NJ Department of Environmental Protection
Water Monitoring and Standards

Reappraisal Report of Shellfish Classification for Growing Area SE4 Corsons Sound and Corsons Inlet

May 2016

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

NJ Department of Environmental Protection
Bob Martin, Commissioner

Reappraisal Report of Shellfish Classification for Growing Area SE4 Corsons Sound and Corsons Inlet

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Cover Photo – Blue Water Marina at 600 Whelk Drive, Ocean City, near Crook Horn Creek.

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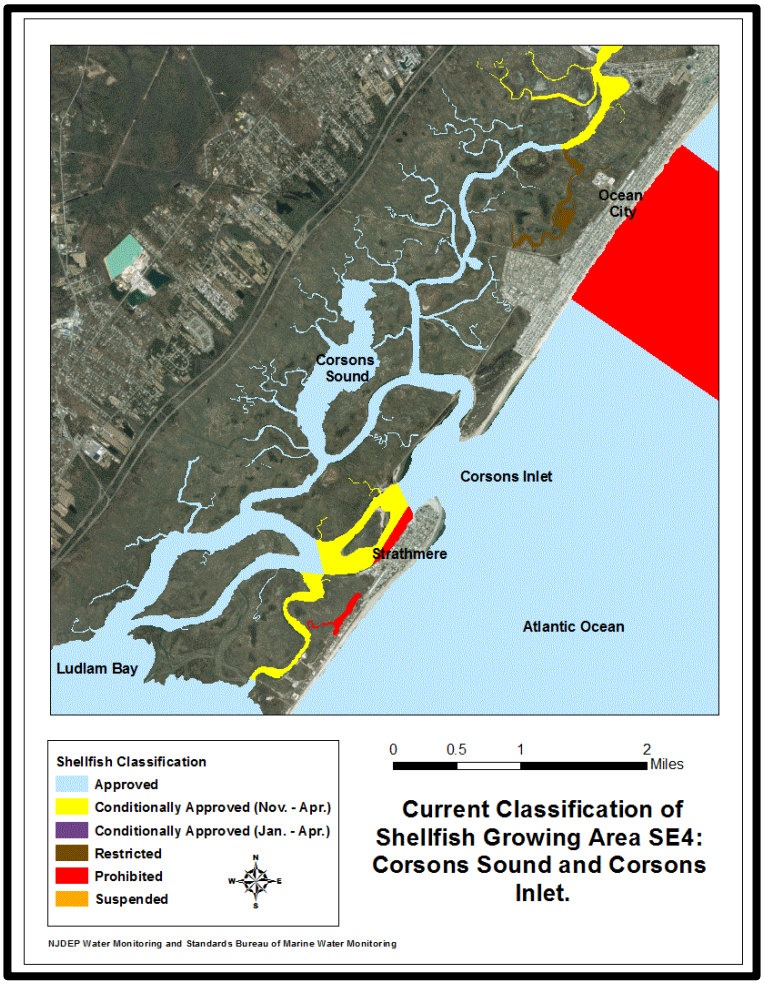
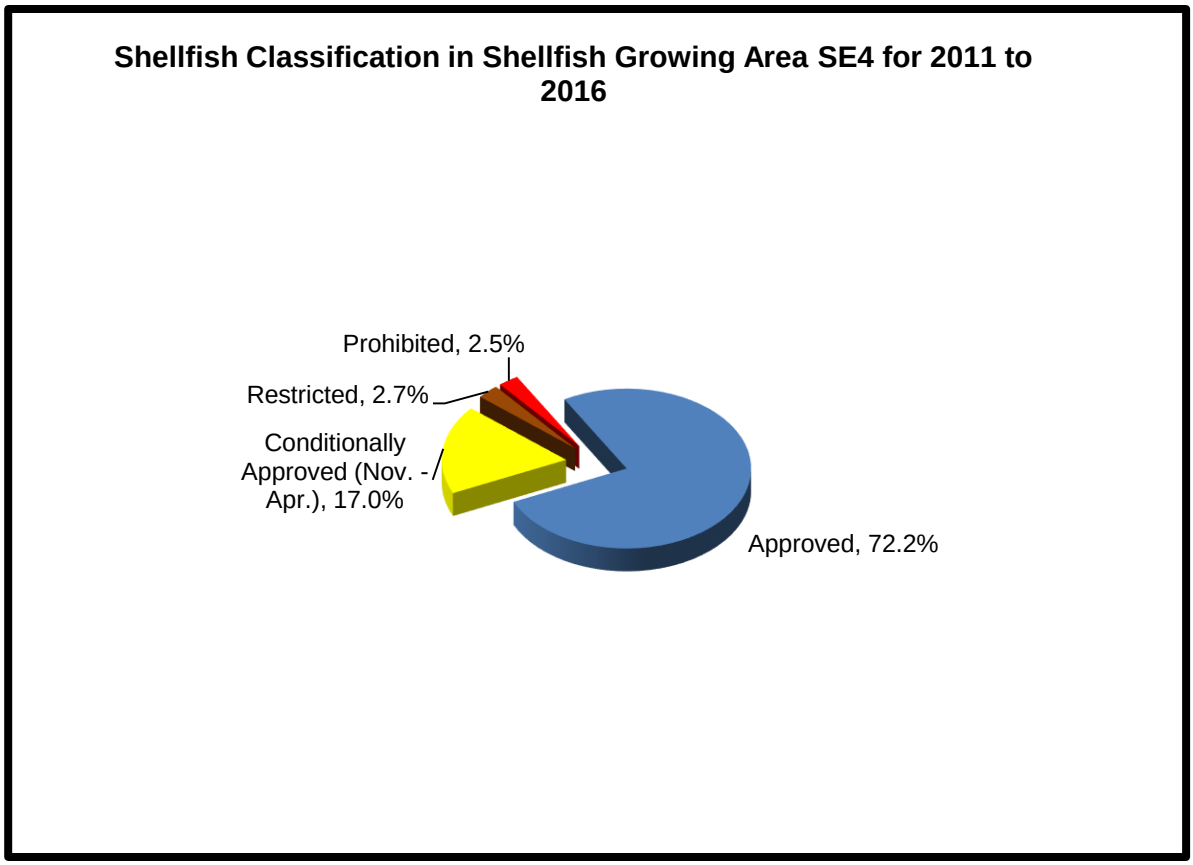
EXECUTIVE SUMMARY

Shellfish Growing Area SE4, Corsons Sound and Corsons Inlet, is a shellfish growing area located south of Ocean City and north of Sea Isle City in the southeastern part of New Jersey. The water quality data presented in this Reappraisal of Shellfish Growing Area SE4 were collected between January 2011 and May 2016. This shellfish growing area is sampled using the Systematic Random Sampling strategy. According to NSSP sampling criteria, only 8 water samples are needed for each sampling station (49 stations sampled, 44 stations in Assignment 235 and 5 stations in Assignment 247) per year. The approximate size of this shellfish growing area is 1,408 acres, and the shellfish classifications for this growing area are *Approved, Conditionally Approved (November to April), Restricted,* and *Prohibited* for shellfish harvesting (as seen in the figure to the right). All but one of the sampling stations (Sampling Station **3109A**) was in compliance with the fecal coliform criteria for the existing classifications of this shellfish growing area, as specified by the National Shellfish Sanitation Program (NSSP). Sampling station **3109A** is located in Main Channel west of Strathmere in *Approved* shellfish waters and exceeded the *Approved* classification year-round and during the summer. However, there are other sampling stations next to this station that meet the existing *Approved* shellfish classification. Therefore, no classification changes are recommended for this shellfish growing area and Sampling Station **3109A** will be closely monitored during shoreline surveys of this area. There were no observed changes to pollution sources of this area as documented in the shoreline survey included in this report.





