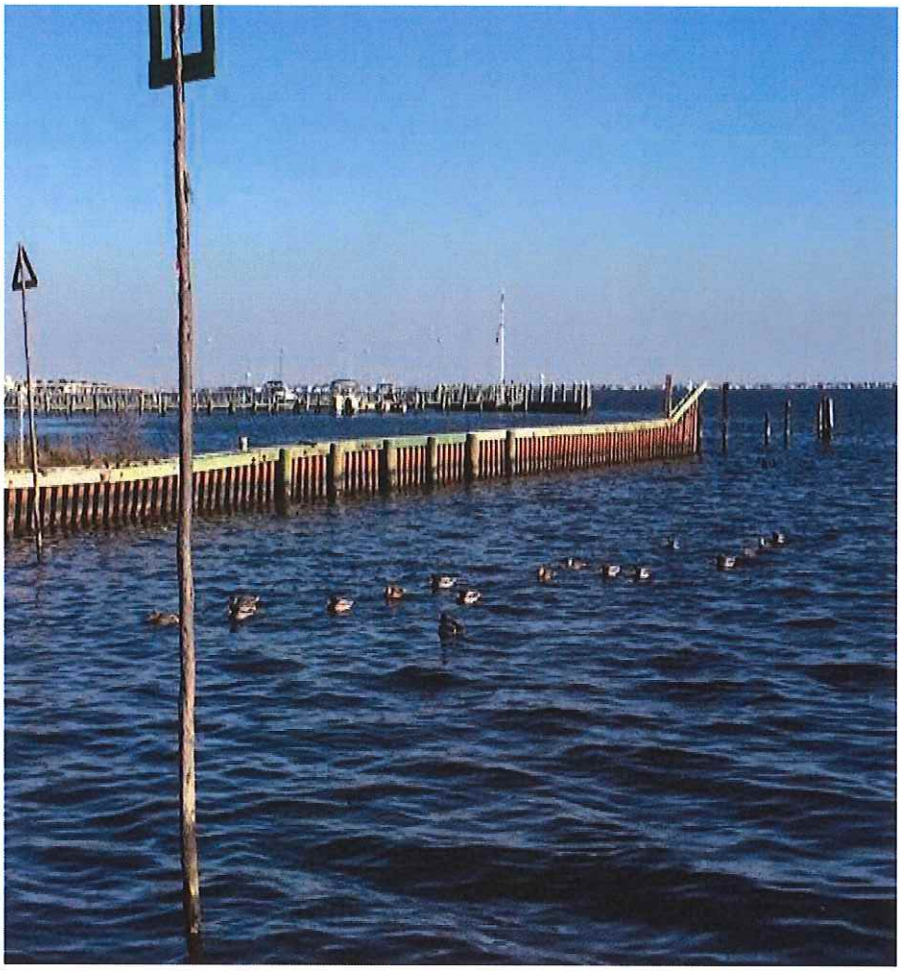
NJ Department of Environmental Protection
Water Monitoring and Standards
Marine Water Monitoring

Reappraisal Report of Shellfish Growing Area BB2

Central Barnegat Bay



December 2015

Reappraisal Report of Shellfish Growing Area BB2

Central Barnegat Bay

New Jersey Department of Environmental Protection (NJDEP)

Bureau of Marine Water Monitoring (BMWM)
Robert Schuster, Interim Bureau Chief

December 2015

Data from August 1, 2011 – August 24, 2015

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Special acknowledgment is given to the Boat Captains, the laboratory staff and the technical and support staff.

Cover Photo by Lisa DiElmo

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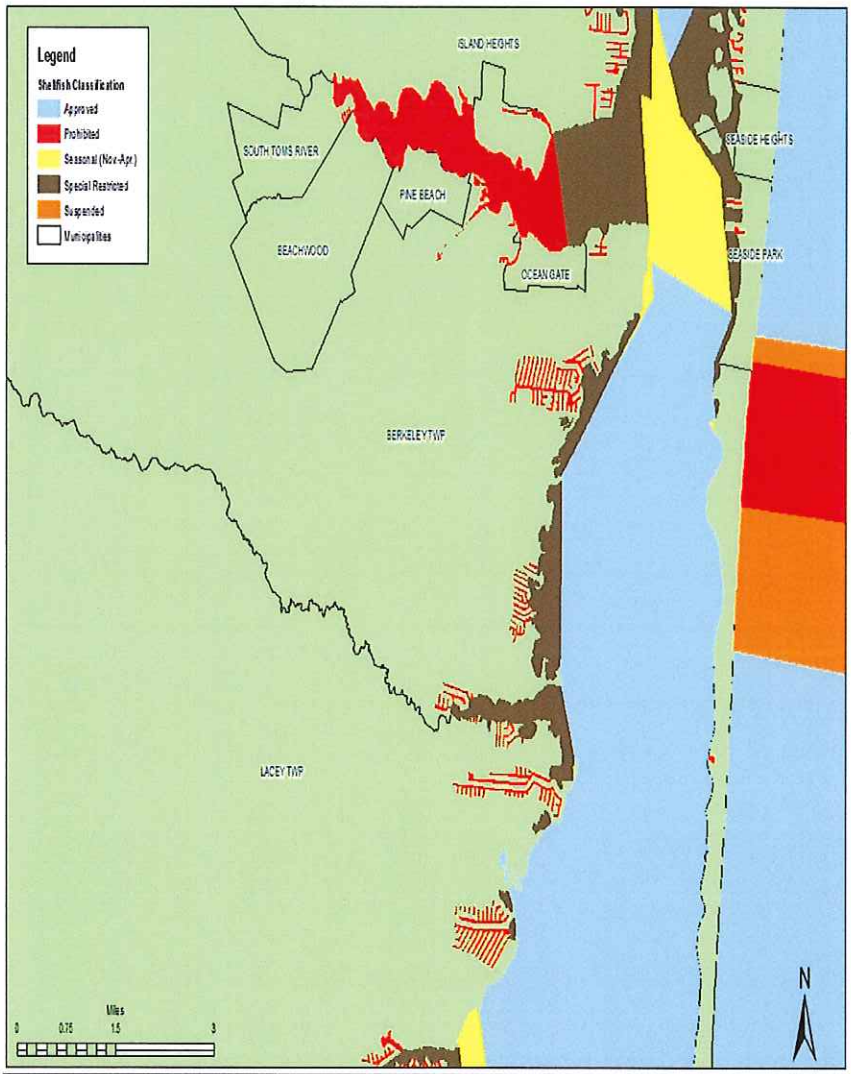
EXECUTIVE SUMMARY

The Central Barnegat Bay (BB2) consists of the marine waters from Bay Shore to Sunrise Beach, which includes the Toms River, Cedar Creek and a large section of the Barnegat Bay. Currently, the headwaters of the Toms River are classified as *Prohibited* and the remaining waters of the Toms River are classified as *Restricted*. The portion of the Barnegat Bay adjacent to Toms River is classified as *Conditional (Nov-Apr)*. The Cedar Creek is classified as *Restricted* and there is a buffer of *Restricted* waters on the western portion of the Barnegat Bay. Apart from marina buffers, the rest of the Barnegat Bay in this growing area is classified as *Approved* (see figure below). All lagoons in this growing area are classified as *Prohibited*.



Shellfish Classification in Growing Area BB2 (2015)

NJDEP
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The sampling strategy for this area is Systematic Random Sampling. Data were analyzed from August 1, 2011 to August 24, 2015 for fecal coliform. All but one of the 93 sampling stations in the Central Barnegat Bay area remain in compliance with their respective classification criteria. This station (1501D) is located in the mouth of the Toms River outside of Dillons Creek. At the time of the 2014 Annual Growing Area report, there were several more stations in this area of the Toms River that did not meet NSSP *Restricted* criteria. However, according to the data collected for this report and for the 2015 Annual Growing Area report, the only station that remains out of compliance is 1501D. Therefore, a downgrade of the waters surrounding this station is recommended at this time.

DESCRIPTION OF GROWING AREA

Location & Description

The Central Barnegat Bay region includes the waters of the Toms River, Cedar Creek and a large section of Barnegat Bay. The Barnegat Bay estuary is about 64-square miles and drains approximately 1,350-square miles (US Fish and Wildlife Service, 1997). The average depth of the estuary is 5-feet with a maximum depth of 20 feet; therefore, it is considered a shallow estuary (US Fish and Wildlife Service, 1997). This Central Barnegat Bay growing area includes almost 14,000 acres of marine waters. This growing area contains sections that are *Conditional, Restricted* and *Prohibited* which are used as buffers around the marinas and urbanized areas; however, much of the Central Barnegat Bay area is *Approved* for harvesting shellfish. (see adjacent figure).

The Barnegat Bay Inlet can be found just south of Island Beach State Park, approximately seven miles southeast of Cedar Creek. The inlet governs the tides in Barnegat Bay and provides a tidal flush for the bay water.

Growing Area Classification Summary

The Toms River is a large waterway surrounded by urban areas. The inland waters of Toms River are *Prohibited* for harvesting shellfish due to the urban land use and abundance of marinas in this region. The eastern portion and the mouth of Toms River is classified as *Restricted.* There are many small tributaries that feed into Toms River, including Davenport's Branch, Jake's Branch, Union Branch and Wrangle Brook. These freshwater inputs mix with the salt water of the bay to create an estuary.

The majority of the western coastline of the Central Barnegat Bay is wetlands, with a mix of urban and forested areas further inland. The greater part of the eastern coastline is Island Beach State Park, a natural habitat for birds and wildlife. Further north on the eastern coastline are the boroughs of Seaside Heights and Seaside Park, which have high urban land use, especially during the summer tourist season. There are many lagoon systems as well as numerous minor streams and creeks in this growing area.

The State of New Jersey Shellfish Growing Water Classification Chart (NJDEP, 2015) displays the classification of this area; this information can also be found on the Bureau of Marine Water Monitoring's (BMWM) website at http://www.nj.gov/dep/bmwm ; the official and most current classification descriptions can be found at N.J.A.C. 7:12.

