NJ Department of Environmental Protection
Water Monitoring and Standards

Reappraisal Report of Shellfish Classification for Growing Area SE5 (Ludlam Bay to Townsends Inlet)

March 2014

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 SE5 (Ludlam Bay to Townsends Inlet)

New Jersey Department of Environmental Protection
Water Resources Management
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Water Monitoring and Standards
Jill Lipoti, Director

Bureau of Marine Water Monitoring
Bruce Friedman, Bureau Chief

March 2014

Report prepared by:

Paul Wesighan

Acknowledgements:
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Cover Photo – The Sea Isle City Bridge from Sea Isle City to Ocean View in Dennis Township**.**

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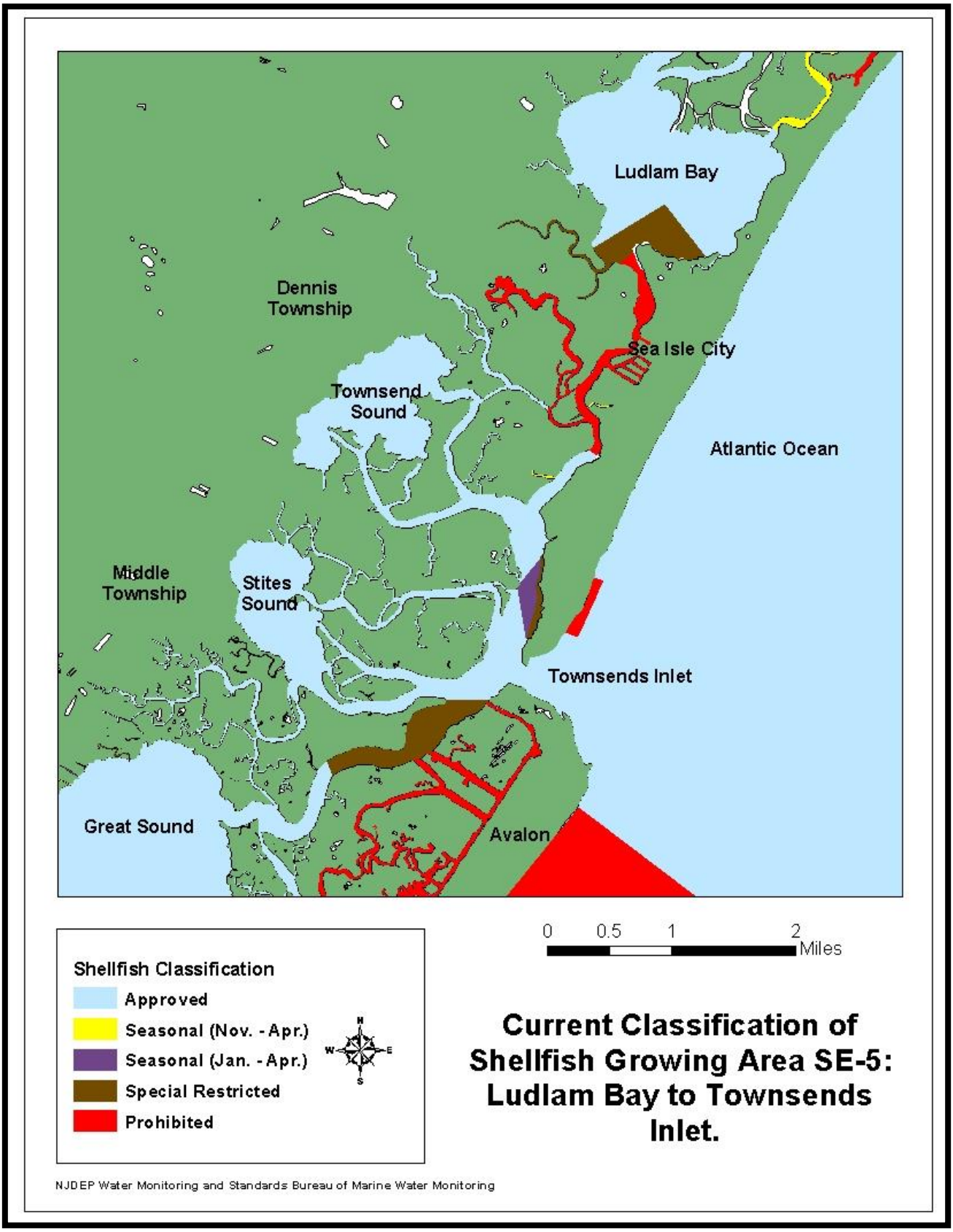
EXECUTIVE SUMMARY