DESCRIPTION OF GROWING AREA

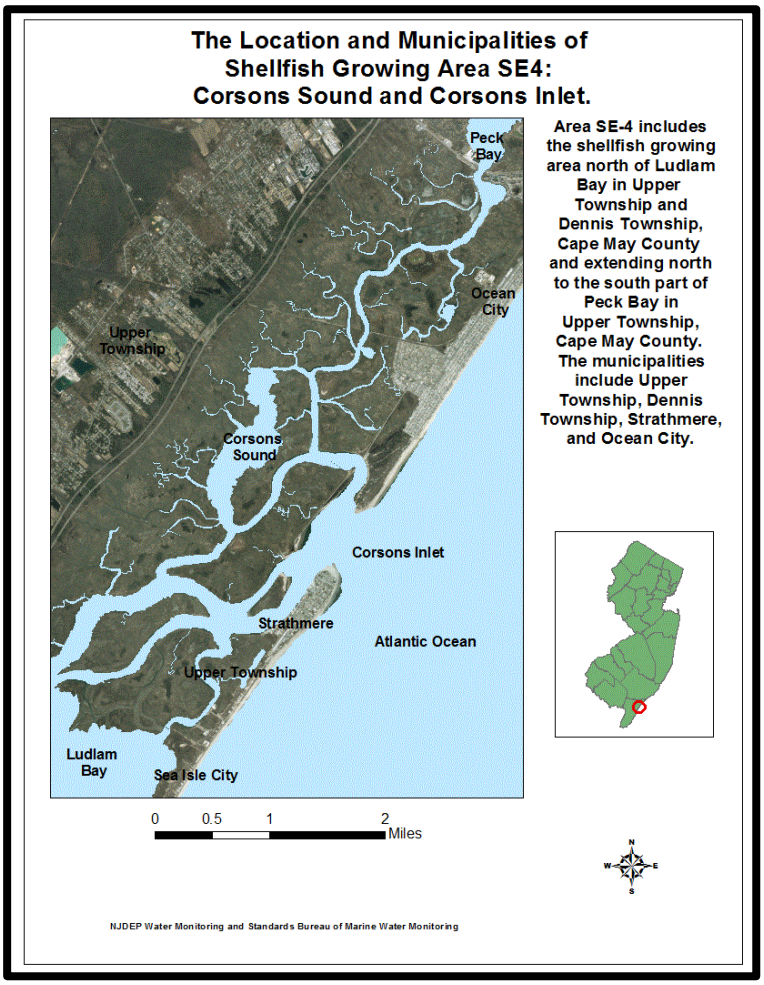
Location & Description

Shellfish Growing Area SE4: Corsons Sound and Corsons Inlet is located south of Ocean City and north of Sea Isle City in the southeastern part of New Jersey, Cape May County (see figure on next page). Upper Township is located to the west and northwest, Dennis Township is located to the southwest, Strathmere is located to the southeast and Ocean City is located to the east and northeast of this shellfish growing area.

The shellfish classification of the waters in this growing area are *Approved, Conditionally Approved (November to April), Restricted, and Prohibited* and the approximate size of this shellfish growing area is 1,408 acres.

The municipalities adjacent to this shellfish growing area include Upper Township and Dennis Township to the west and Ocean City and Strathmere to the east in Cape May County. The locations of these municipalities are shown in the figure below.

In Cape May County, this shellfish growing area drains through Corsons Inlet. This area can be found on Charts 14 and 15 of the "2015 State of New Jersey – Shellfish Growing Water Classification Charts" (NJDEP, 2015). The figure on the next page shows the current classification of this shellfish growing area.



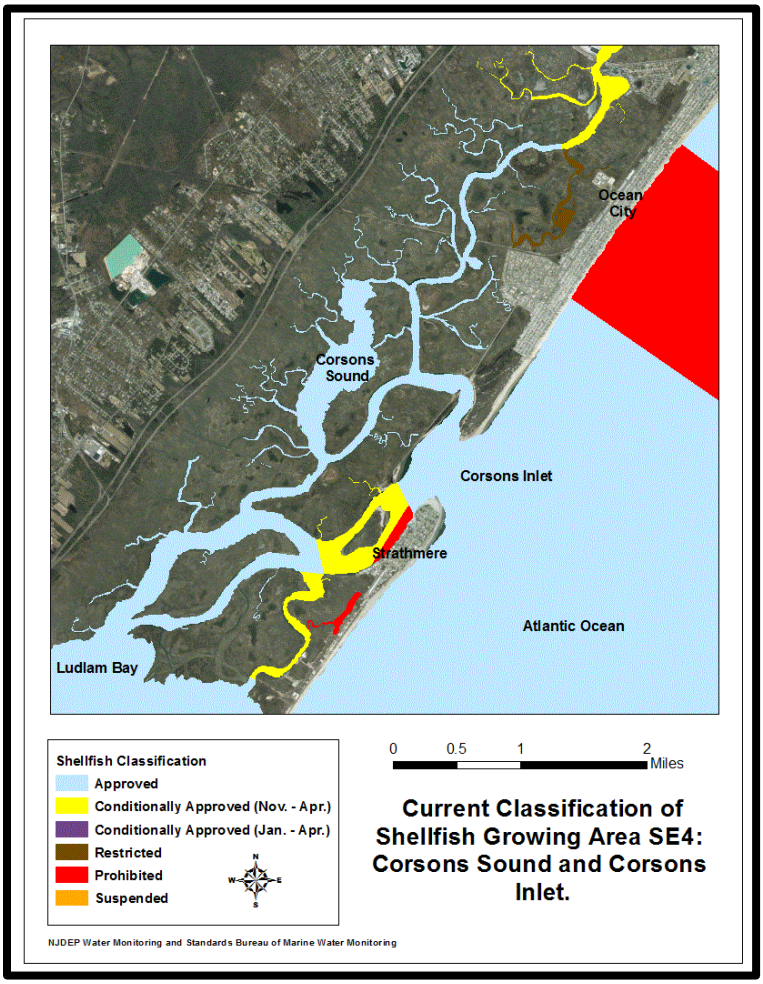
Growing Area Classification

The shellfish waters of this area are primarily classified as *Approved, Conditionally Approved (November-April), Restricted,* and *Prohibited* (NJDEP, 2015). The *Approved* classification applies to the waters of the middle and south part of Crook Horn Creek,Corson Sound, Edward Creek, Beach Creek, Devils Thorofare, Weakfish Creek, Corsons Inlet, the middle and south part of Middle Thorofare, the north part of Strathmere Bay, Ben Hands Thorofare, Mill Creek, Marshalls Creek, Main Channel, Flat Creek, Burroughs Hole, and Ludlam Bay. The *Conditionally Approved (November-April)* classification applies to the waters of Peck Bay, the north part of Crook Horn Creek, the north part of Main Thorofare, the middle and south part of Strathmere Bay, and Whale Creek. The *Restricted* classification applies to the waters of Upland Thorofare, Run Creek, and Beach Creek (the north extension that intersects with Crook Horn Creek). The *Prohibited* classification applies to the waters of the east side of Strathmere Bay, and to the creek extending east from Whale Creek, southwest of Strathmere. The *Restricted* classification signifies that it is prohibited to harvest shellfish from these waters for direct market, unless a special permit is issued which is in compliance with the State of New Jersey's depuration programs.

In 2010, approximately 110 acres of Crook Horn Creek were upgraded by Julie Nguyen from the *Seasonally Approved (November-April)* to the *Approved* shellfish classification.

In the 2012 Annual Review of SE4, written by Julie Nguyen using water quality data from 2008 to 2012, approximately 74.9 acres of the north part of Crook Horn Creek were upgraded from the Special Restricted to the Seasonally Approved (November to April) shellfish classification.

A Reappraisal Report for Shellfish Growing Area SE4, Corsons Sound and Corsons Inlet, was written in March 2013 and included water quality data from 2008 to 2013. In this report, all of the sampling stations in this shellfish growing area met the shellfish classification for the fecal coliform mTEC criteria, and no classification change was recommended for this area at that time.



In the 2014 Annual Review of Shellfish Growing Area SE4: Corsons Sound and Corsons Inlet, using water quality data from 2009 to 2014, no classification change was proposed for this area. However, 40 sampling stations showed a seasonal component for water quality, and seven (7) sampling stations showed a significant rainfall component for water quality at 48 hours cumulative. All of the 50 sampling stations met the NSSP classification criteria, year-round, during the summer, and during the winter.

The 2015 Annual Review of Shellfish Growing Area SE4: Corsons Sound and Corsons Inlet, using water quality data from 2010 to 2015, proposed no classification change or upgrade to this area at that time. However, 40 sampling stations showed a seasonal component for water quality, and four (4) sampling stations showed a significant rainfall component for water quality at 24 hours cumulative. All of the 50 sampling stations met the NSSP classification criteria on a year-round and seasonal basis. The last Sanitary Survey for this area was written in 2008.