Evaluation of Biological Resources

There are several shellfish native to New Jersey that are commercially and recreationally important. These include: hard clams (*Mercenaria mercenaria*), soft clams (*Mya arenaria*), blue mussels (*Mytilus edulis*), eastern oysters (*Crassostrea virginica*), ocean quahogs (*Arctica islandica*), surf clams (*Spisula solidissima*) and sea scallops (*Placopecten magellanicus*).

The Central Barnegat Bay area is not very productive for shellfish harvesting at this time. The most densely populated and economically productive species in the area is hard clam (NJDEP, 1986). The most recent

hard clam stock assessment, conducted in 2012, showed a 23 percent decrease in hard clam population in the Barnegat Bay since the last assessment in 1986. (NJDEP, 2015) This does not mean, however, that viable shellfish resources are not present or may not be present in the Central Barnegat Bay in the future. Factors that contribute to having a viable resource include: salinity, dissolved oxygen levels, bottom conditions and predator activity.

SHORELINE SURVEY: EVALUATION OF POTENTIAL POLLUTION SOURCES

There are many marinas in this area which have significantly higher use in the summer months than in the winter months due to tourism in this region. Seaside Park, Seaside Heights and surrounding areas are well-known tourist spots on the New Jersey shore during the summer. Therefore, the waters in the summertime have the potential to receive more pollutants due to increased population and recreational boating.

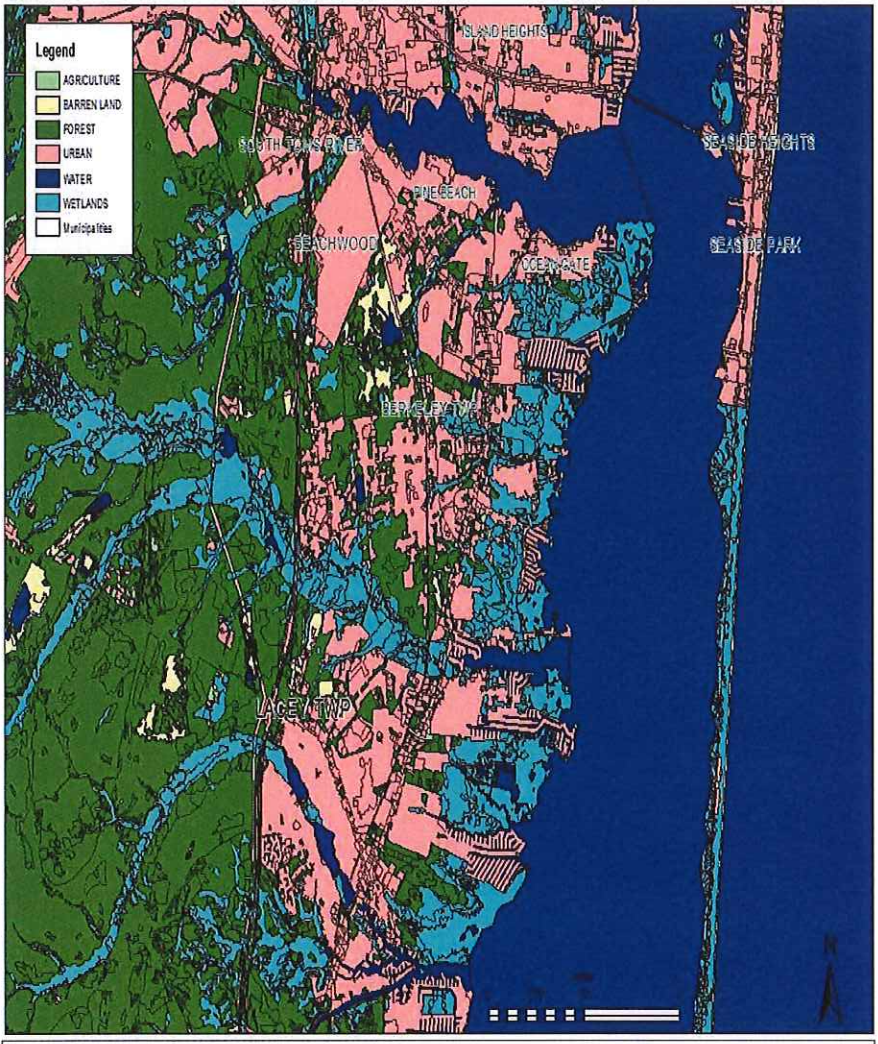
Since they started in 2008, The Barnegat Bay Shellfish Restoration Program (BBSRP) has made steps to restore oyster beds off the coast of Good Luck Point. BBRSP is a collaborative venture among NJDEP's Division of Fish and Wildlife Bureau of Shellfisheries, Rutgers Cooperative Extension, the American Littoral Society and ReClam the Bay. Since 2008, hundreds of thousands of oysters (cultchless and spat-on-shell) have been planted on the reef (American Littoral Society). Oyster larvae are allowed to set to a hard surface in a tank or floating tray, then nutrients are pumped over the larvae for feeding, and in a couple of weeks the surviving oysters will be moved to the reef site in the Barnegat Bay (APP, 2009; NJDEP, 2008).

Waterfowl are known to inhabit the Central Barnegat Bay, especially during winter months. Many gulls, ducks and geese occupy the sandbars and shoreline at low tide. Oftentimes, these waterfowl also nest within the wetlands. Bird waste can add to contamination of the waters, which can contribute to high coliform values.

Vegetation is an essential part of the marine ecosystem, offering habitat and nursery grounds for numerous species. In the Central Barnegat Bay, the submerged aquatic vegetation (SAV) is prevalent in shallow areas. Some of the most common species of SAV in New Jersey include widgeon grass (*Ruppia maritima*), sago pondweed (*Potamogeton pectinatus*), horned pondweed (*Zannichellia palustris*) and eelgrass (*Zostera marina*). Eelgrass is an important component of the ecosystem because of its ability to convert the sun's energy into food for higher organisms. (US Fish and Wildlife Service, 1997)

The area is still rebuilding from Hurricane Sandy and there has been some construction and new development in proximity to the shoreline, but there have been no major shoreline changes since the last survey.

Land Use



Land Use in Growing Area BB2 (2012)

NJDEP
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The majority of land use in this area is divided into wetlands, urban, and forested areas (see adjacent figure). Island Beach State Park and Good Luck Point are wetland areas. Wetlands serve to purify water, acting as a strainer that filters out harmful substances such as fertilizer and animal waste before they enter the water body. Therefore, the wetlands can help to maintain good water quality in this area. The condition of the wetlands is very important to the health of the shellfish.

Urban areas are found along Toms River, in lagoon areas along the western shoreline and north of Island Beach State Park. These areas experience a fluctuation in population each year, higher in the summer and lower in the winter. Forested areas are interspersed around the Central Barnegat Bay. Several forested areas are within the National Pinelands Reserve; others are located in parks and undeveloped sections. Agricultural land use is not particularly high in this area; furthermore, the agricultural areas tend to be situated inland.

Many lagoons can be found in the Central Barnegat Bay. A lagoon is essentially a manmade canal, surrounded by bulkheaded properties, with access to the bay. Lagoon areas commonly have numerous storm water outfalls that often drain directly into the canal water. Additionally, many homeowners have docks, which are used to store their own boats. Although there are pump out stations at many marinas, some boat owners will discharge sanitary waste directly into the bay water. For these reasons, all lagoons are classified as *Prohibited.* The area directly outside all lagoons are appropriately classified as *Prohibited, Conditional (Nov - Apr), Conditional (Jan - Apr)*, or *Restricted.*

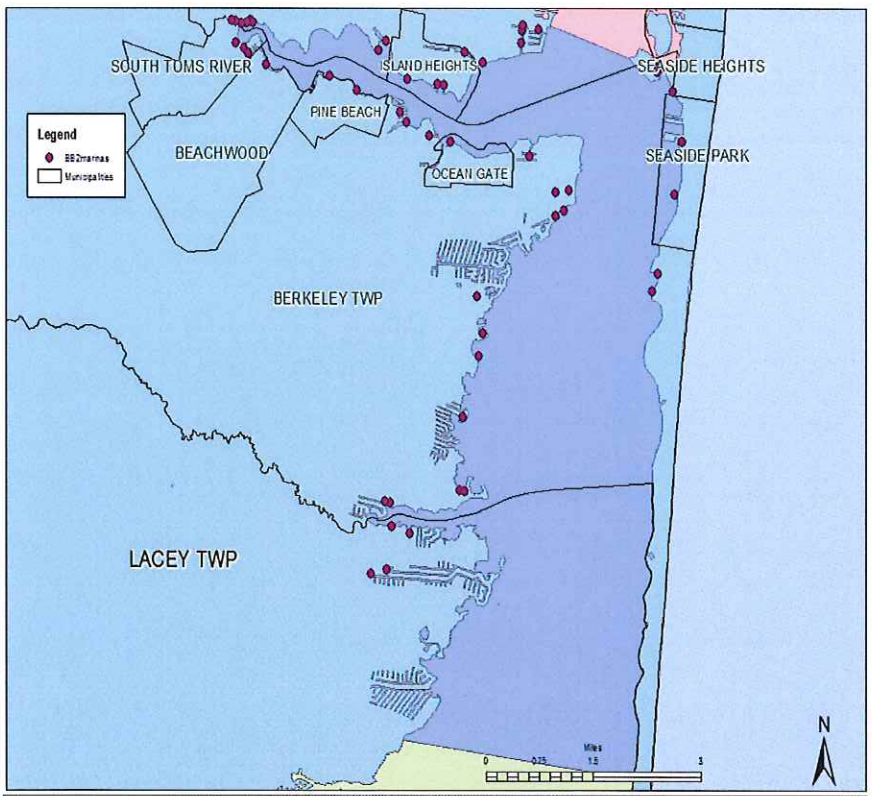
Surface and Ground Water Discharges

A surface water discharge involves the release of treated effluent from various municipal and industrial facilities directly into a river, stream or the ocean. There are no known effluent discharges directly into the Central Barnegat Bay waters. The Ocean County Utilities Authority's (OCUA) Central Water Pollution Control Facility (CWPCF) treats domestic waste and handles the sanitary wastewater in this growing area (OCUA, 2013). The plant is located three miles south of Toms River and west of Route 9 in Bayville, Berkeley Township. The facility sends treated effluent one mile into the Atlantic Ocean at a location east of Seaside Park. As a precautionary measure, the NSSP requires a closed safety zone, so ocean waters adjacent to the outfall line are classified as *Prohibited* for the harvesting of shellfish for a distance of 1.5 miles offshore. Although the ocean outfall line is not within the confines of the Central Barnegat Bay area; the pipeline runs through this growing area. Therefore, there is the potential for leaks and breaks in the line, which would affect the surrounding waters.