Shellfish Growing Area SE-5; Ludlam Bay to Townsends Inlet, is located in the southern part of New Jersey, northwest of the city of Avalon and southwest of Strathmere, in Cape May County. This area includes the shellfish growing waters from Ludlam Bay in the north, to the north of Great Sound in the south. Great Sound is not included in this shellfish growing area. The water quality data presented in this Reappraisal of Shellfish Growing Area SE-5; Ludlam Bay to Townsends Inlet, were collected between January 2009 and March 2014 using the Systematic Random Sampling (SRS) strategy for the sampling stations from Ludlam Bay to Townsends Inlet because there are no adverse pollution sources that are directly discharging into these shellfish waters. The Adverse Pollution Condition (APC) strategy is used for the sampling stations from Townsends Inlet to Great Sound because there are some adverse pollution sources, such as marinas and storm water outfalls, that are indirectly discharging into these shellfish waters. The approximate size of this shellfish growing area is 3,574 acres, and the shellfish classification for this growing area is *Approved (79.75%), Seasonally Approved (November-April) (0.08%), Seasonally Approved (January to April) (1.09%), Special Restricted* (9.14%), and *Prohibited (9.93%)* for shellfish harvesting. All sampling stations were in compliance with the fecal coliform criteria for the *Approved, Seasonally Approved (November-April), Seasonally Approved (January to April), Special Restricted,* and *Prohibited* classifications of this shellfish growing area, as specified by the National Shellfish Sanitation Program (NSSP). No classification changes are recommended for this shellfish growing area. There were no observed changes to pollution sources of this area as documented in the shoreline survey included in this report. It is proposed in this report that the Adverse Pollution Condition (APC) sampling strategy for Assignment 287 will be changed to the Systematic Random Sampling (SRS) strategy. The APC strategy only requires 15 water samples collected in three years to determine shellfish water classification while the SRS strategy requires 30 water samples collected in three years. This change in sampling strategy will be used to obtain more samples for analysis.


