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

Reappraisal Report of Shellfish Growing Area NE5

Manasquan River

Data from January 1, 2009 – August 30, 2013

State of New Jersey
Chris Christie, Governor
Kim Guadagno, Lt. Governor

NJ Department of Environmental Protection
Bob Martin, Commissioner

Reappraisal Report of Shellfish Growing Area NE5

Manasquan River

New Jersey Department of Environmental Protection (NJDEP)

Bureau of Marine Water Monitoring (BMWM)
Bruce Friedman, Chief

December 2013

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Cover Photo – 7/24/13 Shoreline Survey photos by Tracy Fay

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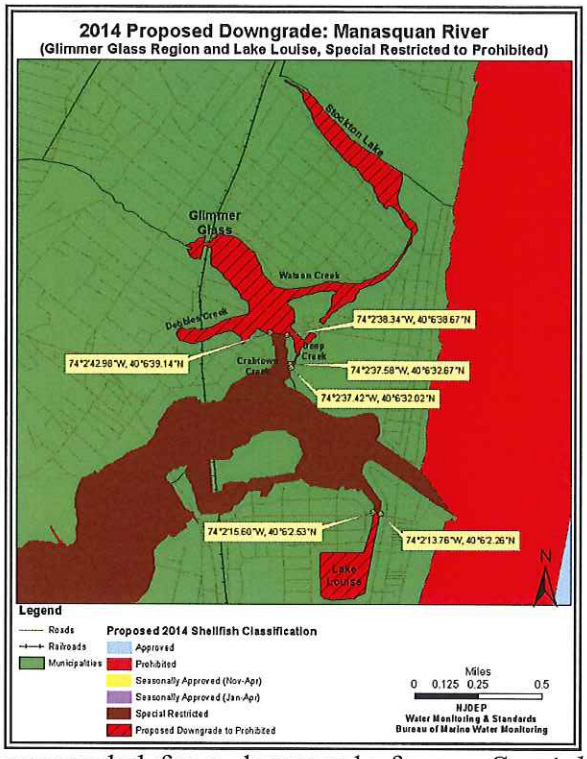
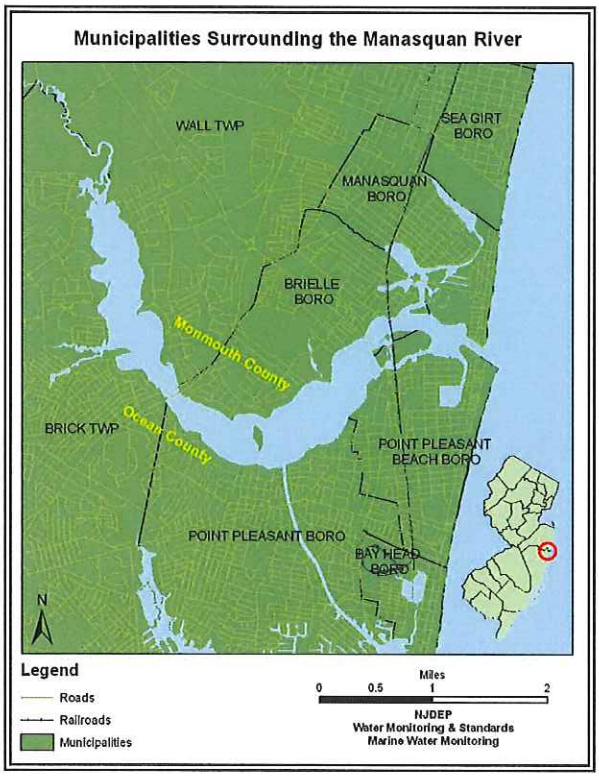
EXECUTIVE SUMMARY

Shellfish Growing Area NE5, the Manasquan River, divides Ocean County and Monmouth County and connects to the Atlantic Ocean via the Manasquan Inlet. It also connects to the Barnegat Bay through the Point Pleasant canal. Currently, the Manasquan River is classified as *Prohibited* upstream of the Route 70 Bridge and *Special Restricted* downstream of the Route 70 Bridge. The Point Pleasant canal is classified as *Prohibited* (see figure on page 2). There are no direct discharges into the Manasquan River, although there are numerous stormwater outfalls and other indirect discharges.



Water samples from the Manasquan River were collected (using the Systematic Random Sampling strategy) and analyzed from 44 sampling stations for fecal coliform levels during the period of January 1, 2009 to August 30, 2013 for this Reappraisal report. Two stations, 1303A & 1303B, were not in compliance with the NSSP criteria, therefore, sections of the Manasquan River are being recommended for a downgrade from a *Special Restricted* classification to a *Prohibited* classification in this report. Specifically, 99.4 acres in the Glimmer Glass region and 24.2 acres in Lake Louise (see the above map and 'Recommendations' section below).



All remaining sampling stations comply with their criteria for *Special Restricted* and *Prohibited* classifications, respectively. Significant changes to shorelines and hydrography occurred in this area due to Superstorm Sandy, a recent shoreline survey shows that repairs due to the storm are ongoing. Otherwise, there have been no substantial changes to the area.