According to New Jersey Pollutant Discharge Elimination System (NJPDES), there are a few facilities with an active Discharge to Groundwater (DGW) permit in this area. Besides groundwater dischargers, septic systems are occasionally used where public sewer lines are unavailable. When septic systems fail to function properly, there is potential for groundwater contamination.

Marinas

Marina facilities have the potential to affect the condition of shellfish growing areas for the harvest of shellfish. The biological and chemical contamination associated with marina facilities may be of public health concern.



Marinas Located in BB2

There are 50 marinas in the Central Barnegat Bay area, as shown in the adjacent figure. Although there are marinas throughout this growing area, they are more prevalent in the Toms River and Cedar Creek, and around the Seaside Heights/Seaside Park areas. The waters enclosed by the footprint of a marina are classified as *Prohibited.* Water immediately adjacent to each marina may be classified as *Prohibited*, *Restricted* or *Conditionally Approved* (no harvest during summer months when the marina is active) depending on the size of the marina and the water quality. Marina buffer zones were calculated using the Virginia Model or the marina buffer equation, depending on the location. Additional information on the marina

equations used for buffer generation can be found in the NJDEP *Shellfish Growing Area Report Guidance Document* (2011).

The Department of Environmental Protection's 'Clean Marina' program is voluntary and provides guidelines that aim, "to prevent adverse impacts to water quality, sensitive habitats and living resources in proximity to marinas. " By adopting pollution prevention measures, marina owners and managers can engage in environmentally responsible operations and management of their facility. (NJDEP Clean Marina Program, 2013). Certified 'Clean Marinas' that are located in this growing area are Dillons' Creek Marina in Island Heights, Riverbank Marina in Bayville, Hobby Lobby Marina in Toms River and Ocean Gate Yacht Basin and Good Luck Point Marina, both in Berkeley. The marinas that are pledging to become a "Clean Marina" are Cozy Cove Marina and Nelson Marine Basin both located in Island Heights.

Spills, Unpermitted Discharges, and Closures

Spills reported to the NJDEP hotline (1-877-WARN-DEP) are passed on to the BMWM when there is a possibility of impact on shellfish waters. Since there is a direct correlation between the pollution of shellfish growing areas and the transmission of diseases to humans, BMWM must carefully assess each spill occurrence. If the spill is determined to be harmful to the shellfish beds, then a closure is made in the impacted area in the interest of public health. The closure is not lifted until the source of the problem is fixed and/ or eliminated and all samples in that area fall within the applicable classification criteria.

There were no other significant spills, unpermitted discharges, or closures concerning the Central Barnegat Bay since the last report on the area. Closures prior to this time period are discussed in the prior reports on this area, see www.nj.us.gov/dep/bmw for more information.

With the exception of Hurricane Irene in August of 2011 and Superstorm Sandy in October of 2012, which brought about the interim closure of all State shellfish growing waters as a precaution for public health and safety, there have been no spills or unpermitted discharges that resulted in the closure of waters in shellfish growing area BB2.

The process of dredging can impair water quality and contaminate shellfish beds that are located near dredging and disposal sites. BMWM is given the opportunity to review such projects through CAFRA permit submission and will recommend denial of a project if the proposed dredging or disposal site can potentially contaminate shellfish beds or cause water quality impairment. Comments from the BMWM are taken into account by the NJDEP, Division of Land Use Regulation (DLUR) when approving or denying a permit.

Stormwater Discharges

Environmental pressures on shellfish beds in New Jersey can originate in materials that enter growing waters via stormwater. Runoff is a term for the surface water that moves from land to the ocean over impervious surfaces. Storm drains along roads collect runoff and transmit it to stormwater outfalls. The stormwater outfalls deposit the runoff directly into the bay, or indirectly via other water bodies. While some of this runoff provides nutrients for plants and animals, it also carries pollutants that potentially contaminate the waters. Stormwater outfalls are one of the most significant non-point sources of pollution. Pesticides,

animal wastes, petroleum fuel products and bacteria from faulty septic systems and failing municipal infrastructure are among the harmful materials in stormwater runoff. Runoff can potentially bring the bacteria to swimming beaches and other waterbodies. Among other things, this can cause human illness through recreational contact or through consumption of contaminated shellfish. The storm water outfalls are often found in urban areas and are especially common within lagoon communities. Lagoon storm water discharges are especially harmful because lagoons see little tidal flushing, heavy boat usage and high quantities of bulkheading.

The Bureau of Marine Water Monitoring conducts storm water projects, where water samples are taken before, during and after a storm event in order to determine the effect of runoff. Once a possible source of the problem is identified, the appropriate State and local officials are notified to attempt to remedy the situation. Historically, there have been storm studies conducted in this area, but there were none during the time frame of this report.

WATER QUALITY STUDIES

Sampling Strategy

The State Shellfish Control Authority has the option of choosing one of two water monitoring sampling strategies for each growing area. For additional information on the types of sampling strategies see the NJDEP *Shellfish Growing Area Report Guidance Document* (2011). This shellfish growing area is not impacted by discharges from sewage treatment facilities or combined sewer overflows; therefore, it was sampled under the Systematic Random Sampling Strategy (SRS).

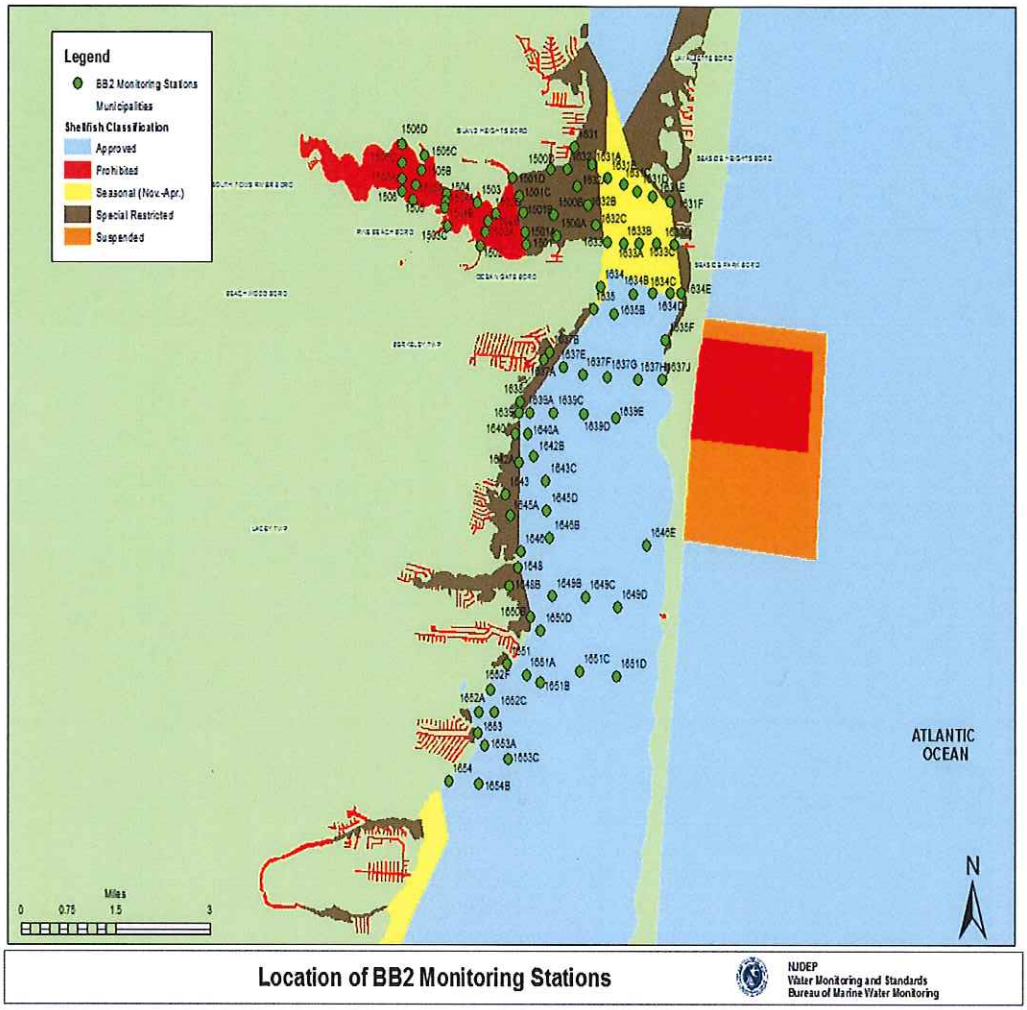
Each shellfish producing state is required to adopt either the total coliform or fecal coliform criterion. New Jersey bases its growing water classifications on the fecal coliform criterion. Each classification criterion is composed of a measure of the statistical 'central tendency' (geometric mean) and the relative variability of the data set. The criteria for the bacterial acceptability of shellfish growing waters are provided in the NSSP *Guide for the Control of Molluscan Shellfish,* 2013 Revision. For the Systematic Random Sampling Strategy, variability is expressed as the estimated 90th percentile.