Ludlam Bay
Dennis Township
Sea Isle City
Townsend Sound
Atlantic Ocean
Middle Township
Stites Sound
Townsends Inlet
Great Sound
Avalon
0 0.5 1 2
Miles
Shellfish Classification
Approved
Seasonal (Nov. - Apr.)
Seasonal (Jan. - Apr.)
Special Restricted
Prohibited
N
W
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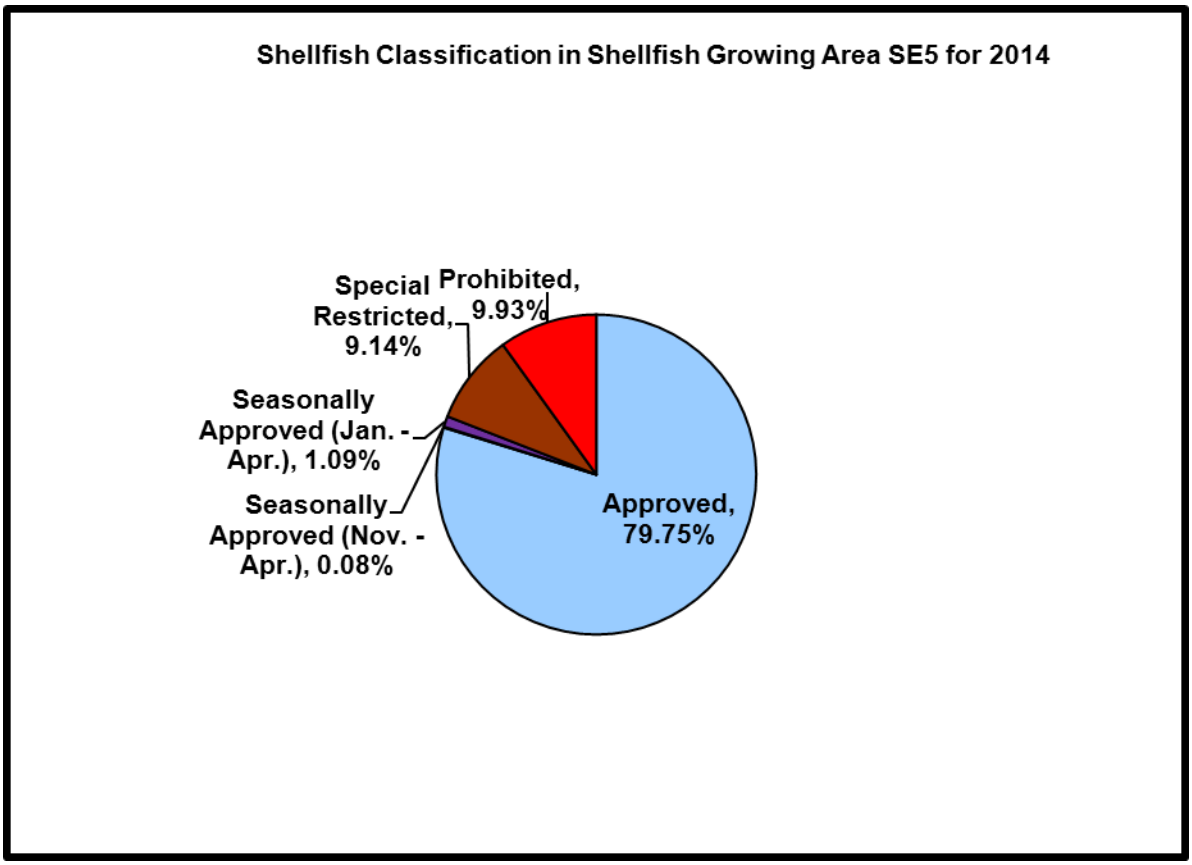
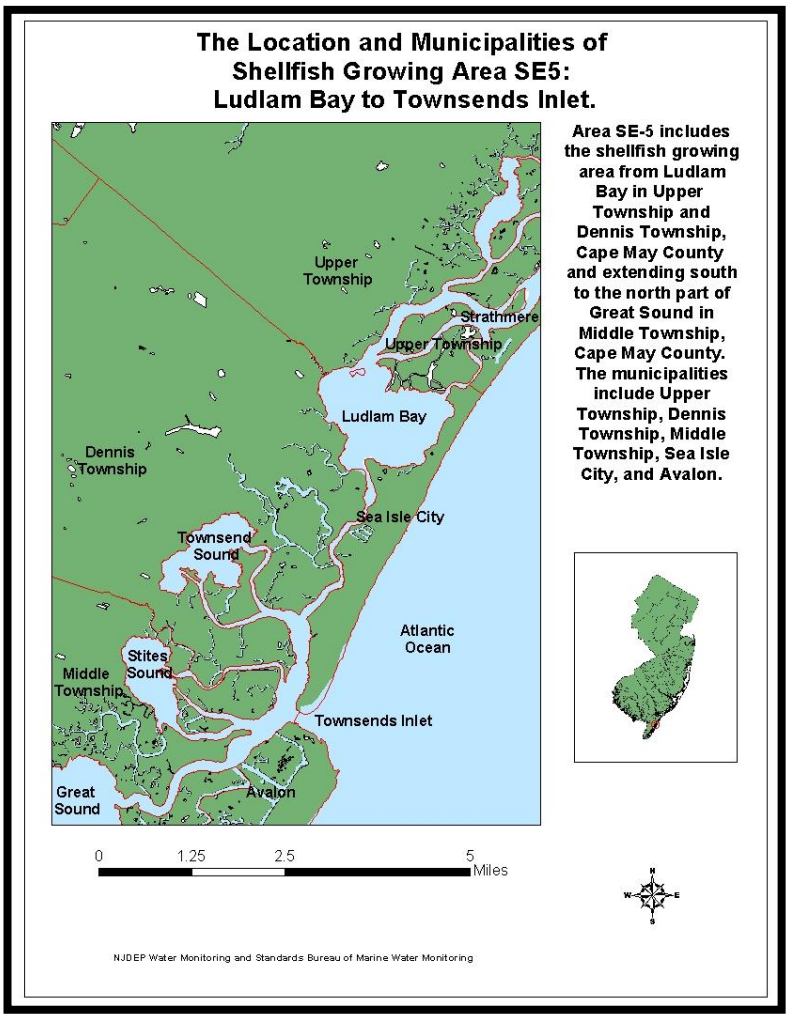
S
Current Classification of Shellfish Growing Area SE-5: Ludlam Bay to Townsends Inlet.
NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring


Shellfish Classification in Shellfish Growing Area SE5 for 2014
Special Restricted, 9.14%
Prohibited, 9.93%
Seasonally Approved (Jan. - Apr.), 1.09%
Seasonally Approved (Nov. - Apr.), 0.08%
Approved, 79.75%

DESCRIPTION OF GROWING AREA

Location & Description

Shellfish Growing Area SE-5; Ludlam Bay to Townsends Inlet, is located in the southern part of New Jersey, northwest of the city of Avalon and southwest of Strathmere, in Cape May County (see Figure). This area includes the shellfish growing waters from Ludlam Bay in the north, to the north of Great Sound in the south. Great Sound is not included in this shellfish growing area.