Evaluation of Biological Resources

This growing area has a wide diversity of biological resources. Hard clams (*Mercenaria Mercenaria*) exist in high and medium abundance, and are privately and commercially harvested. Blue crabs (*Callinectes sapidus*) are also harvested in this shellfish growing area. Crook Horn Creek, Corsons Sound, Middle Thorofare, Strathmere Bay, Ben Hands Thorofare, Main Channel, Flat Creek, Whale Creek, Ludlam Bay, and Corsons Inlet are also utilized for fishing, clamming, crabbing, and boating. Striped bass, bluefish, eels, summer flounder (fluke), weakfish, and other species of fish are caught in this shellfish growing area. The first table on the next page shows the total New Jersey hard clam landings data from 2011 to 2015. Shellfish landings statistics had not been verified and posted for 2014 or 2015 at the time this reappraisal report was written.

The second table on the next page shows the total New Jersey shellfish landings data from 2011 to 2015 (NMFS, 2016). Shellfish landing statistics had not been verified and posted for 2015 at the time this reappraisal report was written. These shellfish species include blue crabs (*Callinectes sapidus*), blue crabs – peelers, hard clams (*Mercenaria mercenaria*), blue mussels (*Mytilus edulis*), bay scallops (*Aequipecten irradians*), oysters (*Crassostrea virginica*), ocean quahogs (*Arctica islandica*), surf clams (*Spisula solidissima*), and sea scallops (*Placopecten magellanicus*) (Morris, 1975, Gosner, 1978). However, this report primarily focuses on bivalve mollusks, such as clams, quahogs, oysters, and mussels, and does not include crustaceans, such as blue crabs.

Many species of animals and vegetation can be found in the marshes of this shellfish growing area. Corson's Inlet State Park, which is located on the north shore of Corson's Inlet, also has many species of animals and plants, including sea birds, waterfowl, salt-tolerant grasses, muskrats, field mice, turtles, etc. Wildlife populations of birds and animals are actual contributors of water quality in north Crook Horn Creek, and possible contributors of water quality in Strathmere Bay and Corsons Inlet.

New Jersey Hard Clam Landings - 2011 to 2015 (NMFS, 2016).

NEW JERSEY HARD CLAM LANDINGS 2011 to 2015		
YEAR	POUNDS OF MEAT (millions)	$ VALUE (exvessel)
2011	14,831,350	$9,033,694
2012	18,408,860	$13,100,352
2013	17,231,460	$12,044,144
2014	*	*
2015	*	*

***No Data**

New Jersey Shellfish Landings - 2011 to 2015 (NMFS, 2016).

NEW JERSEY SHELLFISH LANDINGS 2011 to 2015		
YEAR	POUNDS OF MEAT (millions)	$ VALUE (exvessel)
2011	65,434,503	$177,412,023
2012	57,693,336	$146,022,490
2013	45,992,234	$96,264,744
2014	55,569,046	$120,369,860
2015	*	*

***No Data**

SHORELINE SURVEY: EVALUATION OF POTENTIAL POLLUTION SOURCES

Shoreline Survey

A shoreline survey was conducted for this shellfish growing area on June 22, 2016. On this date, it was observed that the businesses (Vaughan's Farm Market and Yesterday's Restaurant) on the south side of Roosevelt Boulevard in Upper Township were all on septic and there was no evidence (sewage on surface of ground, odors, etc.) of septic system failures. The septic systems were located with GPS and photographs were taken. Stormwater drains and outfalls not on the ArcGIS stormwater outfall layer/ theme were also located with GPS and photographs were taken. There were no changes observed to All-Seasons Marina in Upper Township or Blue Water Marina in Ocean City. A stormwater outfall and pump station near the south corner of Westminster and Waterview Boulevards in Ocean City was located with GPS and photographs were taken of the location. Another stormwater pump station near the corner of Oxford and Somerset Boulevards in Ocean City was located with GPS and photographs were taken of the location.

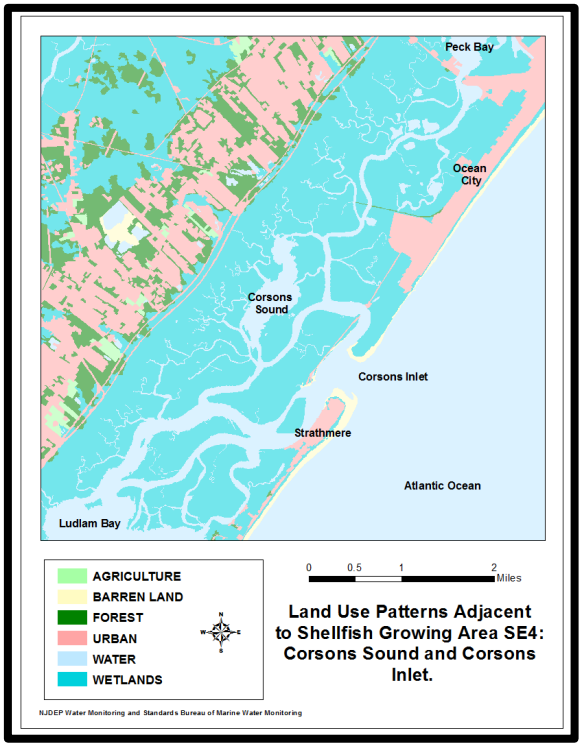
An osprey in its nest was observed in the marsh behind Vaughan's Farm Market and laughing gulls were observed near trash cans behind Yesterday's Restaurant south of Roosevelt Boulevard in Upper Township. Two (2) diamondback terrapins were observed on the street near the corner of Westminster and Waterview Boulevards in Ocean City.

Photographs were taken of some of the stormwater outfalls along the west side of Ocean City that drain into the creeks and bays behind Ocean City. Photographs were taken of the Ocean City Wastewater Treatment Facility at the west end of 45th Street in Ocean City. I contacted Jason Lynch, superintendent of the Ocean City Wastewater Treatment Facility, and Tom LaRocco, engineer of the facility, and received the site names, the addresses, and the latitude and longitude coordinates for the 4 sewage pump stations of the wastewater treatment facility in Ocean City. Of these four sewage pump stations servicing this wastewater treatment facility, the pump station located at 46th Street & Simpson Avenue in Ocean City is the only sewage pump station in this shellfish growing area.