The water quality of each growing area must be evaluated before an area can be classified as *Approved, Conditional (Nov-Apr or Jan-Apr), Restricted,* or *Prohibited.* A *Conditional* area must be sampled and meet the *Approved* criterion during the time of the year that it is open for harvest. The criteria for the bacterial acceptability of shellfish growing waters are provided in the NSSP *Guide for the Control of Molluscan Shellfish,* 2013 Revision.

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 2005). Water quality sampling, shoreline, and watershed surveys were conducted in accordance with the NSSP *Guide for the Control of Molluscan Shellfish,* 2013 Revision. Data management and analysis were accomplished using database applications developed for the Bureau of Marine Water Monitoring. Mapping of data was performed with Geographic Information System software (GIS: ArcMap).

Bacteriological Quality

Approximately 3,320 water samples were collected at 93 sampling stations in the Central Barnegat Bay between August 11, 2011 and August 24, 2015 and analyzed using the membrane filtration method with m-Tec agar according to the American Public Health Association (APHA, 1970 & 1995). The adjacent figure shows the Shellfish Growing Water Quality monitoring stations in the Central Barnegat Bay.



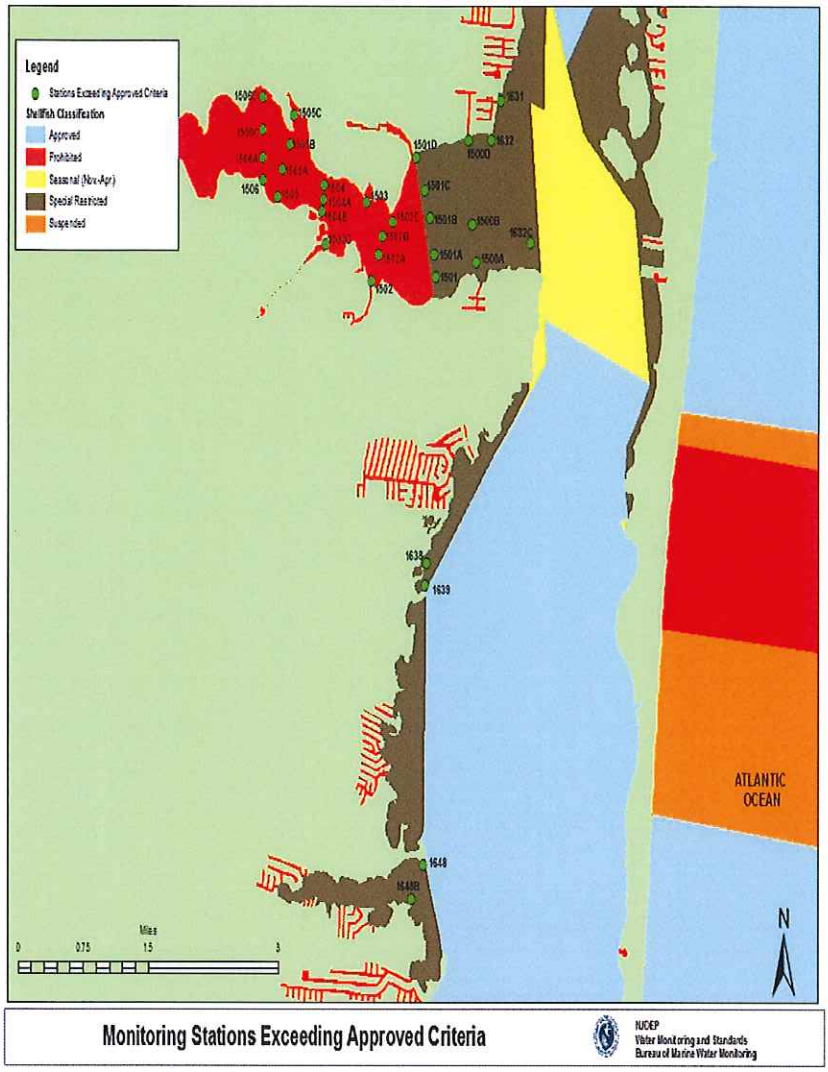
Location of BB2 Monitoring Stations

NJDEP
Water Monitoring and Standards
Bureau of Marine Water Monitoring

Compliance with NSSP Criteria

According to the National NSSP *Guide for the Control of Molluscan Shellfish* (2013 Revision), the water quality of each growing area must be evaluated before an area can be classified as *Approved, Conditional (Nov-Apr or Jan-Apr), Restricted,* or *Prohibited.* A *Conditional* area must be sampled and meet the *Approved* criterion during the time of the year that it is open for harvest.

Four separate assignment runs are required for this large growing area. Three of these assignment runs are in Barnegat Bay (102, 107 & 108) and one is in Toms River (097). This report examined the data from the assignment runs done in-between August 1, 2011 and August 24, 2015. According to the Systematic Random Sampling strategy, the sample size for evaluation must be at least 30 samples from each station in the growing area.



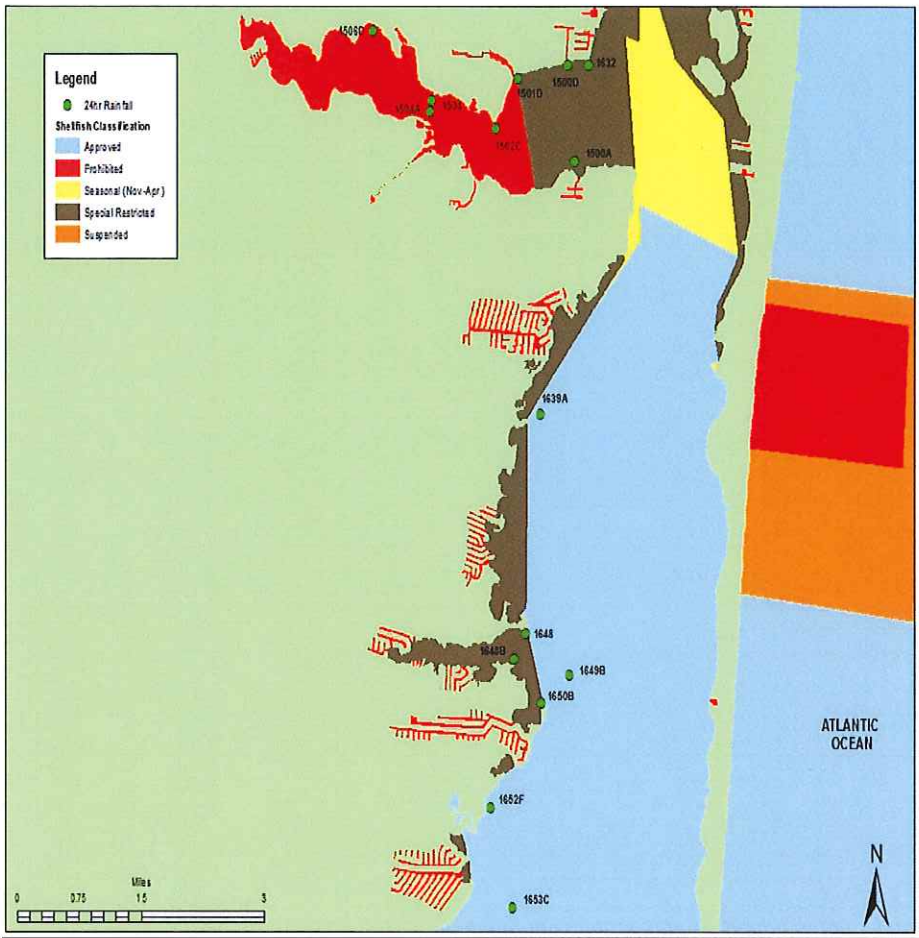
Thirty two stations did not meet the SRS *Approved* criteria year round; however, none of these stations are located in *Approved* waters. Therefore, no changes in classification are needed based on the stations in *Approved* waters (see adjacent figure).

The year round data are divided between the summer and winter sampling seasons. The summer season runs from May 1 through October 30 and the winter season runs from November 1 through April 30. Eighteen stations exceeded NSSP *Approved* criteria during the winter months (November-April). These stations are all located in Toms River, they are all stations that also had high year-round values and are not situated in *Approved* or *Conditional* waters. Thirty nine stations in the Central Barnegat Bay exceeded the criteria for *Approved* waters during the summer months (May-October). However, none of these stations exceeded the *Restricted* criteria and none of the stations that exceeded the *Approved* criteria are currently classified as *Approved.* Therefore, no changes in classification are needed based on these data.

Even though some of the stations in *Conditional* and *Restricted* waters fit the *Approved* criteria, no changes in classification are recommended at this time. The areas that are currently *Restricted* in the Barnegat Bay should remain so because they act as a buffer from the lagoon systems, urban areas and marinas. The *Conditional* area should remain Conditional to buffer any negative influence from the Toms River.

All but one station complied with the NSSP fecal coliform criteria for *Restricted* waters. This station (1501D) is located in the mouth of the Toms River outside of Dillons Creek. At the time of the 2014 Annual Growing Area report, there were several more stations in this area of the Toms River that did not meet NSSP *Restricted* criteria. However, according to the data collected for this report and for the 2015 Annual Growing Area report, the only station that remains out of compliance is 1501D. Therefore, a downgrade of the waters surrounding this station is recommended at this time.