The principal bodies of water in this area are Ludlam Bay, Townsends Sound, Stites Sound, and Townsends Inlet (see figure on right). This area also includes Devauls Creek, Maple Swamp, Big Elder Creek, Little Elder Creek, Swimming Creek, Ludlam Thorofare, Sunks Creek, Mill Creek, Scraggy Creek, Ware Thorofare, Mill Thorofare, Townsend Channel, Clem Thorofare, Granny Creek, Mud Thorofare, Jonadab Creek, Uncle Aarons Creek, Kitts Thorofare, Bottle Creek, Middle Thorofare, North Channel, South Channel, Leonard Thorofare, Ingram Thorofare, Gravens Thorofare, Cornell Harbor, Pennsylvania Harbor, Princeton Harbor, S Creek, Deep Creek, Rachael Gut, Salt Creek, Cat Run, Deep Thorofare, and Paddy Thorofare.

The shellfish classification of this growing area is *Approved*, *Seasonally Approved (November to April)*, *Seasonally Approved (January to April)*, *Special Restricted*, and *Prohibited*, and the approximate size of this shellfish growing area is 3,574 acres.

The *Approved* waters are located in Ludlam Bay (excluding the Special Restricted part in the south of Ludlam Bay), Main Channel, Townsend Sound, Mill Creek, Ware Thorofare, Mill Thorofare, Clem Thorofare, Townsend Channel, the south part of Ludlam Thorofare, Stites Sound, Kitts Thorofare, Middle Thorofare, North Channel, South Channel, Townsends Inlet, Deep Creek, Deep Thorofare, Leonard Thorofare, and the south part of Paddy Thorofare. The *Seasonally Approved*

(November-April) waters are located in an unnamed creek on Gull Island, which is west of Ludlam Thorofare, and in Scraggy Creek which is east of the central part of Ludlam Thorofare and west of Sea Isle City. The *Seasonally Approved (January-April)* waters are located in the south part of Townsend Channel north of Townsends Inlet. The *Special Restricted* waters are located in the south part of Ludlam Bay, in Big Elder Creek, the east side of Townsend Channel north of Townsends Inlet, and the north and central parts of Ingram Thorofare. The *Prohibited* waters include the rest of the waters in this shellfish growing area.

The shellfish waters in this growing area are bordered to the north by Upper Township, to the east by Sea Isle City and Avalon, and to the west by Dennis Township and Middle Township. The locations of the adjacent municipalities are shown in the figure on the previous page. Population statistics for the adjacent municipalities can be found in the previous reappraisal report of this shellfish growing area, which was written in October 2006 and included the population statistics from the 2000 census of this area.

Tidal flushing of this area mainly occurs through Townsends Inlet. This shellfish growing area can be found on Chart 15 of the "2013 State of New Jersey – Shellfish Growing Water Classification Charts" (NJDEP, 2014). The figure page 6 shows the current classification of this shellfish growing area.

Growing Area Classification

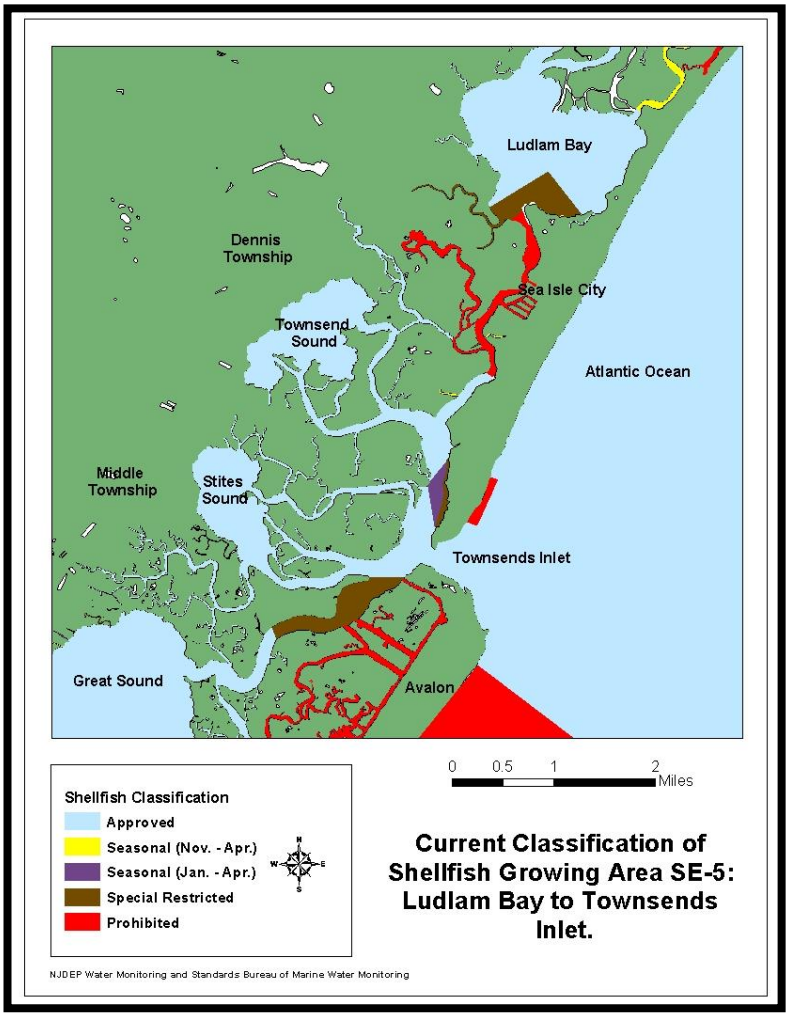
The waters of this shellfish growing area are classified as *Approved (2,851 acres), Seasonally Approved (November–April) (3.0 acres), Seasonally Approved (January-April) (39.0 acres), Special Restricted (327.0 acres)* and *Prohibited (355.0 acres).* There are approximately 3,574 acres in this shellfish growing area.