DESCRIPTION OF GROWING AREA

Location & Description

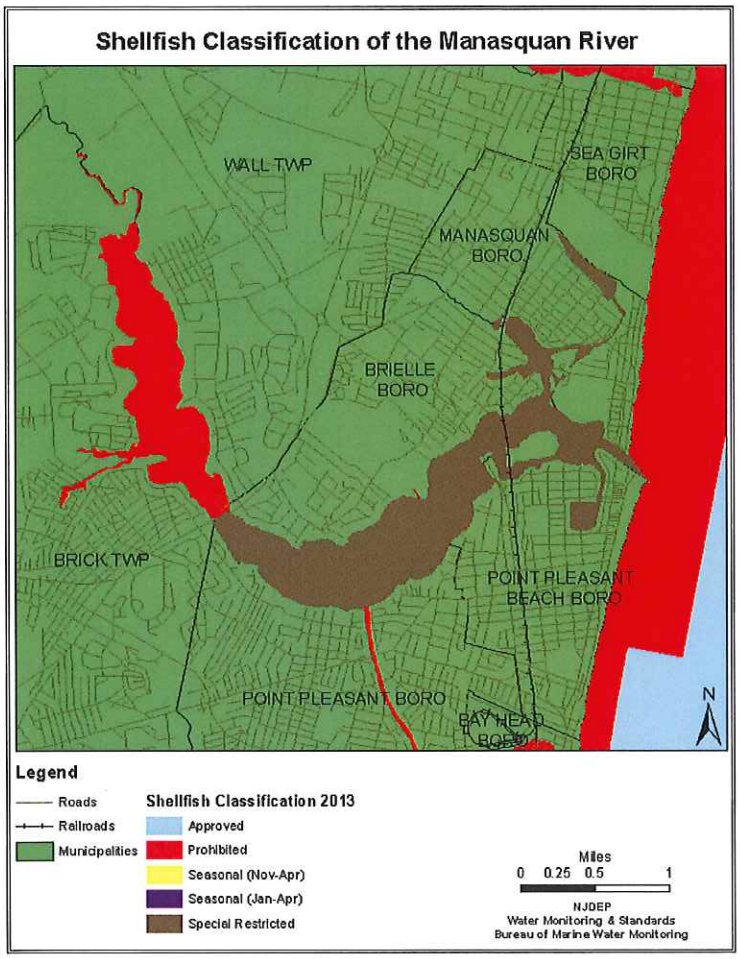
The Manasquan River is approximately 26.5 miles long (USGS, 2011). The Manasquan River also serves as a boundary, separating Ocean County from Monmouth County (see adjacent figure). This river connects to the Atlantic Ocean via the Manasquan Inlet. It also connects to the Barnegat Bay through the Point Pleasant Canal. The Manasquan River is the northernmost entry point to the Intracoastal Waterway.

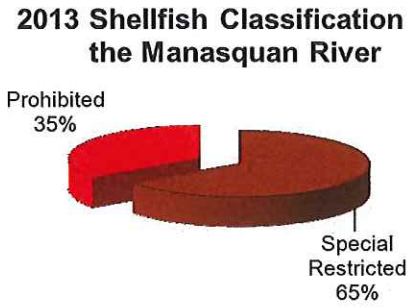
The major tributaries of the Manasquan River are Squankum Brook, Debois Creek, Mingamahone Creek, and Marsh Bay Brook.

There are six municipalities surrounding the Manasquan River, three in Monmouth County and three in Ocean County. Brielle Borough, Manasquan Borough, and Wall Township are located in Monmouth County; Point Pleasant Beach Borough, Point Pleasant Borough, and Brick Township are located in Ocean County (see figure on page 1).

Growing Area Classification Summary

The lower 6.5 miles of the Manasquan River is deemed part of the Manasquan River Estuary (USEPA, 1998). The estuary includes the shellfish waters, but also the narrows, (the section where the width of the river decreases and there is little tidal influence), and various tributaries. This report concentrates on the approximately 1,320 acres of shellfish growing waters within the Manasquan River Estuary.



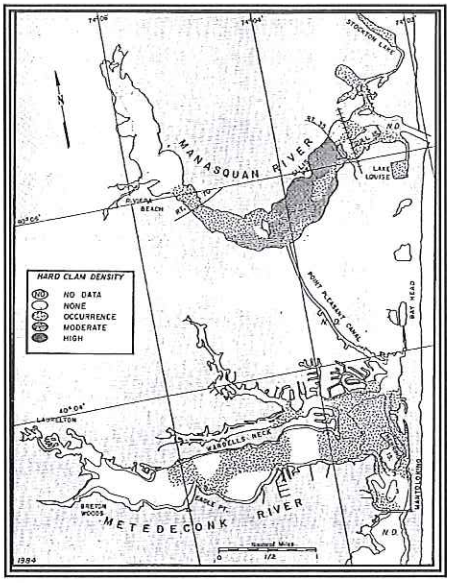


In 1961, the entire Manasquan River, NE5, was classified as *Prohibited* for harvesting shellfish. In 1987 the classification of the entire river was upgraded to *Special Restricted*. In 1990, 424 acres northwest of the Route 70 bridge were downgraded from *Special Restricted* to *Prohibited* due to high coliform levels associated with nonpoint source runoff from development (N.J.A.C. 7:12). Currently, the area upstream of the Route 70 bridge is classified as *Prohibited*, as is the Point Pleasant canal. The remaining portion of the river, downstream of the Route 70 Bridge, is classified as *Special Restricted* (see adjacent figure).

There is no harvesting allowed in the *Prohibited* region of the Manasquan River. It is illegal to harvest shellfish from *Special Restricted* waters for direct market; a special permit must be issued by the BMWM. Recreational harvest of shellfish is not permitted from *Special Restricted* waters. The Manasquan River is displayed the current State of New Jersey Shellfish Growing Water Classification Chart (NJDEP) or on the Bureau of Marine Water Monitoring's (BMWM) website at http://www.state.nj.us/dep/bmw/; the official and most current classification descriptions can be found at N.J.A.C. 7:12.

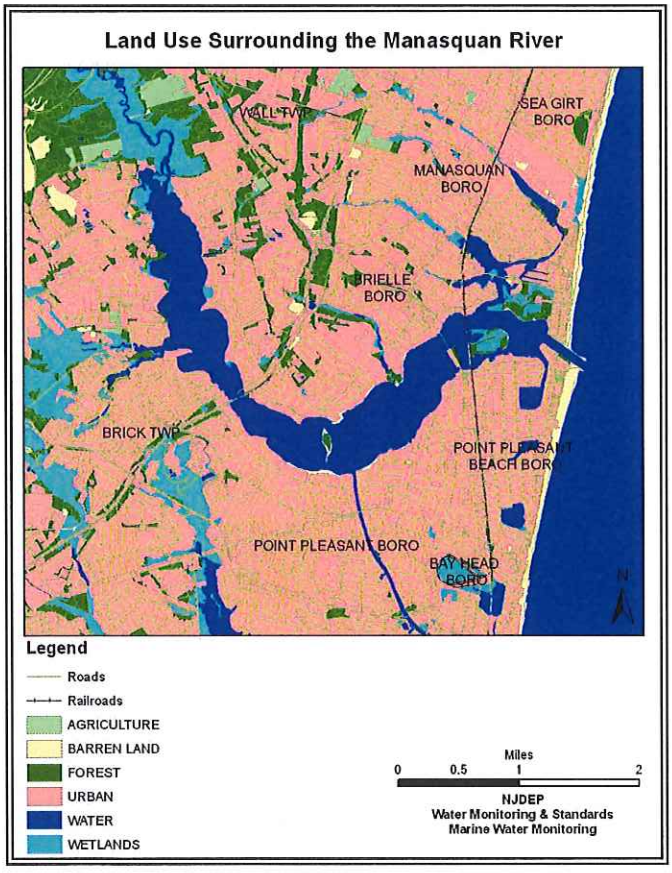
Evaluation of Biological Resources

Commercially important shellfish native to New Jersey 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 Manasquan River has few to high densities of hard clams and some soft-shelled clams and blue mussels reside around the Point Pleasant Canal and Gull Island (according to the last clam census done by NJDEP's Division of Fish & Wildlife in 1984, see adjacent figure). The Manasquan River is also home to commercial clam boats which harvest shellfish from ocean waters.