Rainfall Effects



Monitoring Stations Impacted by Rainfall (24hrs Cumulative)

NJDEP
Water Monitoring and Standards
Bureau of Marine Water Monitoring

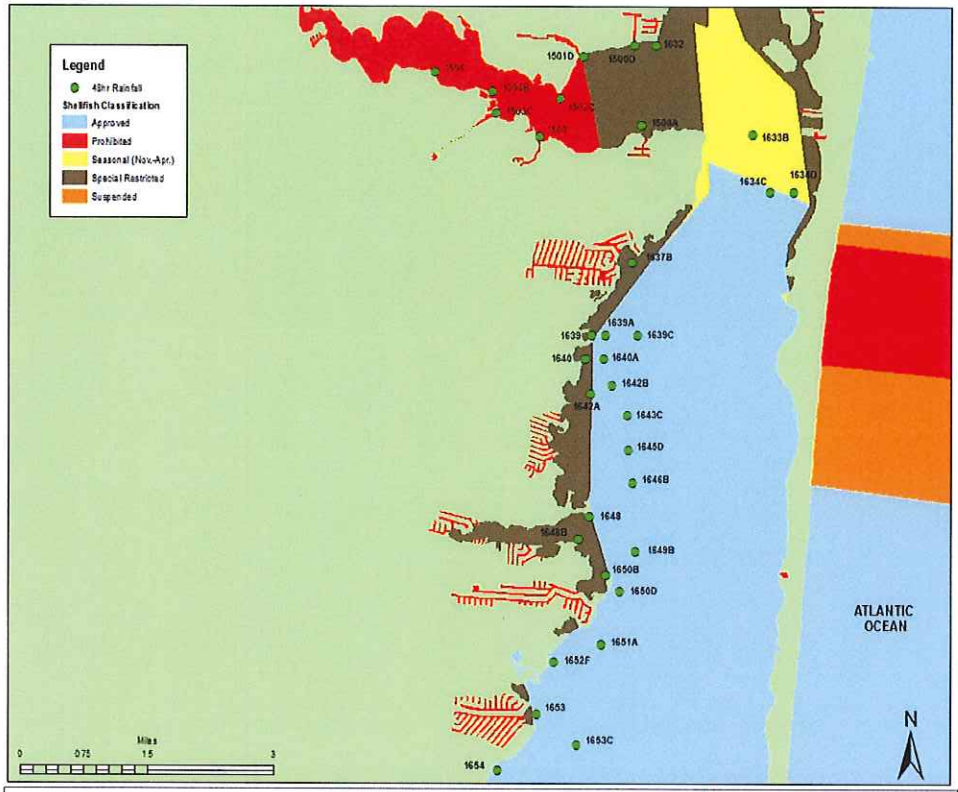
Precipitation patterns in the coastal areas of New Jersey are typical of the Mid-Atlantic coastal region. Summer storms are localized and often associated with thunder and lightning activity. Winter storms are frequently associated with northeasters. Hurricanes can occur during the summer and early fall.

Rainfall amounts are based on the closest established NOAA/National Weather Service station; each assignment run is assigned to a weather station to accurately reflect the rainfall at the sampling stations.

WM&S/BMWM uses the t-test method to assess rainfall effects. This method compares the coliform MPN values from samples collected during dry weather to samples collected during wet weather and identifies areas where runoff can potentially affect water quality. The wet/dry cutoff determines whether a sample was collected under wet or dry conditions.

For this growing area, the wet/dry cutoff criterion was set at 0.2 inches, which is the typical standard used for assessing rainfall effects. The t-test calculates the statistical probability for each station based on 24, 48 and 72 hours of cumulative. The purpose of analyzing 24, 48 and 72 hours prior to sampling is to determine if there is an immediate or delayed effect from rainfall. Any stations with a t-statistical probability of less than 0.05 are believed to be impacted. Stations that are found to be impacted tend to have a higher coliform count during a rainfall event. However, if they are impacted by rain it does not necessarily mean they are also out of compliance with NSSP. The data were analyzed at 24hr prior to sampling, 48hr prior to sampling and 72hr prior to sampling. Rainfall appears to be a significant factor for the stations located in this growing area. The first flush after 0.2 inch of rainfall, especially impacts the Toms River and the mouth of Cedar Creek (see above figure). The land surrounding the Toms River is generally urban and has many impervious surfaces causing stormwater runoff.

The cumulative 48 hours prior to sampling' illustrates the spread of the 24-hour impacted stations expanding out the mouth of the Toms River (see adjacent figure). It also has a substantial impact off the west coast of the Barnegat Bay including the area below Cedar Creek. The 'cumulative 72 hours prior to sampling' shows the impact dissipating throughout the Barnegat Bay and the Toms River. Rainfall appears to be a significant factor for the stations located in this growing area. This is expected since this area has high urban land use and is abundant in impervious surfaces.



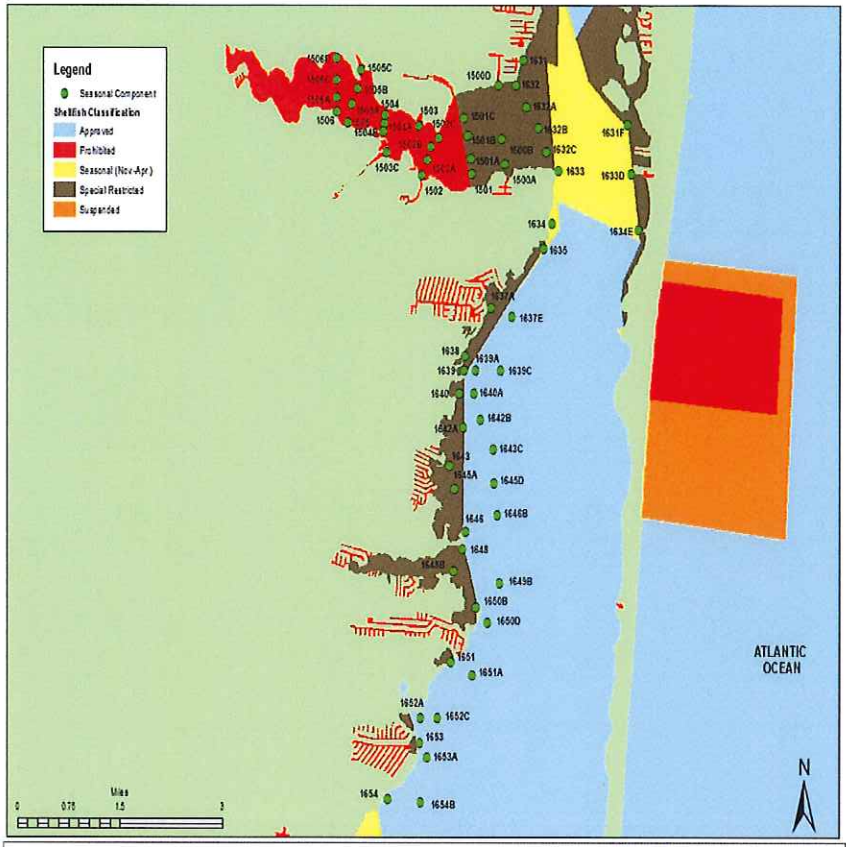
Monitoring Stations Impacted by Rainfall (48hrs Cumulative)

NJDEP
Water Monitoring and Standards
Bureau of Marine Water Monitoring

Conditional Effects

Temperature, precipitation, wind and the general circulation of the atmosphere have Conditional variations that affect the marine environment (Ingmanson and Wallace, 1989). Conditional variation may also be the result of a variety of conditions, including specific agricultural land-use practices, biological activity, stream flow and/or sediment. Summertime pressures are usually more likely to impact these waters because of such things as higher temperatures and heavy boat travel due to the influx of tourists in the area. The water quality also has the potential to be affected by other non-point sources from increased summer population and/or increased use of recreational water activities.

Statistically significant Conditional impacts were observed at sixty four stations (see adjacent figure). SRS Conditional components were assessed using a *t*-test to compare log-transformed total coliform values for summer verses winter data. The *t*-statistical probability must be less than or equal to 0.05 for a station to have a Conditional component. All of the stations with a Conditional component have higher coliform values in the summer. However, none of the noted stations had a Geometric Mean that exceeded the established criteria for the existing classifications. No changes in classification are needed as a result of the Conditional components at these stations.



RELATED STUDIES

Water Monitoring and Standard's (WM&S) Bureau of Marine Water Monitoring (BMWM) also monitors New Jersey waters for levels of nutrients (estuarine monitoring), phytoplankton, bathing beach standards and toxic monitoring.

Nutrients

WM&S/BMWM perform additional water quality studies related to the bacteriological monitoring program. Nutrient monitoring and the collection of nutrient data as part of the NJ Coastal Monitoring Network is an example of one of those studies.

Nutrient stations are sampled monthly on a biennial basis. The 82 nutrient stations are spread throughout the State's back bay waters and tidally impacted rivers, three of which are located in this growing area. At these nutrient monitoring sites, various parameters are measured including water temperature, biogenic silica, chlorophyll a, pH, salinity, secchi depth, total suspended solids, dissolved oxygen, ammonia, nitrate and nitrite, orthophosphate, total nitrogen and total phosphorus.

WM&S/BMWM compiles the results of nutrient levels from such stations and then prepares a separate report. For full nutrient assessment, see the Estuarine Monitoring Reports, available at: http://www.state.nj.us/dep/bmw/.

Phytoplankton

Phytoplankton are photosynthetic algae that play a critical role at the base of aquatic food webs. Phytoplankton studies are used to show what species are present and in what concentration. Normally, New Jersey's coastal waters are populated with non-threatening diatoms during the summer months. However, algal blooms have historically been rather common to the Barnegat Bay area.

The Bureau of Marine Water conducts routine sampling year-round at 45 static stations (up to 10 times a year) throughout New Jersey marine waters to detect the occurrence of species of marine phytoplankton that could produce biotoxins. BMWM, in accordance with the NSSP requirements, also analyzes the data and annually updates its Marine Biotoxin Contingency Plan. For more information on the BMWM phytoplankton program visit the BMWM website, www.nj.gov/dep/bmw.

Bathing Beaches

The WM&S group works cooperatively with the New Jersey Department of Health and local health agencies to monitor the bathing beaches in New Jersey. Together, these agencies implemented the Cooperative Coastal Monitoring Program (CCMP). With this program, the coastal and estuarine waters that are open to the public for recreational bathing are surveyed and regularly monitored for the concentration of bacteria. The CCMP, in conjunction with US Army Corps of Engineers, also carries out the NY/NJ Harbor Estuary Program's Floatables Action Plan that utilizes aerial surveillance to detect floating solid waste and debris.