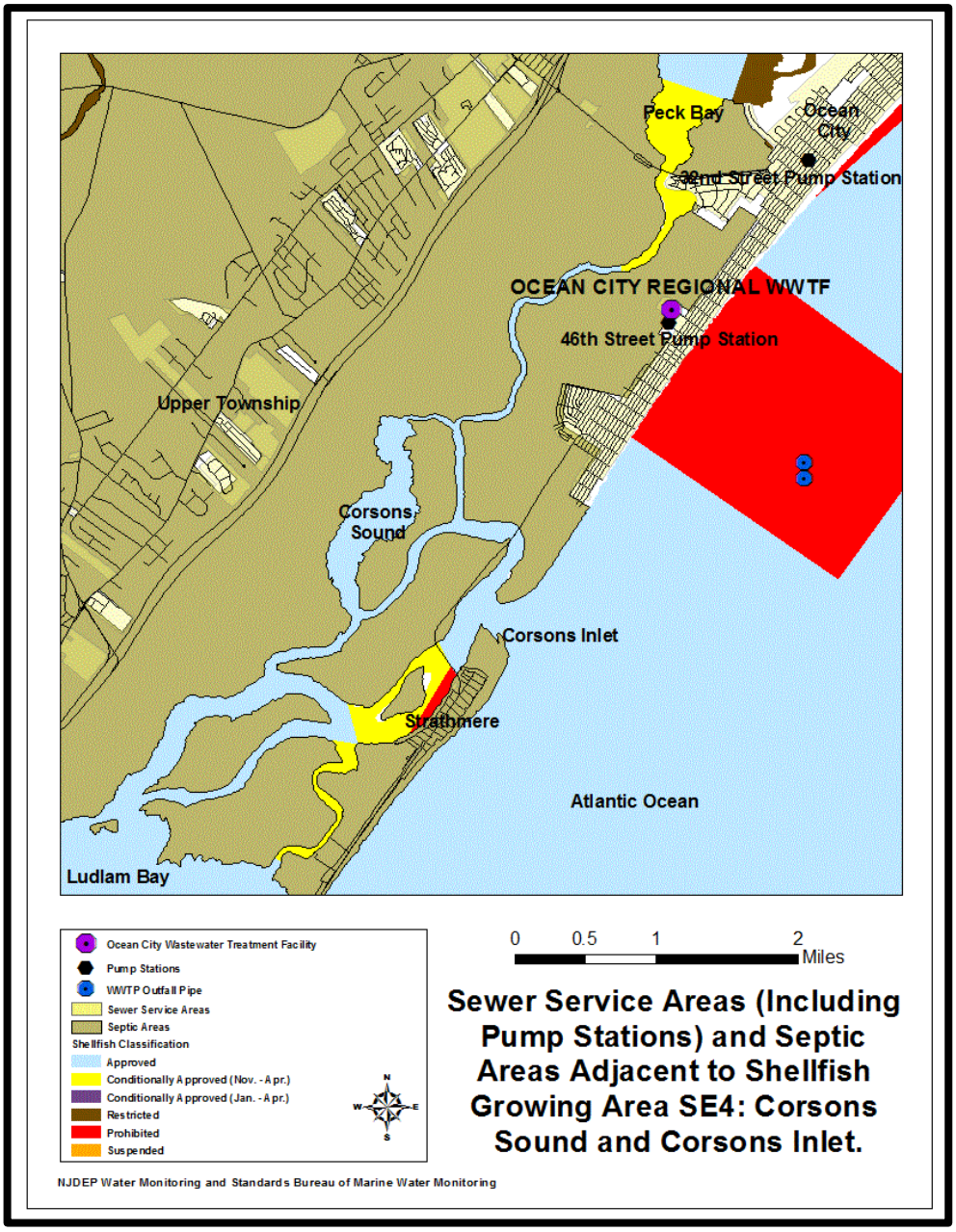
Mounded and subsurface septic systems (and what appeared to be septic holding tanks) were observed at some of the homes along Ocean Drive going through Strathmere. The Ocean Beach Trailer Resort near the corner of Prescott Drive and Commonwealth Drive in Strathmere had many seasonal trailers at the resort. I spoke to Linda Wilde of the Cape May County Department of Environmental Health and she told me that the Ocean Beach Trailer Resort has its own septic system and the seasonal trailers discharge into that system, which is sized to receive 18,000 gallons per day of flow. She also told me that all of Strathmere is still on septic systems, that there are no septic holding tanks in Strathmere, and the August 1981 proposal to connect Strathmere to the Seven Mile Beach/Middle Wastewater Treatment Facility via a sewer line through the Whale Beach area has still not happened.

Land Use

Much of this area is a resort area bordered by an extensively urbanized area to the east, and tidal wetlands to the west. The urban areas to the east are resort areas (Ocean City, Strathmere, and Sea Isle City) with significant boating and water activities during the summer. There are currently five marinas in this area. The wetlands to the west of the growing area act as a buffer for the communities on the western side of the bay. However, Devauls Creek crosses the Garden State Parkway into these communities, and is upstream of this shellfish growing area (Ludlam Bay). Since some of these communities are still on septic systems, there is a potential for pollution inputs into these shellfish growing waters. However, there is no evidence that they currently impact this area.

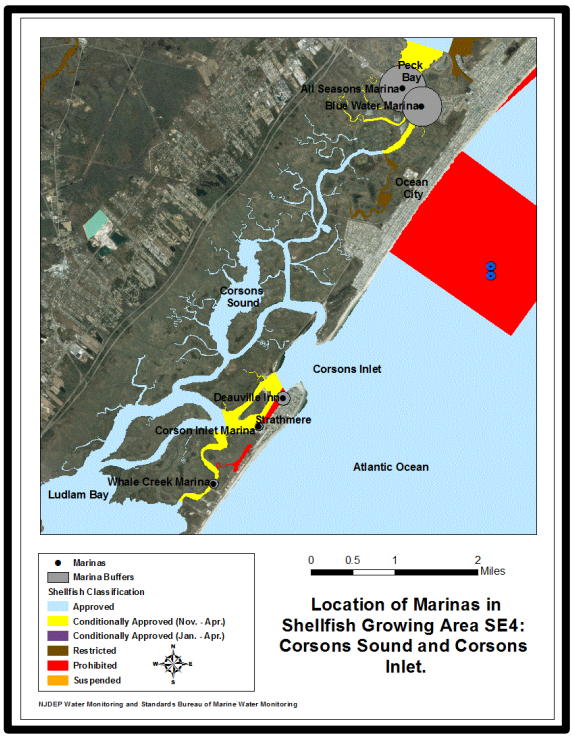


The area immediately west of the Garden State Parkway is part of the Pinelands Comprehensive Management Plan, and is listed as a Regional Growth Area. According to the New Jersey Pinelands Commission, a Regional Growth Area is "an area that can accommodate existing and future growth while protecting the essential character and environment of the pinelands". The Pinelands Comprehensive Management Plan permits from 1.5 to 5.25 dwelling units per developable acre of land. There is little or no livestock farming in this area. The Corsons Inlet State Park is also located on the north shore of Corsons Inlet, and many species of animals and plants can be found in the park.


Peck Bay
Ocean City
39nd Street Pump Station
OCEAN CITY REGIONAL WWTF
46th Street Pump Station
Upper Township
Corsons Sound
Corsons Inlet
Strathmere
Atlantic Ocean
Ludlam Bay
Ocean City Wastewater Treatment Facility
Pump Stations
WWTP Outfall Pipe
Sewer Service Areas
Septic Areas
Shellfish Classification
Approved
Conditionally Approved (Nov. - Apr.)
Conditionally Approved (Jan. - Apr.)
Restricted
Prohibited
Suspended
N
W
E
S
0
0.5
1
2
Miles
Sewer Service Areas (Including Pump Stations) and Septic Areas Adjacent to Shellfish Growing Area SE4: Corsons Sound and Corsons Inlet.
NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring

Marinas

Marina facilities have the potential to affect the suitability of shellfish growing areas for the harvest of shellfish. The biological and chemical contamination associated with marina facilities can be of public health significance. The discharge of sewage from vessels into the waterways can contribute to the degradation of the marine environment by introducing disease-causing microorganisms (pathogens), such as bacteria, protozoan, and viruses into the marine environment. In addition, sewage released in the vicinity of shellfish beds poses a public health problem. Because shellfish are filter feeders, they concentrate the pathogens in their tissue, thereby causing the shellfish to be unsafe for human consumption. The most notable diseases potentially transmitted by the ingestion of shellfish contaminated with the pathogens are gastroenteritis, dysentery, infectious hepatitis, and typhoid fever. Chemical compounds, such as oil and gasoline resulting from spills or leaks from vessels, can poison fish and other marine organisms. Research has shown that by-products from the biological breakdown of petroleum products can harm fish and wildlife and pose threats to human health if ingested.



In this growing area, there are five known marinas. The table on the next page lists the facility name and the number of boat slips that are available at each facility. The location of these facilities can be found on the figure above. The waters enclosed by the marina (the marina basin) are classified as *Prohibited*. Depending on the size of the marina, the water quality, flushing rates, and the depth of the water, shellfish waters immediately adjacent to each marina may be classified as *Prohibited*, *Restricted*, or *Conditionally Approved* (no harvest during summer months when the marina is normally active).

NJDEP has implemented the New Jersey Clean Marina Program. This program aims to protect waters from being polluted by marina activities. This is a volunteer based program for marinas. The program provides assistance and guidance to marina owners as well as boaters on ways to reduce pollution, including sewage facility management, fueling operations, fish and solid waste management and boat cleaning. Currently, there are only a small percentage of marinas in the state that participate in this program. A list of marinas that are certified and/or have pledged under this program are listed on the New Jersey Clean Marina Program website (www.njcleanmarina.org).

Within this growing area, two marinas were found to be members of the New Jersey Clean Marina Program. The Blue Water Marina and All Seasons Marina are not yet certified, but have pledged to identify opportunities to fix and/or implement new practices to control pollution associated with activities occurring at the marinas.