SHORELINE SURVEY: EVALUATION OF POTENTIAL POLLUTION SOURCES



New and reconstructed residential homes were observed on shoreline survey. In many neighborhoods construction repairs were needed as a result of Superstorm Sandy. Repairs at marinas and new/repaired sections of bulk heading were also observed on shoreline survey. The upstream wetlands still support many crucial wildlife habitats. Numerous fishermen were observed on shoreline survey.

Land Use

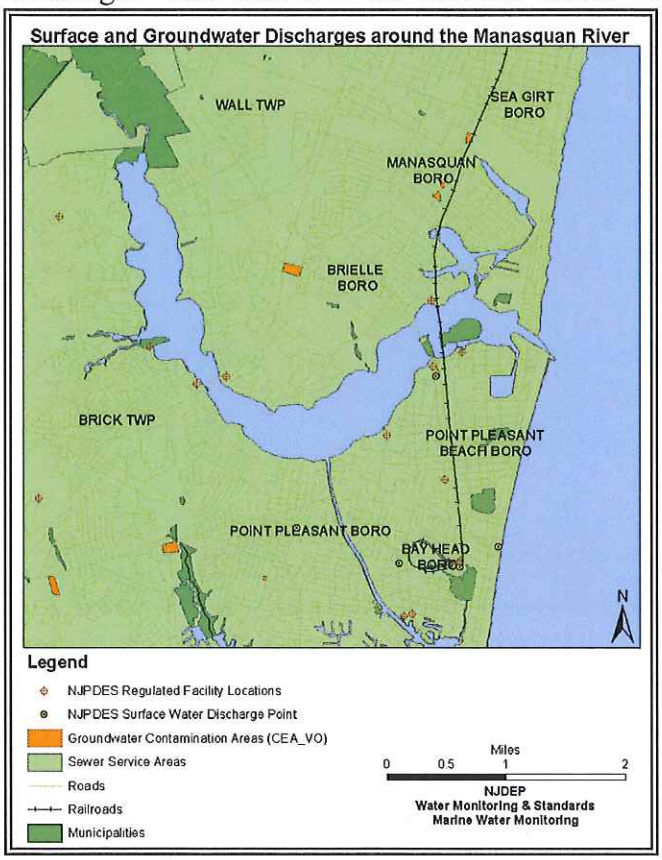
The Manasquan River is popular for recreating. The recreational use is substantially increased in the summer months due to a seasonal growth in population. Popular ocean bathing beaches are located both north and south of the Manasquan Inlet. The Manasquan Inlet provides direct access to the Atlantic Ocean, which attracts fishermen, both commercial and recreational. As a result, there are many marinas within the Manasquan. There are also many waterfront restaurants that provide boat access. Consequently, much of the river shoreline is bulkheaded.

There is agricultural land use near the headwaters of the Manasquan, but as the river runs southeast toward the ocean, the land use becomes mostly urban (see above figure). Much of the Manasquan River coastline is residential development, with commercial sections near the inlet. Gull Island, in the eastern portion of the river, and the Manasquan River Wildlife Refuge are conservation areas.

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 direct discharges into the waters of the Manasquan River. The Northern Water Pollution Control Facility in Brick Township (below the Metedeconk River) treats the waste material of Bay Head, Brick Township, Mantoloking, Point Pleasant Beach, Point Pleasant Borough, Lakewood Township, and Jackson Township. This facility was built in 1976 and the maximum flow from the facility is 32 million gallons per day (OCUA, 2013). Once treated, the effluent is 'disinfected and discharged' one mile into the Atlantic Ocean via an outfall pipe. The South Monmouth Regional Sewerage Authority (SMRSA) provides secondary treatment to Belmar, Lake Como, Brielle, Manasquan, Sea Girt, Spring Lake, Spring Lake Heights, and Wall Township. The SMRSA was founded in May of 1970 and the maximum flow from the facility is 9.1 million gallons per day (SMRSA, 2013).

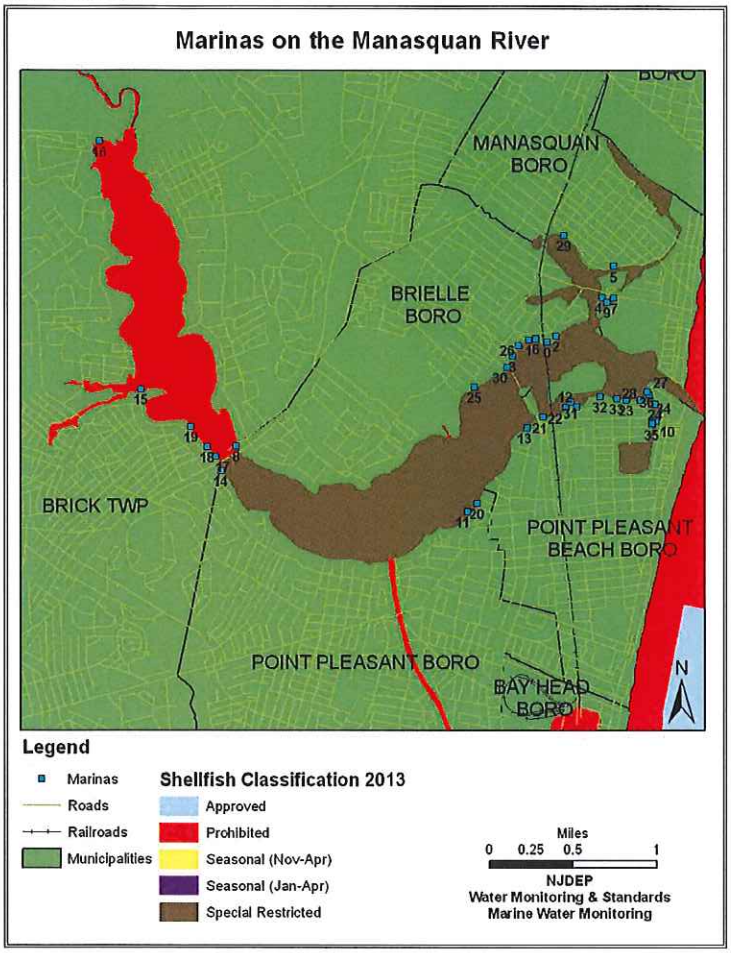


The New Jersey Water Supply Authority controls the Manasquan Reservoir, located upstream of the Manasquan River. The reservoir, which was opened in 1990, has a 4 billion gallon water capacity and a maximum depth of 40', the reservoir can supply up to 30 million gallons of water a day (Monmouth County Park System, 2013).