A reappraisal report for Shellfish Growing Area SE-5, using water quality data from 1997 to 2001, was written in July 2003. In this report, all of the sampling stations met the *Approved* total coliform classification criteria for water quality and no classification change was proposed for this shellfish growing area. However, two of the sampling stations in this shellfish growing area showed a tidal component and 16 sampling stations showed a seasonal component to water quality.

In the Reappraisal of Shellfish Growing Area SE-5, written in 2004 using water quality data from 1999 to 2003, no classification change was proposed for this shellfish growing area and all of the sampling stations met the existing shellfish classification criteria. However, APC sampling station **3225A** showed a tidal component and nine sampling stations showed a seasonal component to water quality.

In the Reappraisal of Shellfish Growing Area SE-5, written in 2006 using water quality data from 2001 to 2006, no classification change was proposed for this shellfish growing area and all of the sampling stations met the existing shellfish classification criteria. However, 36 sampling stations showed a rainfall component, seven sampling stations showed a tidal component, and three sampling stations showed a seasonal component to water quality.

In the 2005 to 2012 Annual Reviews of Shellfish Growing Area SE-5 for the Ludlam Bay to Townsends Inlet area, no classification changes were proposed for this shellfish growing area. No sampling stations in this shellfish growing area exceeded the existing shellfish classification criteria, and the data supported the existing shellfish classification for this area. However, in the 2005 Annual Review of this shellfish growing area, two sampling stations (APC sampling stations **3303A** and **3303B**) were added to this shellfish growing area southwest of Avalon in Long Reach and Gravens Thorofare, respectively, due to an administrative decision to keep all of the sampling stations from the north of Great Sound to Ludlam Bay in Shellfish Growing Area SE-5. The last Sanitary Survey for Shellfish Growing Area SE-5 (Ludlam Bay to Townsends Inlet) was written in 1996.



Evaluation of Biological Resources

This growing area has a wide diversity of biological resources. Hard clams (*Mercenaria Mercenaria*) exist in high densities and are privately and commercially harvested (Morris, 1975, Gosner, 1978).

Blue crabs (*Callinectes sapidus*) are also harvested in this area. Ludlam Bay, Townsend Sound, Stites Sound, and Townsends Inlet are also utilized for fishing, boating, and other marine activities. Many species of finfish can be found in the waters of this shellfish growing area. The important finfish species caught by marine recreational anglers are Bluefish (*Pomatomus saltatrix*), Striped Bass (*Morone saxatillis*), Weakfish (*Cynoscion regalis*), Winter Flounder (*Pseudpleuronectes americanus*), Summer Flounder (Fluke) (*Paralichthys dentatus*), Tautog (*Tautoga onitis*), Scup

(Porgy) (*Stenotomus chrysops*), Black Sea Bass (*Centropristus striata*), Northern Searobin (*Prionotus carolinus*), Northern Puffer (*Spheroides maculatus*), Atlantic Silverside (*Menidia menidia*) and Mummichog (killies, minnows) (*Fundulus heteroclitus*) (The Richard Stockton College of New Jersey, 2002). In 1991, the Striped Bass (*Morone saxatillis*) was classified as a gamefish in New Jersey, and this status prevents the commercial harvest or sale of this first coastal saltwater species designated as such in New Jersey (Bochenek, 2000).