Map Key	Marina Name	Location	# of Wet Slips Total / Boats > 24 ft.	*Size of Buffer Area* (radius; feet)	Depth (ft)	Pumpout Facility
1	All Seasons Marina	Upper Township	217/132	3,262	2	Yes
2	Blue Water Marina	Ocean City	155/98	924	2	No
3	Deauville Inn Dock	Upper Township	12/12	401	6	No
4	Corsons Inlet Marina	Upper Township	25/25	578	6	No
5	Whale Creek Marina	Upper Township	62/0	100	6	No

Spills, Unpermitted Discharges, and Closures

There were no spill reports in the spills database from January 2011 to May 2016 for Shellfish Growing Area SE4: the Corsons Sound and Corsons Inlet area.

On August 26, 2011, the State of New Jersey Department of Environmental Protection put into effect a precautionary closure for all shellfish waters in New Jersey due to the approach of Hurricane Irene 'to assure that the public health is not imperiled by the consumption of shellfish that may be subject to pollution or to any other conditions which may render shellfish dangerous.' All shellfish waters in this shellfish growing area were closed to shellfish harvesting. On September 8, 2011, except for a portion of the Delaware Bay north of a line from Beadon Point to the Cross Ledge abandoned lighthouse, all of the rest of the shellfish waters in New Jersey were reopened, and the shellfish waters in this shellfish growing area were then reopened for harvesting.

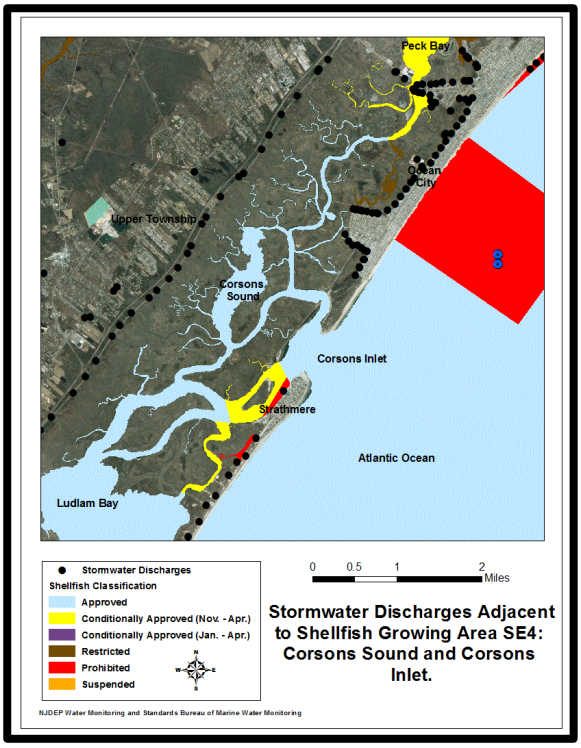
On October 29, 2012, the State of New Jersey Department of Environmental Protection put into effect a precautionary closure for all shellfish waters in New Jersey due to the approach of Hurricane Sandy 'to assure that the public health is not imperiled by the consumption of shellfish that may be subject to pollution or to any other conditions which may render shellfish dangerous.' All shellfish waters in this shellfish growing area were closed to shellfish harvesting. On November 15, 2012, all of the New Jersey shellfish waters of Atlantic and Cape May Counties from Little Egg Inlet to Cape May Point were reopened, and the shellfish waters in this shellfish growing area were then reopened for harvesting.

On October 2, 2015, the State of New Jersey Department of Environmental Protection put into effect a precautionary closure for all shellfish waters in New Jersey due to the approach of a nor'easter predicted to impact the State from October 2 through 4, 2015 'to assure that the public health is not imperiled by the consumption of shellfish that may be subject to pollution or to any other conditions which may render shellfish dangerous.' All shellfish waters in this shellfish growing area were closed to shellfish harvesting. On October 5, 2015, 'the Department returned all waters of the State to their prior classification and opened them to all shellfish harvesting in accordance with their classification.'

There were no emergency closures of shellfish waters in area SE4 due to spills or unpermitted discharges for the time period from January 2011 to May 2016.

Stormwater Discharges

Stormwater runoff is generated when precipitation from rain and snowmelt flows over land or impervious surfaces and does not percolate into the ground. As the runoff flows over the land or impervious surfaces (paved streets, parking lots, and building rooftops), it accumulates debris, chemicals, sediment or other pollutants that could adversely affect water quality if the discharge is untreated. runoff The typical pollutants that are associated with stormwater run-off are bacterial, heavy metals, pesticides, herbicides, chlorides, petroleum, and nutrients. (NJStormwater.Org) Most of the stormwater outfalls within this growing area are near residential and urbanized districts. There are over 100 outfalls which discharge into this shellfish growing area and these outfalls have the potential to impact the water quality of this area. The bulk of these outfalls are in Upper Township, Ocean City, and Strathmere.



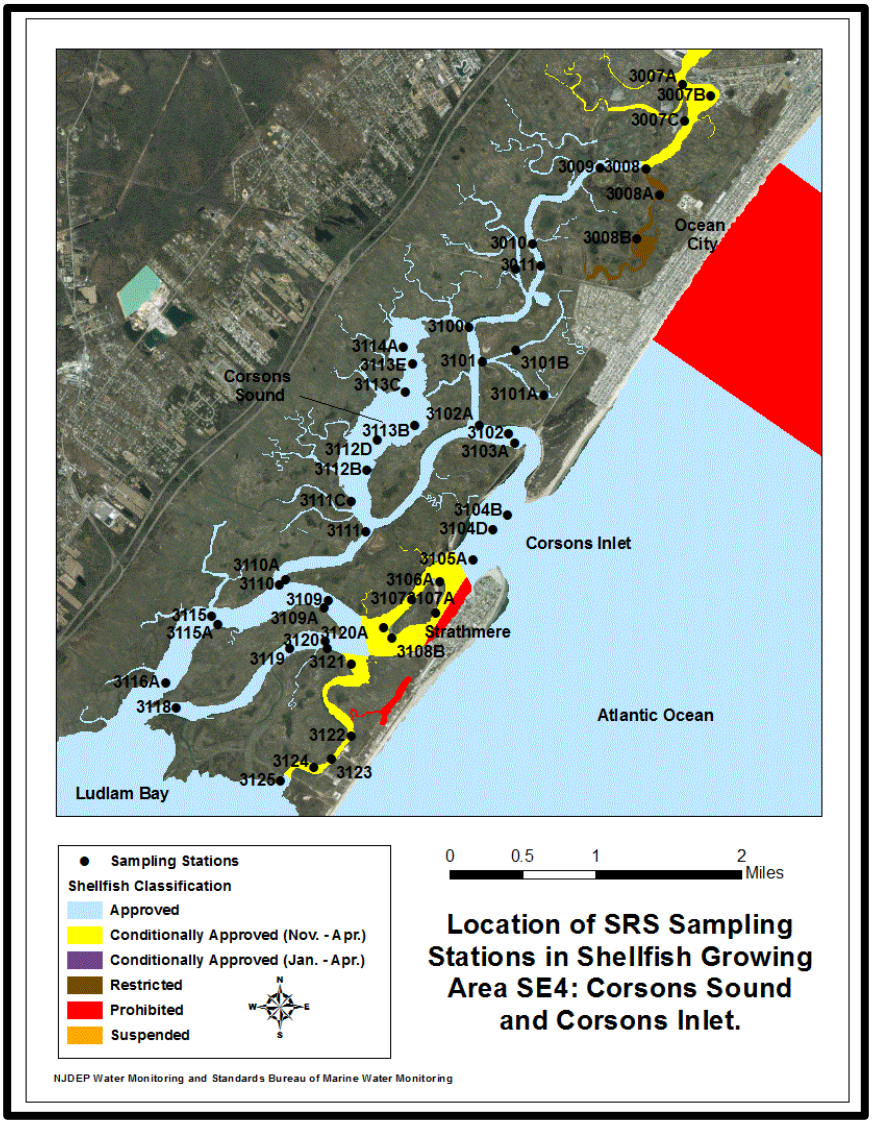
These outfalls usually discharge to nearby creeks and lagoon systems. For this reason, shellfish harvesting is condemned in all lagoon system.

WATER QUALITIES 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 *Shellfish Growing Area Report Guidance Document, 2007.* This shellfish growing area is not impacted by discharges from sewage treatment facilities or combined sewer overflows. Therefore, it was sampled using the Systematic Random Sampling (SRS) strategy.