Indirect discharges include underground storage tanks, septic systems, sewer leaks, and reported contaminated sites. New Jersey Pollutant Discharge Elimination System (NJPDES) facility locations and surface water discharge points are shown in the adjacent map.

Most of the area surrounding the Manasquan River is served by sewer systems (see above figure). The quality of a sewer system depends heavily on the municipal planning and maintenance of the sewer lines. New residential developments joining into a sewer system must be adequately planned for in order to handle the increased volume. The age of the pipes and facilities also factor in when assessing the potential for sewer problems. Septic systems are occasionally used where public sewer lines are unavailable. When a septic system's leach field fails septic waste may pond on the grounds surface and can flow or be transported by stormwater to storm sewers, and ultimately discharge to surface water. Failing septic systems can be a significant localized source of bacteria.

Marinas



Boating is a popular summertime activity within the Manasquan River. In this growing area there are a total of 37 marinas (see adjacent map and appendix for map key). Most of these marinas are located near the inlet. Some of the marinas in this area run charter and party boat trips, although there are also many private boats within the marinas. All marinas, anchorages, or other places where docking or mooring facilities are provided for boats are classified as *Prohibited*. Depending on the size of the marina and the water quality, water immediately adjacent to each marina may be classified as *Prohibited*, *Special Restricted*, or *Seasonally Approved* (no harvest during summer months when the marina is active).

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* (2012).

The Manasquan River was made a "No Discharge Zone" in 1998 (USEPA, 1998). Some marinas on the Manasquan River have pledged to pursue NJDEP certification as a New Jersey Clean Marina; for more information on participating marinas, please visit http://www.nj.gov/dep/njcleanmarina/.

Spills, Unpermitted Discharges, and Closures

Spills reported to the NJDEP hotline (1-877-WARN-DEP) are passed on to the BMWM when shellfish waters might be impacted. Since there is a direct relationship 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 detrimental to the shellfish beds, then a closure is made in the impacted area to protect public health. The closure is not lifted until the source of the problem is fixed/eliminated and all samples in that area fit within the appropriate classification criteria.

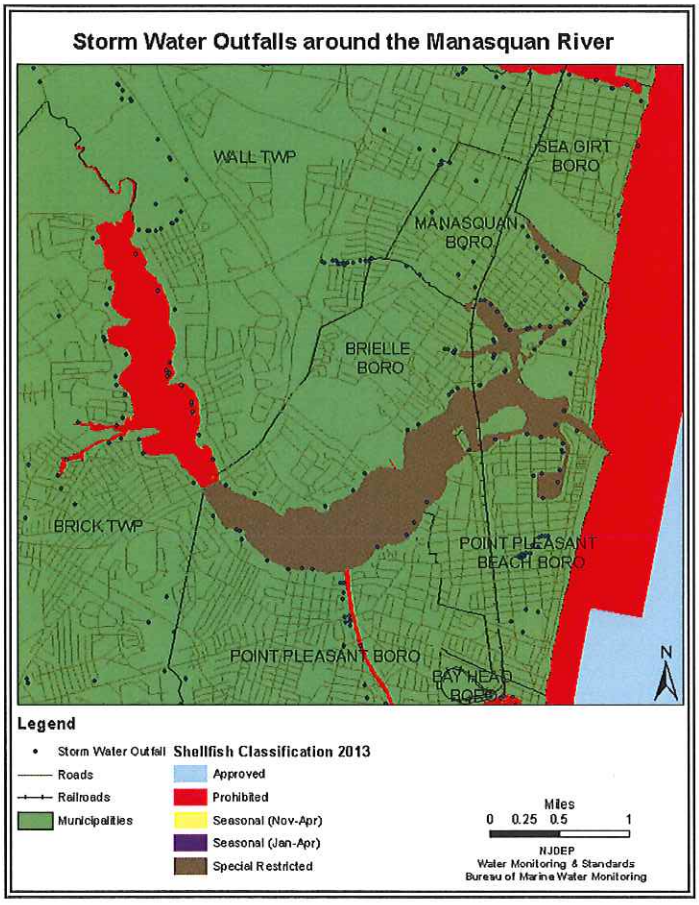
All state waters in New Jersey were closed for shellfish harvest in preparation for Hurricane Irene in 2011 and Superstorm Sandy in 2012. In both instances the shellfish growing waters of the state remained closed until water and, in some cases, tissue tests showed that the shellfish were safe for human consumption.

There were no other spills or events causing shellfish bed closures in the Manasquan River during the January 1, 2009 to August 30, 2013 time period; prior spills are summarized in past reports.

The process of dredging can impair water quality and contaminate shellfish beds near dredging and disposal sites. BMWM is given the opportunity to review such project through CAFRA submission and will respond with a request for denial of the project if the proposed dredging or disposal site can potentially contaminate shellfish beds or impair water quality. BMWM's comments are taken into consideration 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 pollutants that enter growing waters via stormwater runoff. Storm drains along roads collect runoff and transmit it to stormwater outfalls (see below figure). 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 runoff. Runoff can easily transport 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.



BMWM conducts storm water projects, where water samples are taken before and during a storm event in order to determine the effect of runoff. Once a possible source of the problem is identified, then the appropriate State and local officials are notified to attempt to remedy the situation. Currently, there are no stormwater projects planned or ongoing for the Manasquan River.