Many species of animals and vegetation can be found in the marshes of this shellfish growing area. Wildlife populations (birds and animals) are actual contributors to water quality in Townsend Sound and potential contributors to water quality in Stites Sound and Townsends Inlet. Birds sometimes may accumulate around the groins, jetties, seawalls, and bulkheads on the coast of this shellfish growing area, and fecal matter from these birds could affect the water quality.

This shellfish growing area is almost completely surrounded by a shoreline of marshes, with small areas of bulkheads, erodable shorelines, and beaches composing the remainder of the shoreline. Bulkheads are located along the east and west shorelines of the upper and middle sections of Ludlam Thorofare, along the east shoreline of the lower section of Townsend Channel, along the south shoreline of South Channel, and along the east and west shorelines of Ingram Thorofare. Areas with an erodable shoreline include the northeast shoreline of Ludlam Bay, a small section of the northeast shoreline of Ludlam Thorofare, and along the east and west shorelines of the middle section of Ingram Thorofare. The Townsends Inlet area is almost completely surrounded by beaches.

This area also includes a wide variety of marsh types and vegetation, including vegetated salt marshes, tidal ponds, tidal waters, tidal mud flats, tidal sand flats, non-tidal ponds, sandy developed beaches, developed areas, and small areas of coastal scrub shrub. These marsh types and vegetation are located throughout the adjacent shoreline of this shellfish growing area. Townsends Inlet is bordered on the north shore with sandy developed beaches and on the south shore with tidal sand flats. Vegetated salt marshes and tidal waters primarily border Ludlam Bay, Townsends Sound, and Stites Sound.

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SHORELINE SURVEY: EVALUATION OF POTENTIAL POLLUTION SOURCES

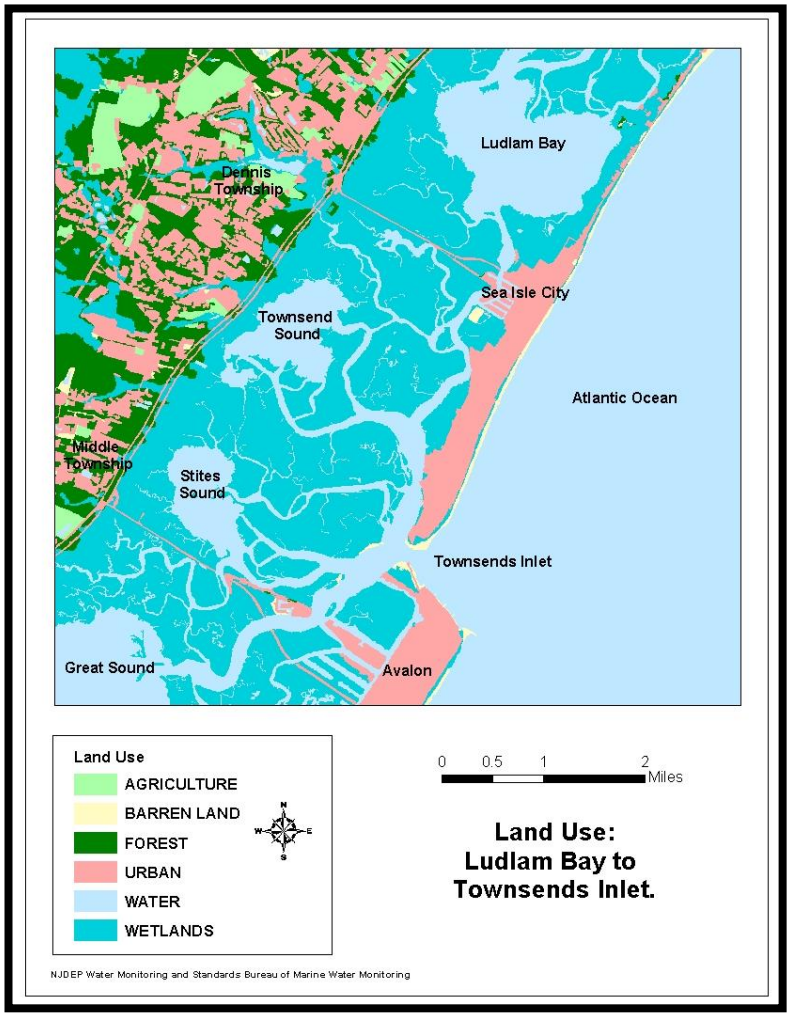
Shoreline Survey

The shoreline survey that was performed for this area on May 30, 2014 determined that there have been minor changes made to the area since the last reappraisal of this area.

There were photographs taken during the shoreline survey of this shellfish growing area on May 30, 2014. The photograph on the front cover shows the location of the bridge from Sea Isle City to Ocean View in Dennis Township. Additional photos taken during the shoreline survey of this area are attached at the end of this report in the Supporting Documentation section.