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 2005). From 2011 through 2016, approximately 1,639 water samples were collected for fecal coliform bacteria from 49 monitoring stations. The locations of these stations are shown in the map below. These samples were analyzed by using the fecal coliform mTEC method (APHA, 1970). Water quality sampling, shoreline and watershed surveys were conducted in accordance with the NSSP *Guide for the Control of Molluscan Shellfish,* Revision 2013. Data management and analysis was accomplished using database applications developed for the Bureau. Mapping of pollution data was performed with the Geographic Information System (GIS: ARC map).

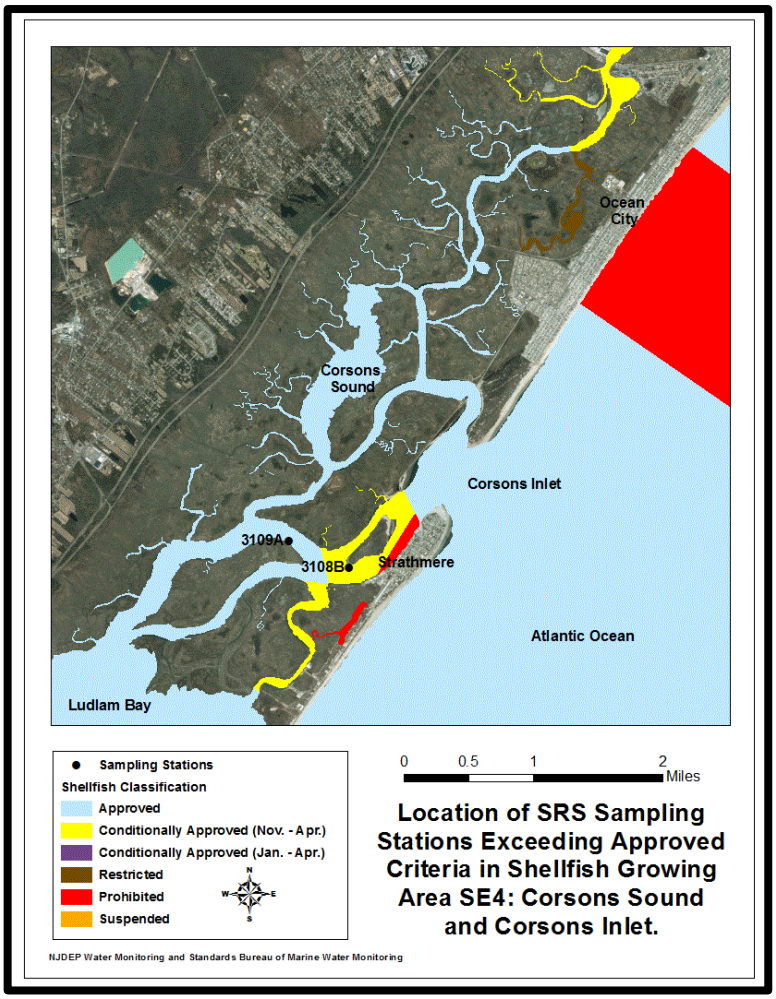


Bacteriological Quality

This report includes data analyzed from January 2011 to May 2016. This shellfish growing area is composed of two assignment areas, Assignment 235 (Corsons Sound and Corsons Inlet) which has 44 of 49 sampling stations in this growing area and Assignment 247 (Ludlam Bay and Townsends Sound) which has 5 of 48 sampling stations in this growing area. This shellfish growing area is sampled using the fecal coliform mTEC Systematic Random Sampling (SRS) strategy year-round. The preceding figure shows all of the sampling stations for this area. The raw data listings for each sampling station, in accordance with the National Shellfish Sanitation Program (NSSP), are attached to the end of this report.

Compliance with NSSP SRS Criteria

Two of the sampling stations in this shellfish growing area exceeded the *Approved* shellfish classification criteria (see the figure on this page). Sampling station 3108B and 3109A exceeded the *Approved* classification year-round and in the summer. Sampling station 3108B is located in the *Conditionally Approved (November to April)* waters of Strathmere Bay, west of Strathmere, and sampling station 3109A is located in the *Approved* waters of Main Channel, west of Strathmere. Only sampling station 3109A exceeded the existing shellfish classification criteria for these shellfish waters. For sampling station 3109A, the year-round geometric mean was 6.8 MPN and the year-round estimated 90th percentile was 41.0 MPN, respectively. During the summer, the geometric mean was 16.6 MPN and the estimated 90th percentile was 93.3 MPN, respectively. This station failed to meet the estimated 90th percentile year-round, and the geometric mean and estimated 90th percentile during the summer. From the seasonal and rainfall evaluation, this station was shown to be impacted by a seasonal component during the summer but had no rainfall component at all. This trend of high fecal coliform results during the summer has only recently been seen. Historically, fecal coliform results at this station have been low, and this station has had no rainfall component at all. The high fecal coliform results during the summer could possibly be due to the activities of birds in the waters and marshes of this area or the fishing and boating activities from the summer tourism industry in the Ocean City area. Sampling station 3109A is located next to sampling station 3109 in Main Channel and sampling station 3109 meets the existing *Approved* shellfish classification. Other than Sampling Station 3109A, the overall water quality for this growing area is good. Therefore, no classification changes are recommended for this shellfish growing area and sampling station 3109A will be closely monitored during shoreline surveys of this area. Some of the sampling stations in this growing area are located in shellfish waters which could possibly be impacted by potential sources of pollution, such as failing septic system in Strathmere, the activities in and around the marinas, and the

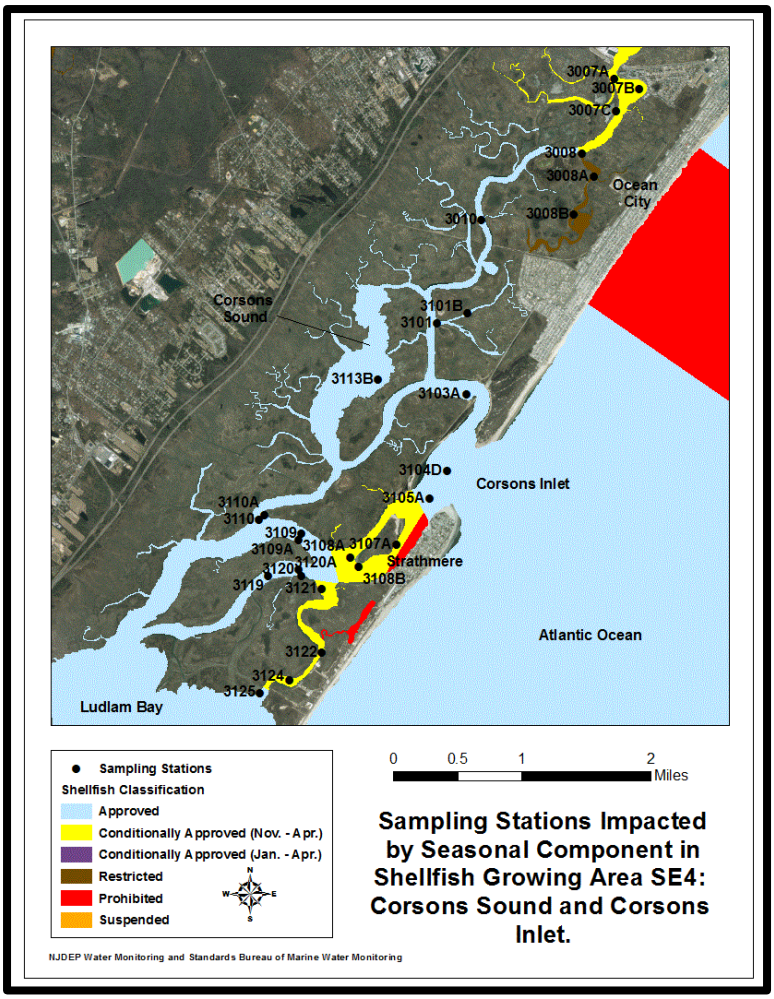


stormwater released from the stormwater outfall pipes into the waters of this area and these shellfish waters are classified accordingly. Except for Sampling Station 3109A, there were no water samples collected at these sampling stations that exceeded the NSSP shellfish classification criteria for water quality in the *Approved, Conditionally Approved (November-April), Conditionally Approved (January-April), Restricted,* and *Prohibited* waters of this shellfish growing area.