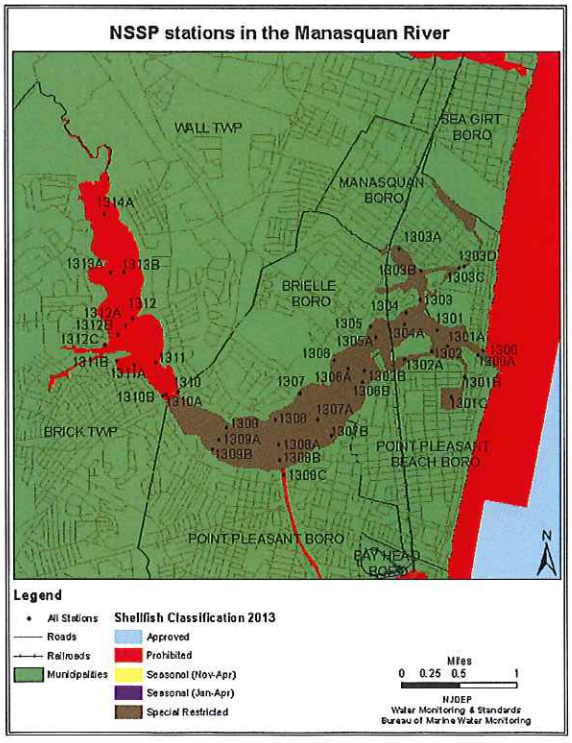
WATER QUALITY STUDIES

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* (2012). 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).

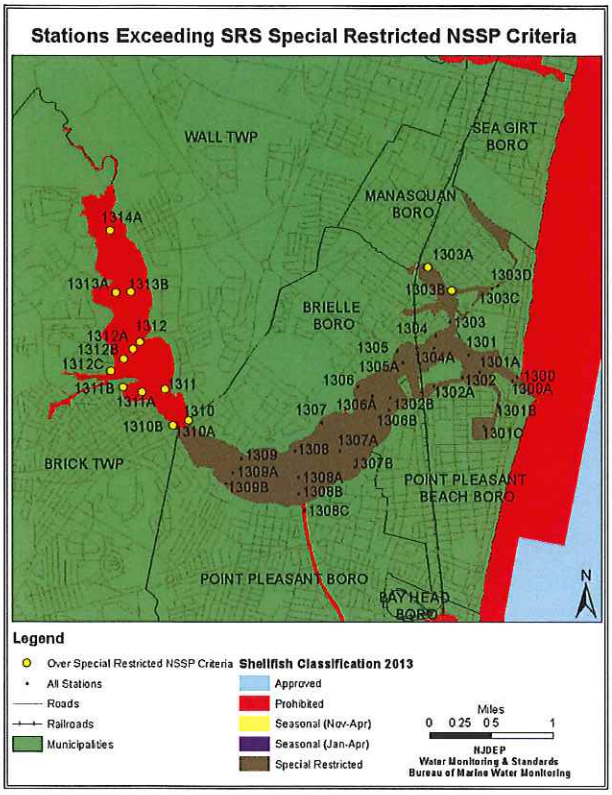
Each shellfish producing state is directed to adopt either the total coliform or fecal coliform criterion. While New Jersey bases its growing water classifications on the fecal coliform criterion, the laboratory does have the ability to make corresponding total coliform determinations. Each classification criterion is composed of a measure of the statistical 'central tendency' (geometric mean) and the relative variability of the data set. The criteria were developed by the NSSP to ensure that shellfish harvested from designated waters would safe for human consumption (NSSP, 2011). For the Systematic Random Sampling Strategy, variability is expressed as the estimated 90th percentile. The following table shows the statistical criteria for the SRS strategy.

CRITERIA FOR SYSTEMATIC RANDOM SAMPLING STRATEGY				
	Total Coliform Criteria		**Fecal Coliform Criteria**	
	Geometric mean (MPN/100 mL)	**Max. 90th Percentile** (MPN/100 mL)	**Geometric mean** (MPN/100 mL)	**Max. 90th Percentile** (MPN/100 mL)
Approved Classification	70	330	14	49
Special Restricted Classification	700	3300	88	300



The water quality of each growing area must be evaluated before an area can be classified as *Approved, Seasonal (Nov-Apr or Jan-Apr), Special Restricted,* or *Prohibited*. A *Seasonal* 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,* 2011 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,* 2011 Revision. Data management and analysis were accomplished using database applications developed for the BMWM. Mapping of data was performed with Geographic Information System software (GIS: ArcMap).



Bacteriological Quality

Approximately 1,540 water samples were collected from this shellfish growing area using the Systematic Random Sampling strategy between January 1, 2009 and August 30, 2013, and analyzed by membrane filtration for fecal coliform levels. The figure on page 8 shows the shellfish growing water quality monitoring stations in the Manasquan River.

Compliance with NSSP Criteria

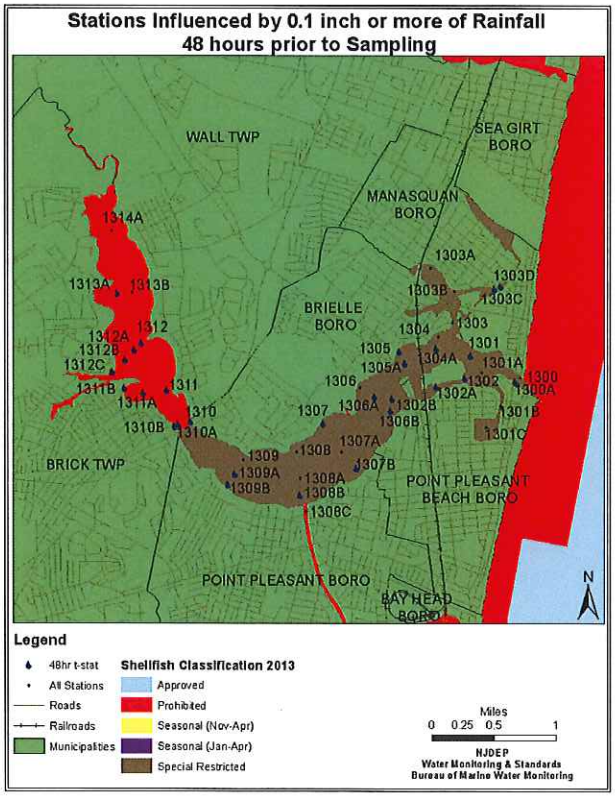
Fourteen stations exceeded the NSSP total coliform criteria for *Special Restricted* waters; these stations are 1303A, 1303B, 1310, 1310B, 1311, 1311A, 1311B, 1312, 1312A, 1312B, 1312C, 1313A, 1313B, & 1314A (see adjacent figure). Twelve of these stations are located in *Prohibited* waters; stations 1303A & 1303B are located in *Special Restricted* waters. Stations 1303A & 1303B, in the Glimmer Glass region of the Manasquan River, are out of compliance with NSSP criteria, and a change in classification is recommended (see below).