Typically, bathing beach samples are taken once a week for the entire summer, usually on Mondays. These samples are tested for Enterococci as a fecal coliform indicator. Local health agencies and law enforcement may close a bathing beach if the results exceed the State Sanitary Code of 104 Enterococci per 100 mL. Stations must be re-sampled when bacteria concentrations exceed the primary contact standard of 104 Enterococci per 100 mL of sample (NJDEP CCMP, 2014). Consecutive samples that exceed the standard require the closing of the beach until a sample is obtained that is within the acceptable limits. Beaches can also be closed at any time if health or enforcement agencies believe it is in the interest of public health.

There are seventeen stations within this shellfish growing area. BMWM utilizes these data as adjunct information; the closure of shellfish waters does not correspond with these results. Please see http://www.njbeaches.org/ for further information.

Toxic Monitoring

Toxic chemicals such as heavy metals, pesticides, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs) are dangerous chemicals that can be found in the environment. These substances can be released into the environment by storm drains, runoff, sewage treatment facilities and atmospheric deposition. Bottom dwelling organisms are most vulnerable to these chemicals and may pose a risk to human health if consumed.

USEPA National Coastal Condition Assessment Program (NCCA)

USEPA National Coastal Assessment EMAP and its partners began sampling in the coastal and estuarine water of the United States in 1990. Data collected include water column parameters, sediment chemistry & toxicity, benthic communities, and tissue contaminants.
Please see http://www.epa.gov/national-aquatic-resource-surveys/national-coastal-condition-assessment for further information and the most recent data.

National Oceanic and Atmospheric Administration (NOAA) Mussel Watch

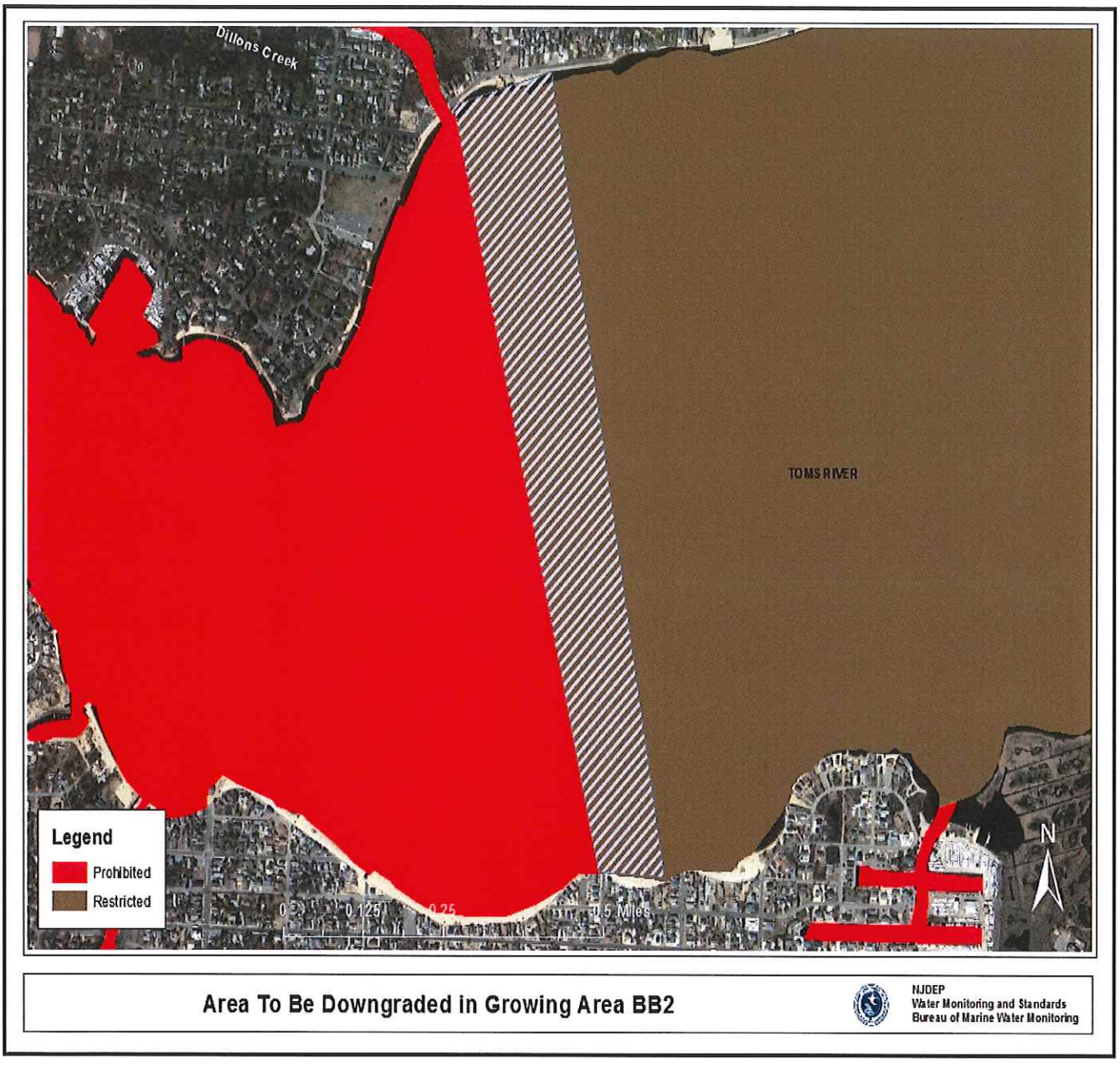
The National Oceanic and Atmospheric Administration (NOAA) Mussel Watch Program monitors the levels of toxins and metals in shellfish. This program is one of the nation's longest-running and most extensive contaminant monitoring programs in U.S. history. The blue mussel, *Mytilus edulis*, occurs worldwide and effectively takes up toxins and metals from seawater and sediments. The toxins and metals then become concentrated in the mussel's living tissues. Assays from the living tissues of this shellfish can be made easily and cheaply. The Mussel Watch Program monitors metals such as mercury, lead, zinc, nickel, cadmium, copper, chromium, aluminum, silicon, manganese, iron, arsenic, selenium, tin, antimony, thallium and silver. The program also monitors toxins such as the synthetic organic compounds that are widely used in pesticides, solvents, flame-retardants, and other products. Please see http://coastalscience.noaa.gov/about/centers/ccma/ for further information and the most recent data.

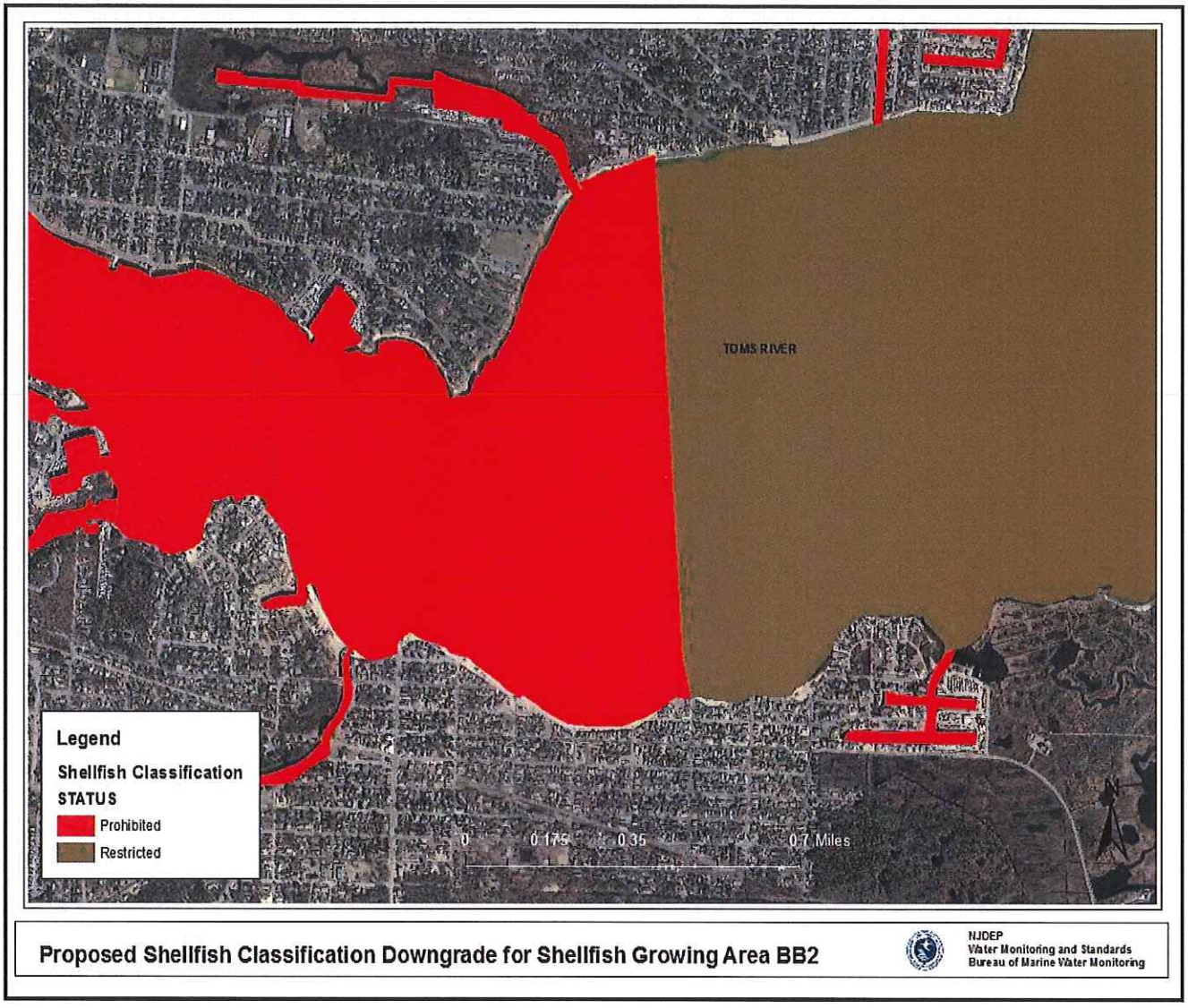
CONCLUSIONS

The following conclusions are based on the water quality data from August 2011 through August 2015. Based on NSSP Systematic Random Sampling criteria, one monitoring station is out of compliance with NSSP *Restricted* criteria. This station (1501D) is located in the *Restricted* waters at the mouth of the Toms River outside of Dillons Creek. At the time of the 2014 Annual Growing Area report, there were several other stations in this area of the Toms River that did not meet NSSP *Restricted* criteria. However, according to the data collected for this report and for the 2015 Annual Growing Area report, the only station that remains out of compliance is 1501D. Therefore, a downgrade of the waters surrounding this station is recommended at this time.