Seasonal Effects

As the earth experiences variations in the tilt of its axis and its revolution around the sun, it goes through seasonal phases of summer, spring, autumn, and winter. These seasonal phases cause much variation in the atmosphere of the earth, resulting in changes in weather patterns. Temperature, precipitation, wind, and the general circulation of the atmosphere have seasonal variations that also 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.

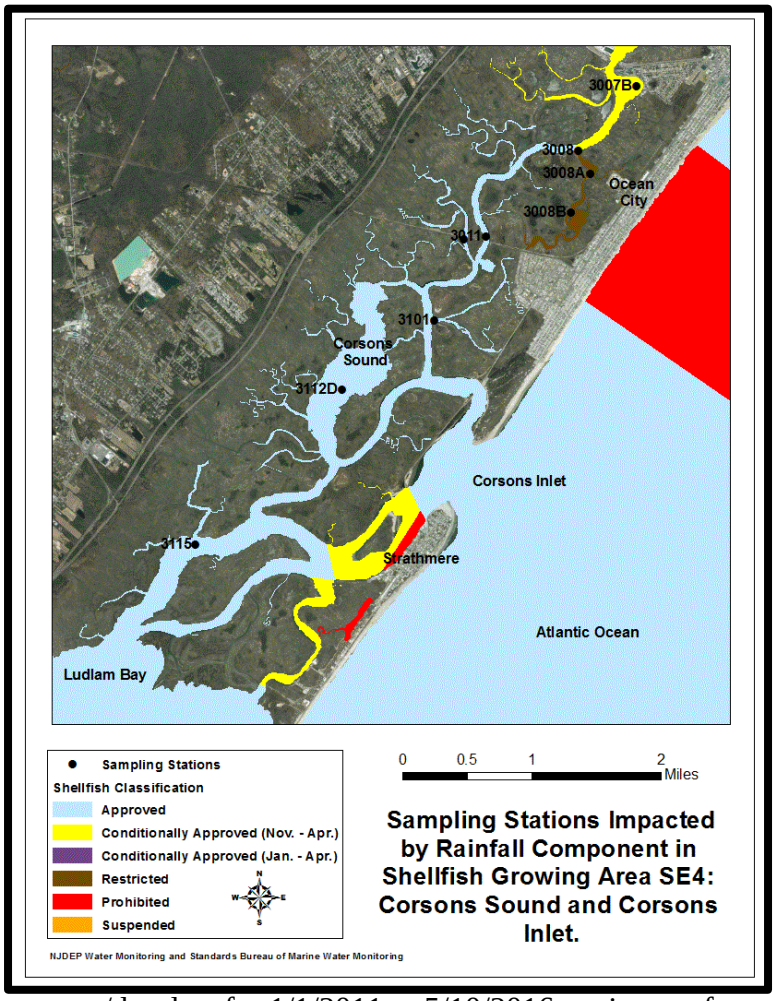
To determine whether seasonal variation can influence bacteria counts, WM&S/BMWM uses a t-test to compare the total coliform MPN values from samples collected during the summer season versus samples collected during the winter months Based on the t-test results, twenty seven (27) monitoring stations had a t-statistical probability of less than 0.05. All of these monitoring stations show a higher geometric mean during the summer than during the winter.



Rainfall Effects

Non-point source pressures on shellfish beds in New Jersey originate in materials that enter the water via stormwater. These materials include bacteria, as well as other waste that enters the stormwater collection system.

Rainfall impacts were assessed by using a t-test to compare the total coliform MPN values from water samples collected during wet weather to water samples collected during dry weather from 1/1/2011 to 5/10/2016. The Wet/Dry Statistics were calculated based on a post impact time of 72 hours prior to the day of sampling and a wet/dry cutoff of 0.2 inches of rain. Any rainfall amounts above 0.2 inches are considered to be a wet condition. A sampling station is considered to be impacted by rainfall when the t-statistic probability is 0.05 or less, but not zero. Using these parameters for the rainfall data, nine (9) sampling stations showed an impact from rainfall for this shellfish growing area from 1/1/2011 to 5/10/2016.



Based on a significant correlation between fecal coliform MPN values from wet/dry data for 1/1/2011 to 5/10/2016, an impact from rainfall was found to occur at the nine (9) sampling stations throughout this shellfish growing area. These sampling stations are located in Crook Horn Creek in *Conditionally Approved (November to April)* shellfish waters, in Beach Creek in *Restricted* shellfish waters, and in Crook Horn Creek, Corsons Sound, and Main Channel in *Approved* shellfish waters. All of these sampling stations showed a higher fecal coliform geometric mean during wet than dry conditions. However, the fecal coliform levels for these rainfall sampling stations still meet the existing *Approved*, *Conditionally Approved (November to April)*, and *Restricted* shellfish classification criteria for these shellfish waters. Since the water quality in this shellfish growing area is slightly impacted by rainfall but not enough to affect the shellfish classification, this area will continue to be sampled using the Systematic Random Sampling (SRS) strategy.

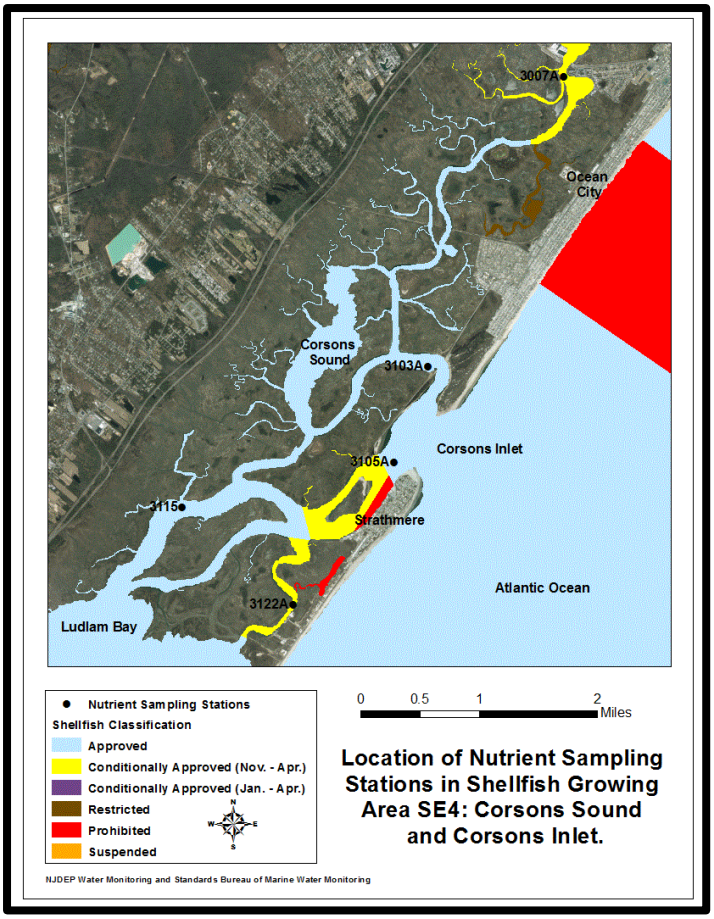
The Bureau of Marine Water Monitoring has begun to identify particular stormwater outfalls that discharge excessive bacteriological loads during storm events. In some cases, specific discharge points can be identified. When specific outfalls are identified as significant sources, the Department works with the county and municipality to further refine the source(s) of the contamination and implement remediation activities.