Rainfall Effects

The Manasquan River has a semi-diurnal tidal exchange with the Atlantic Ocean via the inlet. The tidal range of the ocean water near the Manasquan Inlet is four feet; this tidal range gradually decreases over the course of the river. The tidal influence within the Manasquan River extends beyond the shellfish waters to the area of the Garden State Parkway (MCHD, 1999).

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 sometime occur during the late summer and fall. The primary weather station for this area is in the headwaters of the Manasquan River at National Oceanic and Atmospheric Administration's (NOAA) station RA007.

A *t*-test is used to compare log-transformed total coliform values for wet verses dry data. The *t*-statistical

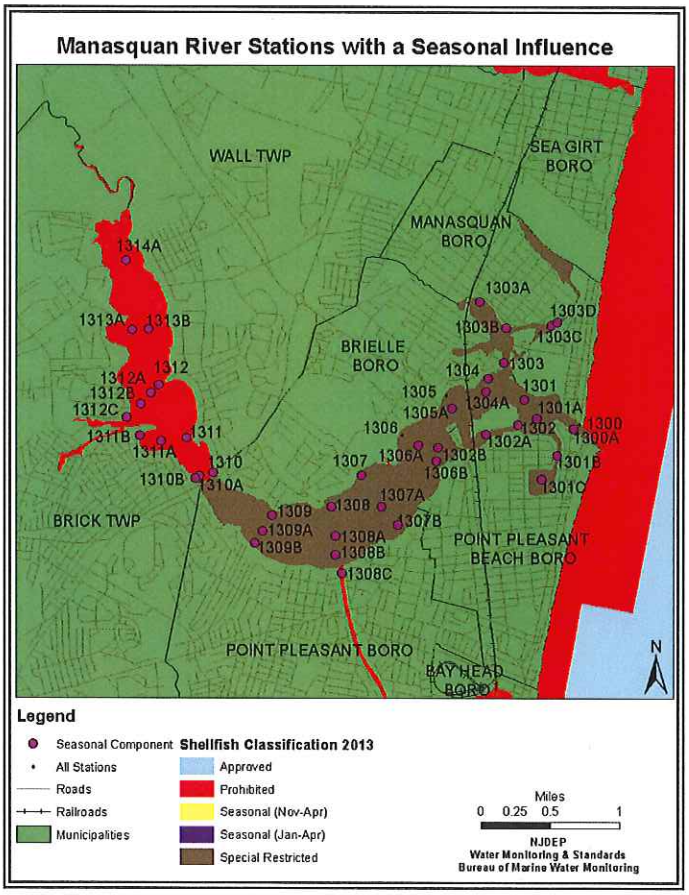


probability must be less than or equal to 0.05 for a station to be rainfall impacted. There is also a wet/dry cutoff for each growing area that dictates what data is considered 'wet' and what data is considered 'dry'. The scenario used for this growing area was based on a wet/dry cutoff of 0.1 inch.

The effects of the 'first flush' should be captured by the '24 hours prior to sampling' *t*-statistics. *T*-statistics are also determined for the 'cumulative 48 hours prior to sampling' and the 'cumulative 72 hours prior to sampling'. These *t*-statistics help to determine if there is a delayed impact on the waterbody.

The Manasquan River seems to be heavily impacted by rainfall that accumulates to 0.1 inch or more within 48 hours prior to sampling. Stations with rain components showed a higher geometric mean during wet conditions as opposed to dry during all scenarios. It is particularly evident that rainfall triggers high levels in coliform, especially in the urban land use areas. The landuse surrounding the river is almost entirely urban and the river itself is very shallow, which effects the dilution of the potentially polluted runoff from rainfall.

Seasonal Effects



Temperature, precipitation, wind, and the general circulation of the atmosphere have seasonal variations that affect the marine environment (Ingmanson and Wallace, 1989). Seasonal variation may also be the result of a variety of conditions, including specific agricultural land-use practices, biological activity, stream flow and/or sediment. Statistically significant seasonal impacts were observed at forty-one of the stations in the Manasquan River (see adjacent figure).

The *t*-statistical probability must be less than 0.05 for a seasonal difference at that station to be considered significant. Summer includes the months of May through October and winter includes November through April. Summertime pressures are usually more likely to impact these waters because of such things as heavy boat travel and higher summer temperatures. 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. No changes in classification are needed solely as a result of these seasonal influences.

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, and bathing beach standards.

Nutrients

Coastal water quality is monitored for ecological health parameter including dissolved oxygen and total nitrogen. The parameters are evaluated, analyzed, and presented on the web at: www.nj.gov/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. The Bureau of Marine Water Monitoring and USEPA (United States Environmental Protection Agency) Region 2 conduct routine helicopter surveillance throughout the summer to determine the occurrence of species of marine phytoplankton that could produce biotoxins. BMWM, in accordance with the NSSP requirements, also analyzes the data. There is not a phytoplankton station in the vicinity of the Manasquan River, but for more information on the Phytoplankton reports visit the BMWM website, www.nj.gov/dep/bmw.

Bathing Beaches

WM&S cooperatively works with the New Jersey Department of Health and local health agencies to monitor the bathing beaches in New Jersey. Together, these agencies implement 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. Flights are scheduled for six days a week, weather permitting, during the summer months.

Typically, bathing beach samples are taken once a week for the entire summer. These samples are tested for Enterococci as a fecal coliform indicator. Ocean and bay recreational beaches are subject to opening and closing procedures of the State Sanitary Code. 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, 2009). Consecutive samples that exceed the standard require the closing of the beach until a sample is obtained that is within the standard. Environmental stations are not bathing beaches and do not require re-sampling. Beaches can also be closed at any time if health or enforcement agencies believe it is in the interest of public health. BMWM utilizes this 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 Assessment Program (NCA)