RECOMMENDATIONS

It is recommended that 83.9 acres at the mouth of the Toms River outside of Dillons Creek be downgraded from *Restricted* to *Prohibited* due to continuously poor water quality. The following maps show the location of the downgraded area and the proposed shellfish classification. Otherwise, continue sampling the remainder of the growing area according to NSSP SRS protocol.





Regulation Description

Existing Language in N.J.A.C 7:12-2.1. Shellfish growing water classification – Prohibited

(a) The following shellfish growing waters are classified Prohibited:

7. Toms River area: All those waters of Toms River and tributaries west from a straight line beginning at the northeastern junction of Dillon Creek with the Toms River that has the coordinates of latitude 39 degrees 56 minutes 33.8 seconds North and longitude 74 degrees 7 minutes 59.2 seconds West and bearing approximately 167 degrees T to the northern terminus of Anglesea Road at Toms River that has the coordinates of latitude 39 degrees 55 minutes 43.1 seconds North and longitude 74 degrees 7 minutes 44.4 seconds West.

Suggested Language in N.J.A.C 7:12-2.1. Shellfish growing water classification – Prohibited

(a) The following shellfish growing waters are classified Prohibited:

1.-6. (No change.)

7. Toms River area: All those waters of Toms River and tributaries west from a straight line beginning at the northeastern junction of Dillon Creek with the Toms River that has the coordinates of latitude 39 degrees 56 minutes 37.1 seconds North and longitude 74 degrees 7 minutes 49.2 seconds West and bearing 170 degrees T to a point with coordinates latitude 39 degrees 55 minutes 42.3 seconds North and longitude 74 degrees 7 minutes 37.3 seconds West.

8.-21. (No change.)

Existing Language in N.J.A.C 7:12-3.1. Shellfish growing water classification – Restricted

(a) The following shellfish growing waters are classified as Restricted:

9. Toms River area: All of those waters forming the mouth of Toms River west from a straight line beginning at Good Luck Point and bearing approximately 353 degrees T toward the most easterly point of land at Windsor Park (north of the Mathis Bridge), and terminating at its point of intersection with the Mathis Bridge; the northern boundary of this condemned area shall follow said bridge in a westward direction to its connection with the mainland shore, thence along the shoreline to the northeastern junction of Dillon Creek with the Toms River that has the coordinates of latitude 39 degrees 56 minutes 33.8 seconds North and longitude 74 degrees 7 minutes 59.2 seconds West and bearing approximately 167 degrees T to the northern terminus of Anglesea Road at Toms River that has the coordinates of latitude 39 degrees 55 minutes 43.1 seconds North and longitude 74 degrees 7 minutes 44.4 seconds West. (Note: This designation adjoins the Prohibited waters described in N.J.A.C. 7:12-2.1(a)7.)

Suggested Language in N.J.A.C 7:12-3.1. Shellfish growing water classification – Restricted

(a) The following shellfish growing waters are classified as Restricted:

1.-8. (No change.)

9. Toms River area: All of those waters forming the mouth of Toms River west from a straight line beginning at Good Luck Point and bearing approximately 353 degrees T toward the most easterly point of land at Windsor Park (north of the Mathis Bridge), and terminating at its point of intersection with the Mathis Bridge then following the bridge westward to its connection with the mainland shore, then along the shoreline to a point with coordinates of latitude 39 degrees 56 minutes 37.1 seconds North and longitude 74

degrees 7 minutes 49.2 seconds West and bearing approximately 170 degrees T to the point that has the coordinates of latitude 39 degrees 55 minutes 43.1 seconds North and longitude 74 degrees 7 minutes 44.4 seconds West. (Note: This designation adjoins the Prohibited waters described in N.J.A.C. 7:12-2.1(a)7.)

10.-33. (No change.)

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Supporting Documentation

Data Sheets – Reappraisal Report for Shellfish Growing Area BB2 (Central Barnegat Bay), December 2015, see the Shellfish Growing Area Reports section at *www.state.nj.us/dep/wms/bmw*.

Shoreline survey field notes and pictures - Reappraisal Report for Shellfish Growing Area BB2 (Central Barnegat Bay), December 2015 see the Shellfish Growing Area Reports section at *www.state.nj.us/dep/wms/bmw*.

APPENDICES

A. Data Listing – August, 2011 through August, 2015
   1. Seasonal Evaluation
   2. Wet/Dry Statistics
   3. Rainfall Amount

B. Shoreline Survey Sheets

SHORELINE SURVEY AREA Barnegat Bay BB2 Boat ☑ Land ☐ Air ☐

SURVEYOR: Tracy Fay **DATE:** 8/13/12 **TIME:** 2-8:30pm

WEATHER CONDITIONS: Warm, Partly Cloudy **TEMPERATURE:** 86

New Stormwater Outfalls:

	General Area	Latitude	Longitude	Diameter	Description (foul odor, damaged, etc.)
1					
2					
3					
4					
5					
6					
7					
8					

Is there any new development in the area that may have an effect on the coastline? Note name and location.

No new development noted.

Do you notice any significant animal populations (migrating birds, horseshoe crabs , etc.)? Note name and location.

Bird populations near Good Luck Point. Marsh area.

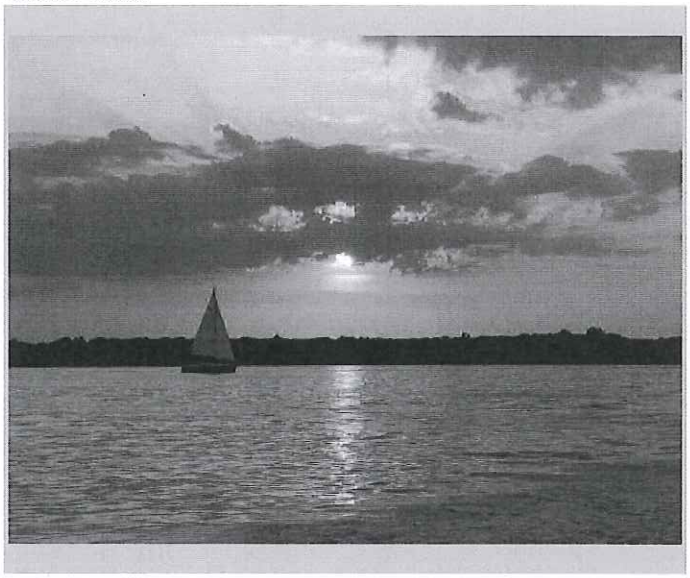
Do you notice any expansion in local marinas? (Without approaching marina owners) Note name, location, & changes.

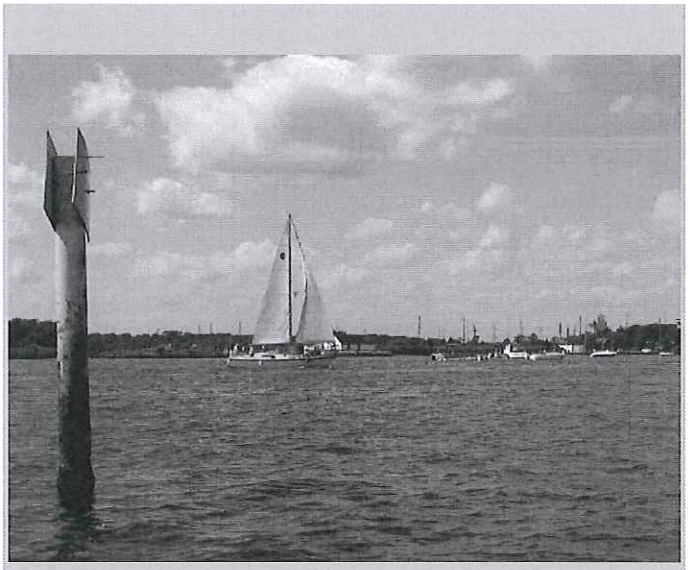
No.

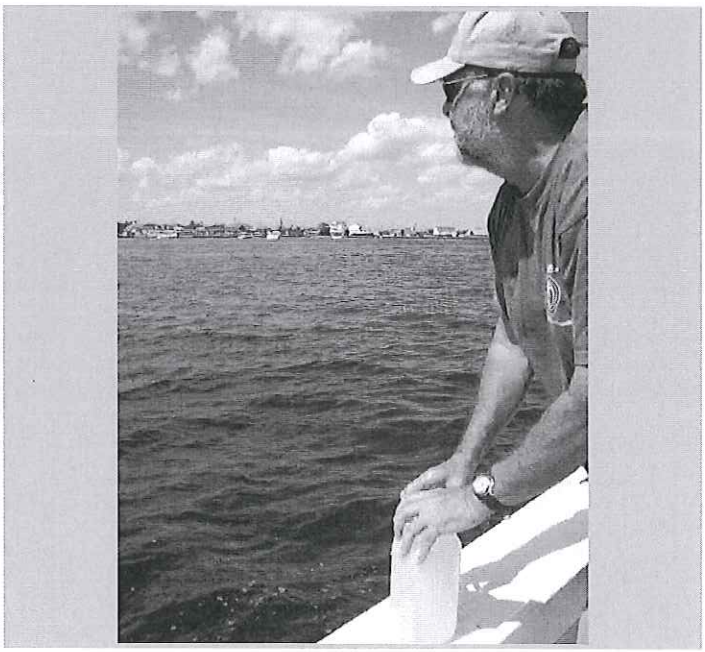
Additional Observations and Comments (bulkhead, land use, dredging, etc.):

On 'Barnegat Bay Intensive Sampling Event' collecting water samples and probe data from BB05a and BB06.