Land Use

An extensively urbanized area to the east and north and tidal wetlands to the south and west border much of this area. The urban areas to the east are resort areas (Sea Isle City, Avalon, and Strathmere) with significant boating and marine activities during the summer months. There are currently 24 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 bays. Devauls Creek, Mill Creek, and Deep Creek cross the Garden State Parkway into these communities, and are upstream of this shellfish growing area. Since some of these communities are still on septic systems, there is a potential for pollutant inputs into these shellfish growing waters, which is why continued monitoring of the water quality in these waters is very important. The figure on this page shows the land use and municipalities that surround this shellfish growing area.

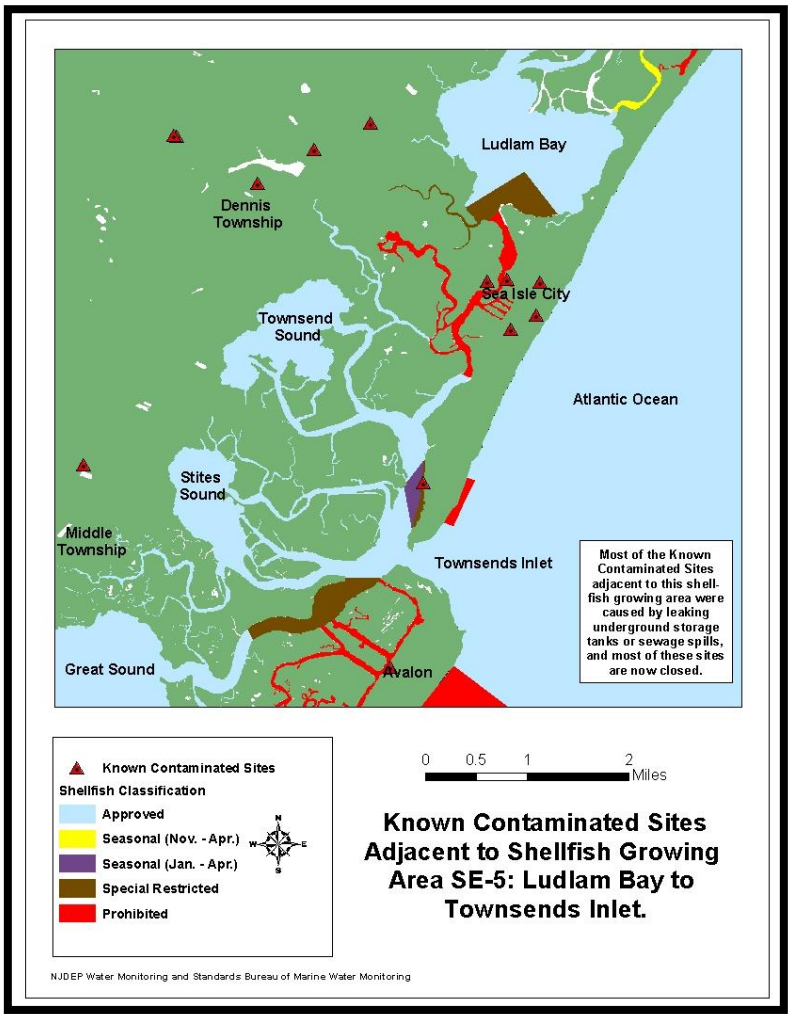


The area immediately west of the Garden State Parkway is part of the Pinelands Comprehensive Management Plan, and is listed as a Regional Growth Area (northwest of Townsend Sound), and a Rural Development Area (west of Stites Sound). According to the New Jersey Pinelands Commission, a Regional Growth 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 in a Regional Growth Area. The New Jersey Pinelands Commission describes a Rural Development Area as “an area that can attempt to protect characteristic Pinelands features, while allowing modest development to proceed, giving municipalities leeway to determine land uses”. The Pinelands Comprehensive Management Plan permits one dwelling unit per 3.2 acres of private, undeveloped upland for a Rural Development Area.

Known Contaminated Sites

NJDEP, Site Remediation Program (SRP) has established a list of the Known Contaminated Sites (KCSNJ), Classification Exception Area (CEA) and Currently Known Extent (CKE) of groundwater pollution. KCSNJ are those non-residential sites and properties within the state where contamination of soil or groundwater has been confirmed at levels equal to or greater than applicable standards. This list of Known Contaminated Sites may include sites where remediation is either currently under way, required but not yet initiated or has been completed. CEA and CKE areas are geographically defined areas within which the local groundwater resources are known to be compromised because the water quality exceeds drinking water and groundwater quality standards for specific contaminants (NJDEP).