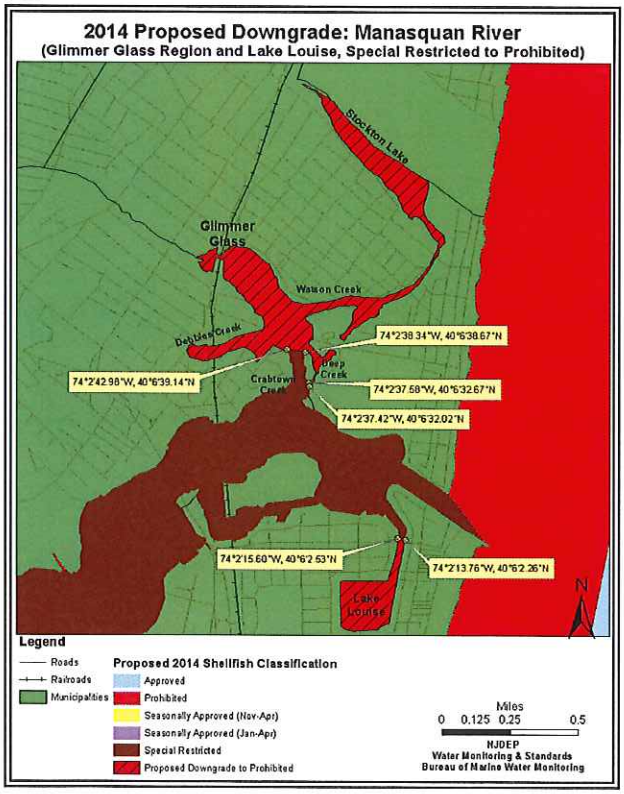
USEPA National Coastal Assessment EMAP and its partners began sampling in the coastal and estuarine water of the United States in 1990. Data collected include water column parameters, sediment chemistry & toxicity, benthic communities, and tissue contaminants. These data are collected once every five (5) years, as part of USEPA's National Aquatic Resource Surveys. Currently, there is no NCA data available for the January 1, 2009 to August 30, 2013 timeframe. Please see http://www.epa.gov/emap/nca/index.html 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. 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. There is a no mussel watch station in the Manasquan River. Please see http://ccma.nos.noaa.gov/about/coast/nsandt/musselwatch.aspx for further information and the most recent data.

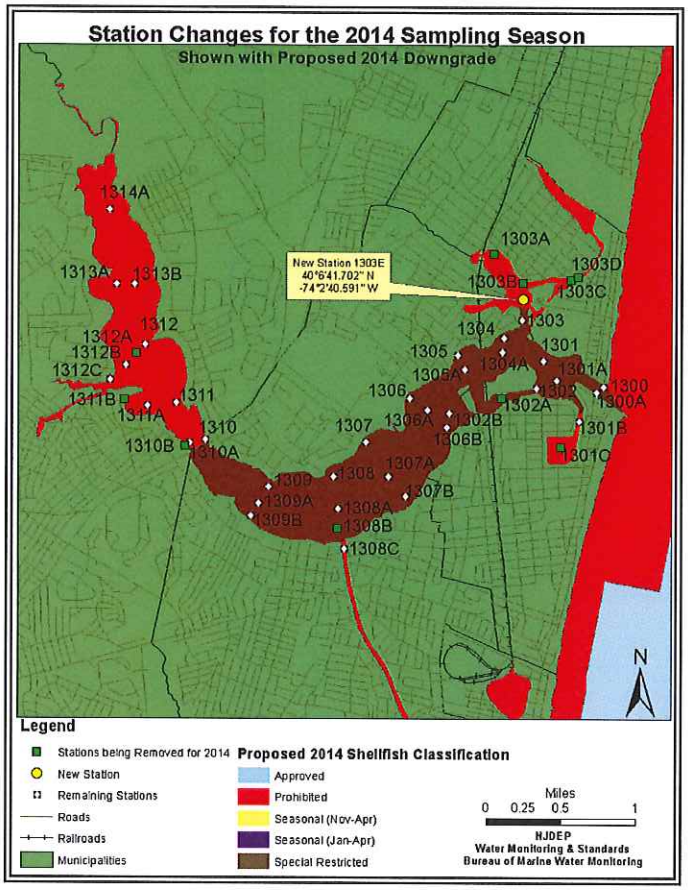
CONCLUSIONS & RECOMMEDATIONS

The appendix lists the water quality data obtained from the sampling period of January 1, 2009 to August 30, 2013. Systematic Random Sampling strategy was used to collect the samples, laboratory tests were run, and a thorough analysis of the fecal coliform data was assembled for this report. The bacteriological data for each station must support the respective criteria for the current classification under the fecal coliform standard. Based on the data, portions of this growing area are recommended for a downgrade. Fourteen stations exceeded the NSSP *Special Restricted* criteria; two are located in *Special Restricted* waters. Stations 1303A and 1303B are in the Glimmer Glass region of the Manasquan River. The Glimmer Glass region is a shallow area lined with private docks and marina boat slips. This area is hard to access for sample collection due to a low bridge. In 2014, 99.4 acres in the Glimmer Glass region, specifically, all or portions of Debbies Creek, the Glimmer Glass, Watson Creek, Stockton Lake, and Deep Creek are being downgraded from *Special Restricted* to *Prohibited* (see adjacent figure).



In addition, 24.2 acres in Lake Louise are being downgraded from a *Special Restricted* classification to a *Prohibited* classification (see figure on page 11). Lake Louise is lined with private docks; there is no chance of an upgrade to *Seasonally Approved* or *Approved*. The one station in Lake Louise, 1301C, is time consuming to retrieve. This area is more appropriately classified as *Prohibited*. No sampling is required in *Prohibited* waters, so station 1301C will be removed from the sampling regime.

It was recommended in the 2013 Annual Report on the Manasquan River to remove stations 1301C, 1302A, 1303A, 1303B, 1303C, 1303D, 1308B, 1310B, 1311B, & 1312A for the 2014 sampling season. Stations 1301C, 1303A, 1303B, 1303C, & 1303D are in the areas that are being recommended for a downgrade to *Prohibited* waters. NSSP sampling of is not required in *Prohibited* waters and due to a low bridge in the Glimmer Glass region stations 1303A, 1303B, 1303C, & 1303D are difficult to retrieve. The other stations are being recommended for deactivation because they are in close vicinity to other stations and/or the stations are hard to capture. This will save time for the boat captains and the laboratory, while not jeopardizing the sampling coverage. Otherwise, the recommendation is to continue the current sampling regimen; this area is currently sampled by one assignment run, collected 10 times a year, under the Systematic Random Sampling strategy.



Regulation Description

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

5. Manasquan River area (Note: A portion is also designated as a Special Restricted area. See N.J.A.C. 7:12-3):

i. All of the Point Pleasant Canal; and

ii. All of the waters of the Manasquan River and tributaries located north and west of the State Highway Route 70 bridge.