Insert Photos:







SHORELINE SURVEY AREA Barnegat Bay BB2 Boat ☑ Land ☐ Air ☐

SURVEYOR: Tracy Fay **DATE:** 8/16/12 **TIME:** 2-8:30pm

WEATHER CONDITIONS: Sunny **TEMPERATURE:** 85

New Stormwater Outfalls:

	General Area	Latitude	Longitude	Diameter	Description (foul odor, damaged, etc.)
1					
2					
3					
4					
5					
6					
7					
8					

Is there any new development in the area that may have an effect on the coastline? Note name and location.

NO.

Do you notice any significant animal populations (migrating birds, horseshoe crabs , etc.)? Note name and location.

Ducks and Geese in the Toms River.

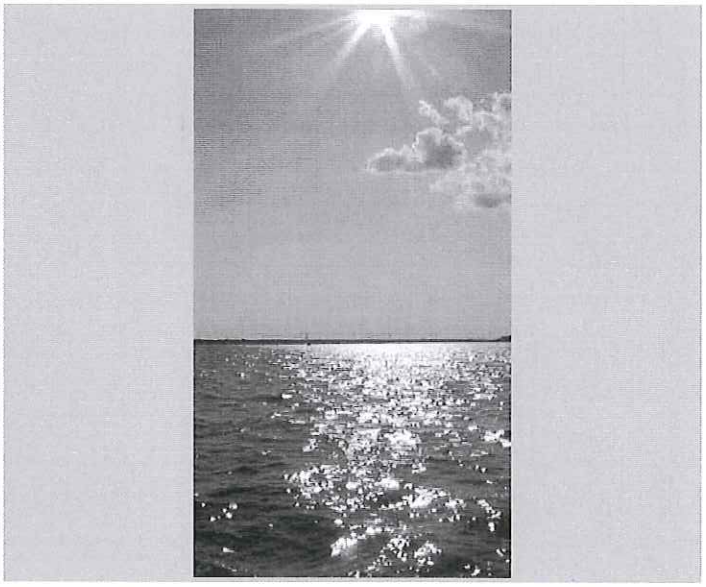
Do you notice any expansion in local marinas? (Without approaching marina owners) Note name, location, & changes.

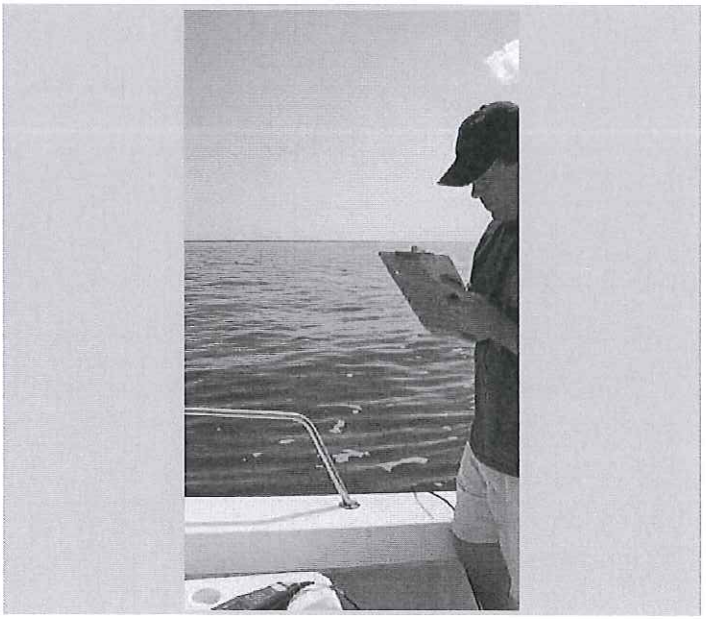
NO.

Additional Observations and Comments (bulkhead, land use, dredging, etc.):

On 'Barnegat Bay Intensive Sampling Event' collecting water samples and probe data from BB05a and BB06.

Insert Photos:





SHORELINE SURVEY AREA Central Barnegat Bay BB2 Boat ☑ Land ☐ Air ☐

SURVEYOR: Tracy Fay **DATE:** 10/15/12 **TIME:** 10am

WEATHER CONDITIONS: Overcast, windy **TEMPERATURE:** 68

New Stormwater Outfalls:

	General Area	Latitude	Longitude	Diameter	Description (foul odor, damaged, etc.)
1					
2					
3					
4					

Is there any new development in the area that may have an effect on the coastline? Note name and location.

Do you notice any significant animal populations (migrating birds, horseshoe crabs , etc.)? Note name and location.

Do you notice any expansion in local marinas? (Without approaching marina owners) Note name, location, & changes.

Direct Discharges:

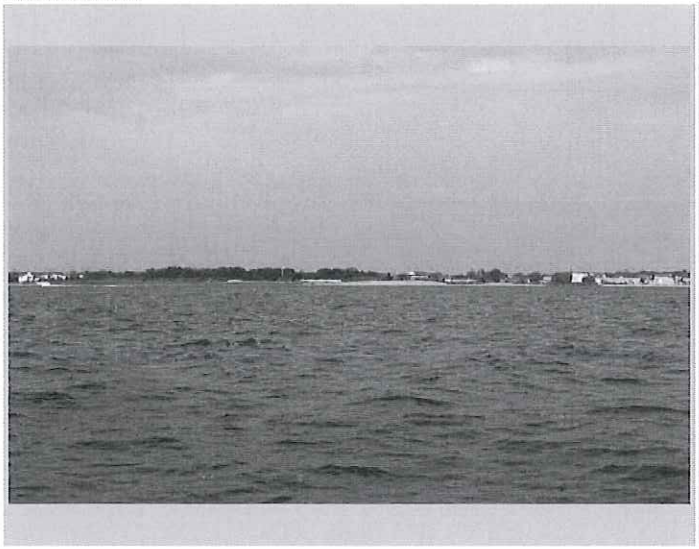
	Yes	No	Details
Any Direct Discharge to Growing Area?	☐	☑	
Plant Survey Conducted?	☐	☐	
Improvements Since Last Survey?	☐	☐	
Improvements Planned?	☐	☐	
Repairs Since Last Survey?	☐	☐	
Repairs Planned?	☐	☐	

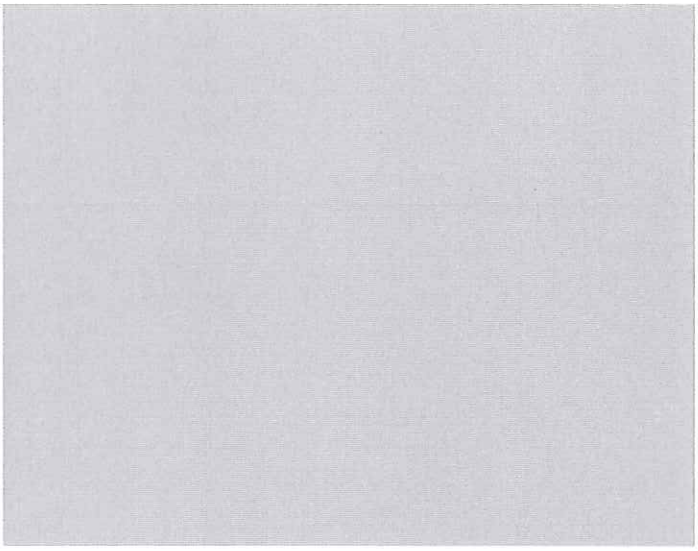
Additional Direct Discharge Notes:

Additional Observations and Comments (bulkhead, land use, dredging, etc.):

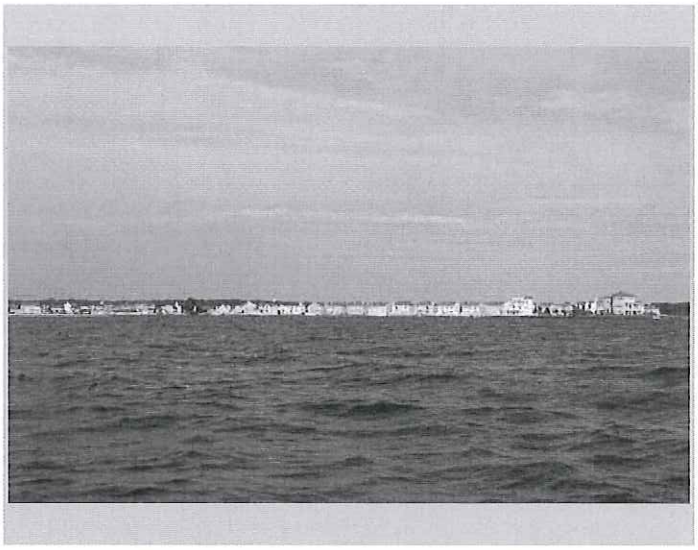
In area because of OCUA dye test leak 10/11/12 Comm Center #12-10-11-1251-25
No direct discharges, but the OCUA line runs underneath BB, leak near station 1637F (~4200ft east of Allen Rd.).
Nothing unusual noted in field, 15 samples being run mTec.
Bulkheading in Sloop Creek.

Insert Photos:





Est. area of leak



Wheelhouse Marina