RELATED STUDIES

Nutrients

In this growing area, five nutrient monitoring sites were sampled under the estuarine monitoring program. At these nutrient monitoring sites, various parameters were measured including water temperature, salinity levels, secchi depth, total suspended solids, dissolved oxygen levels, ammonia levels, nitrate and nitrite levels, orthophosphate levels, total nitrogen levels, and the inorganic nitrogen to phosphorus ratios. Between 2011 and 2016, water samples were analyzed for these nutrient parameters in this growing area. For full nutrient assessment, see the Estuarine Monitoring Reports, available electronically at:

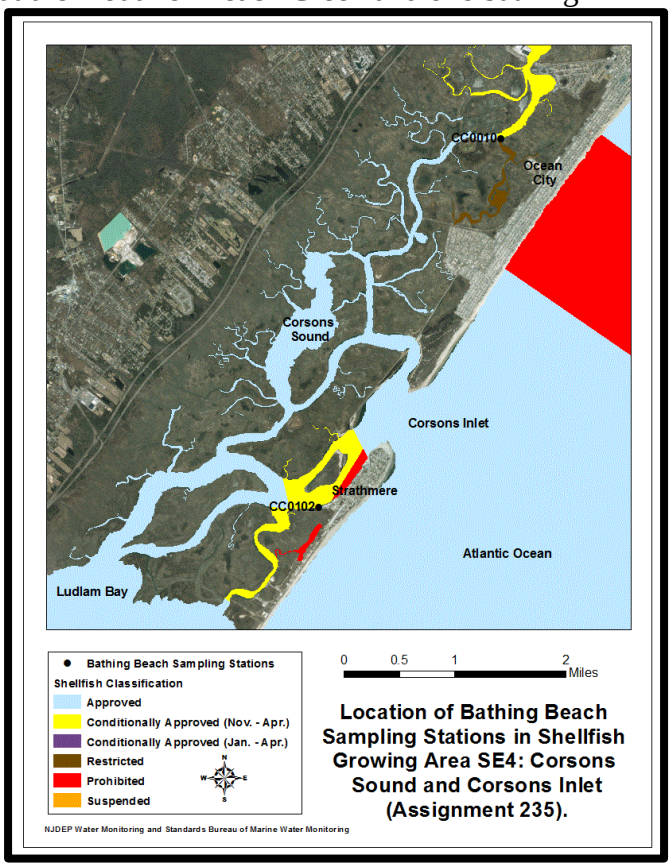
http://www.state.nj.us/dep/bmw/reports.htm



Bathing Beach

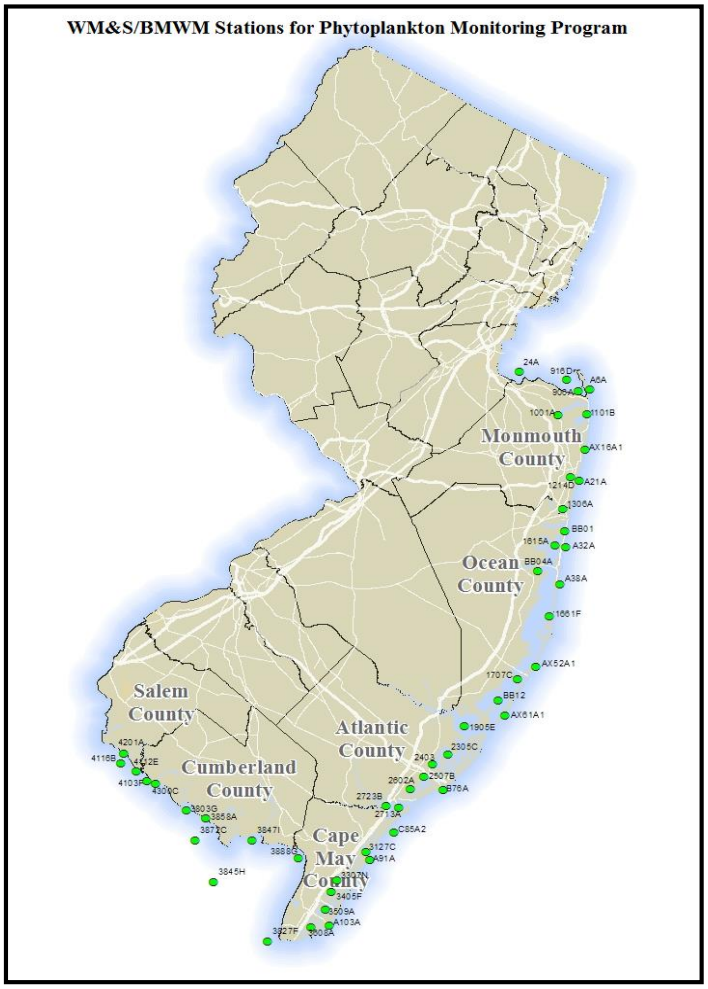
A review of the bathing beach data for 2011 to 2016 showed that there are two bathing beach sampling stations in this shellfish growing area. One of these bathing beach sampling stations (CCMPCC0010) is located west of Ocean City at the mouth of Beach Creek and one bathing beach sampling station (CCMPCC0102) is located west of Strathmere in the Strathmere Bay. A review of the bathing beach data for these sampling stations showed that the geometric mean levels for these stations generally meet the enterococcus criteria. For bathing beach water quality results, go to:

https://www.njbeaches.org/.



Toxic Monitoring

The DWM&S/BMWM collects samples at regular intervals throughout the summer to determine the occurrence of marine algae that produce biotoxins (see figure to the right for the location of the 48 phytoplankton sampling stations in New Jersey). Certain planktonic species have the potential to adversely affect the suitability of shellfish for human consumption and can adversely affect the respiratory function of people. These planktonic species cause algal blooms that deplete the dissolved oxygen levels in the water.



Since 2007, algal blooms are also identified by the DWM&S/BMWM with the aid of a remote chlorophyll flight sensor. Coastal monitoring flights with remote aircraft sensing have taken place from Coyle Field in Burlington County, north to the Raritan Bay, south to the Little Egg Harbor Inlet, and back to Coyle Field (short flights), and from Coyle Field, north to the Raritan Bay, south to Cape May Point, west into the Delaware Bay, and north through the back bays of New Jersey back to Coyle Field (long flights). In a partnership between the DWM&S/BMWM, the New Jersey Forest Fire Service (aviation operations and maintenance), Rutgers University (data management), and USEPA Region 2 (funding), these flights (4 short flights and 2 long flights a week) are scheduled for six days a week from May to September of each year. Flight observers are also on these flights to observe conditions that could adversely affect bathing beach and water quality, such as the presence of algal foam from algal blooms, floating trash or debris, broken sewer lines, and the presence or absence of marine life and fish kills The sensor data from these remote aircraft sensing flights provide estimates of coastal chlorophyll 'a' levels and a perspective on bloom conditions/trends. If estimates of coastal chlorophyll 'a' levels come up high in specific areas during a coastal monitoring flight, this enables the Bureau to target boat sampling to locations where algal blooms might be occurring. The NJDEP and Rutgers University Chlorophyll Remote Sensing flights in the waters of New Jersey are available electronically at: http://njdep.marine.rutgers.edu/aircraft/.

Generally, no toxic species associated with large algal blooms over long periods have been recorded for the Corsons Sound and Corsons Inlet Area. The phytoplankton monitoring of sampling stations in New Jersey waters is available electronically at: http://www.nj.gov/dep/bmw/phytoplankton.htm.

CONCLUSIONS

Based on the bacteriological data assessed, most of the sampling stations in this shellfish growing area meet the *Approved* shellfish classification criteria, year-round, in the summer, and in the winter. Therefore, most of the sampling stations in this area were in compliance with their existing shellfish classification criteria. However, there was one sampling station (3109A) that exceeded the NSSP shellfish classification criteria for water quality in the *Approved* waters of this shellfish growing area. Sampling station 3109A, located in Main Channel west of Strathmere in *Approved* shellfish waters, exceeded the *Approved* classification year-round and during the summer. This station failed to meet the estimated 90th percentile year-round, and the geometric mean and estimated 90th percentile during the summer. From the seasonal and rainfall evaluation, this station was shown to be impacted by a seasonal component during the summer but had no rainfall component at all. This trend of high fecal coliform results during the summer has only recently been seen. Historically, fecal coliform results at this station have been low, and this station has had no rainfall component at all. The high fecal coliform results during the summer could possibly be from the impact to this area of bird activities, or the fishing and boating activities from the summer tourism industry in the Ocean City area. There are other sampling stations next to **3109A** and these stations meet the existing *Approved* shellfish classification. Other than Sampling Station **3109A**, the overall water quality for this growing area is good. Therefore, no classification changes are recommended for this shellfish growing area and Sampling Station **3109A** will be closely monitored during shoreline surveys of this area. There were no significant changes to landuse pattern, hydrography, or discharges that would change the shellfish water classification in this area.

RECOMMENDATIONS

Continue sampling using the existing Systematic Random Sampling (SRS) strategy for Assignments 235 and 247. Sampling Station **3109A** will be closely monitored during shoreline surveys of this area.

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