Proposed New Language for N.J.A.C. 7:12-2.1 Shellfish growing water classification--Prohibited

5. Manasquan River area (Note: A portion is also designated as a Special Restricted area. See N.J.A.C. 7:12-3):

i. All of the Point Pleasant Canal; and

ii. All of the waters of the Manasquan River and tributaries located north and west of the State Highway Route 70 bridge.

iii. All of the waters of The Glimmer Glass region north of a line starting at a point with coordinates of latitude 40 degrees 6 minutes 38.67 seconds N., longitude 74 degrees 2 minutes 38.34 seconds W then crossing Crabtown Creek to a point with coordinates of latitude 40 degrees 6 minutes 39.14 seconds N., longitude 74 degrees 2 minutes 42.98 seconds W, then following the shoreline of Debbies Creek, Glimmer Glass, Watson Creek, Stockton Lake, and Deep Creek to a point with coordinates of latitude 40 degrees 6 minutes 32.02 seconds N., longitude 74 degrees 2 minutes 37.42 seconds W then crossing Deep Creek to a point with coordinates of latitude 40 degrees 6 minutes 32.67 seconds N., longitude 74 degrees 2 minutes 37.58 seconds W, then following the western shoreline of a small unnamed island to its point of origin and terminating;

iv. All of the waters of Lake Louise located south of the northern side of the Broadway Bridge, specifically south of a line from a point with coordinates of latitude 40 degrees 6 minutes 2.53 seconds N., longitude 74 degrees 2 minutes 15.60 seconds W then crossing the Lake Louise channel in an easterly direction to a point with coordinates of latitude 40 degrees 6 minutes 2.26 seconds N., longitude 74 degrees 2 minutes 13.76 seconds W.

Existing Language in N.J.A.C 7:12-3.2 Shellfish growing waters that are classified as Special Restricted

5. All of Manasquan River and tributaries located south and east of the State Highway Route 70 bridge to its union with the Atlantic Ocean at the Manasquan Inlet (See N.J.A.C. 7:12-2).

Proposed New Language for N.J.A.C 7:12-3.2 Shellfish growing waters that are classified as Special Restricted

5. All of Manasquan River and tributaries located south and east of the State Highway Route 70 bridge to its union with the Atlantic Ocean at the Manasquan Inlet excluding Lake Louise and the Glimmer Glass region (Note: The Prohibited waters of Lake Louise and the Glimmer Glass region are described in *N.J.A.C. 7:12-2.1(a)*5.)

LITERATURE CITED

American Public Health Association (APHA). 1970. Recommended Procedures for the Examination of Seawater and Shellfish, 4th ed., American Public Health Association, Washington, DC.

American Public Health Association (APHA). 1995. Standard Methods for the Examination of Water and Wastewater, 19th ed., American Public Health Association, Washington, DC.

Ingmanson, D. and W. Wallace, 1989. Oceanography: An Introduction. Wadsworth Publishing Co., Belmont, CA.

Monmouth County Health Department (MCHD), 1990 The Manasquan River Watershed: A Trend Analysis Focusing on Impacts to Water Quality. Monmouth County Health Department. Freehold, NJ. Accessed 12 December 2009. http://njedl.rutgers.edu/njdlib/details.cfm?record_ID=3675&formKeyword=contaminated%20sites&formTitle=&formOriginator=&formThemekey=&formPlacekey=&formDoctype=&order=PublicationDate%20DESC&results_next=175

Monmouth County Park System. Manasquan Reservoir. Accessed February 27, 2013. http://www.monmouthcountyparks.com/page.aspx?Id=2531

National Oceanic and Atmospheric Administration (NOAA). Rainfall Data from station RA007. Accessed monthly. http://www.noaa.gov/

N.J.A.C. (New Jersey Administrative Code), Department of Environmental Protection. Chapter 7:12.
NJDEP Annual Report on Shellfish Growing Area NE5, Manasquan River, 2008, 2009, 2010, 2011, & 2012). Water Monitoring & Standards, Marine Water Monitoring, Leeds Point, NJ.

NJDEP Cooperative Coastal Monitoring Program (CCMP),. NJDEP. Water Monitoring & Standards, Marine Water Monitoring, Leeds Point, NJ.

NJDEP Division of Fish & Wildlife, 1986. Hard Clam Density in the Manasquan River. New Jersey Department of Environmental Protection, Division of Fish and Wildlife, Port Republic, NJ.

NJDEP. 2005. Field Sampling Procedures Manual. New Jersey Department of Environmental Protection, Trenton, NJ.

NJDEP Sanitary Survey of the Manasquan River, NE5, 2007. Water Monitoring & Standards, Marine Water Monitoring, Leeds Point, NJ.

NJDEP Shellfish Growing Area Report Guidance Document, 2012. New Jersey Department of Environmental Protection, Marine Water Monitoring, Leeds Point, NJ.

NJDEP State of New Jersey Shellfish Growing Water Classification Charts. 2008, 2009, 2011, & 2012. New Jersey Department of Environmental Protection, Marine Water Monitoring, Leeds Point, NJ.

New Jersey Water Supply Authority. Preservation of Critical Areas in the Manasquan River Watershed. September 2005. Accessed November 4, 2009. http://www.manasquanriver.org/

NSSP, 2009 Revision. National Shellfish Sanitation Program. Guide for the Control of Molluscan Shellfish. Model Ordinance. Interstate Shellfish Sanitation Conference. US Public Health Service, Food and Drug Administration, Washington, DC

Ocean County Utilities Authority (OCUA) North Plant Information. Accessed February 27, 2013. http://www.ocua.com/North.html

South Monmouth Regional Sewage Authority (SMRSA). Accessed February 27, 2013. http://www.smrsa.org/

United States Environmental Protection Agency, 1998. 'New Jersey State Prohibition on Marine Discharges of Vessel Sewage; Final Affirmative Determination.' 5 June 1998 (Volume 63, Number 108). 20 June 2003. http://www.epa.com

United States Environmental Protection Agency. June 15, 1998. Volume 63: Number 108. Visit Monmouth County. 19 June 2003.
http://www.visitmonmouth.com/healthbackup/import/man_nd~1.pdf

U.S. Geological Survey. National Hydrography Dataset high-resolution flowline data. The National Map, accessed April 1, 2011.

APPENDICES

A. Statistical Summary

B. Seasonal Evaluation

C. Precipitation (Rainfall Amount and Wet/Dry Statistics)

D. Data Listing: January 1, 2009 to August 30, 2013

E. Marina Map Key

F. Shoreline Survey Reports