This shellfish growing area, which extends from Ludlam Bay to Townsends Inlet, has several known contaminated sites located in the adjacent areas (see figure on this page). The major concentrations of these known contaminated sites are located to the east in Sea Isle City, to the northwest in Dennis Township, and to the west in Middle Township. There are also a few known contaminated sites located to the south in Avalon. The primary causes of these known contaminated sites are from leaking underground storage tanks. Most of these known contaminated sites are now closed.



Surface Water Discharges

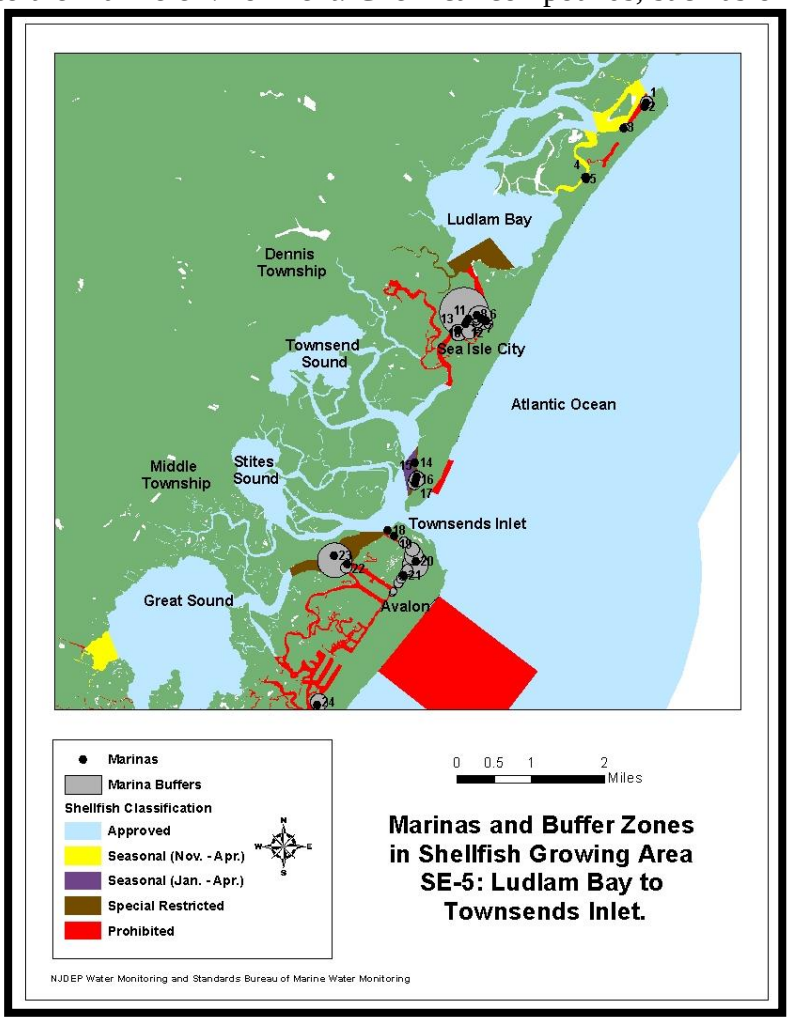
The discharge of pollutant from a point source is authorized under New Jersey Pollutant Elimination System (NJPDES), and the regulations are found at N.J.A.C. 7:14A. The main purpose

of the NJPDES program is to ensure proper treatment and discharges of wastewater. By doing so, the permit limits the amount or concentration of pollutants that can be discharged into ground water, streams, rivers, and the ocean. Facilities regulated under this program include mines, schools, hospitals, large corporate office buildings, industrial manufacturing facilities, campgrounds, mobile home parks, food processor, potable water treatment plants, sewage treatment plants, or any dischargers that may have the potential to impact water quality. As of December 2010, there were 6,752 active permits. The number of active permits includes permits for all NJPDES permit classes, including Discharge to Surface Water (DSW), Discharge to Groundwater (DGW), Significant Indirect User (SIU), Discharge of Stormwater (DST), and Residuals (RES), (NJDEP, Division of Water Quality).

A surface water discharge involves the release of treated effluent from various municipal and industrial facilities directly into a river, stream, or the ocean. According to the NJPDES program, there was no surface discharger found in this shellfish growing area.

Marinas

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. Chemical compounds, such as oil and gasoline resulting from spills, leaks, and pressure washing 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. (NOAA) For this reason, waters within the marina basin are restricted to shellfish harvesting. 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*, *Special Restricted*, or *Seasonally Approved* (no harvest during summer months when the marina is normally active). There are 24 marinas situated within and adjacent to this shellfish growing area.

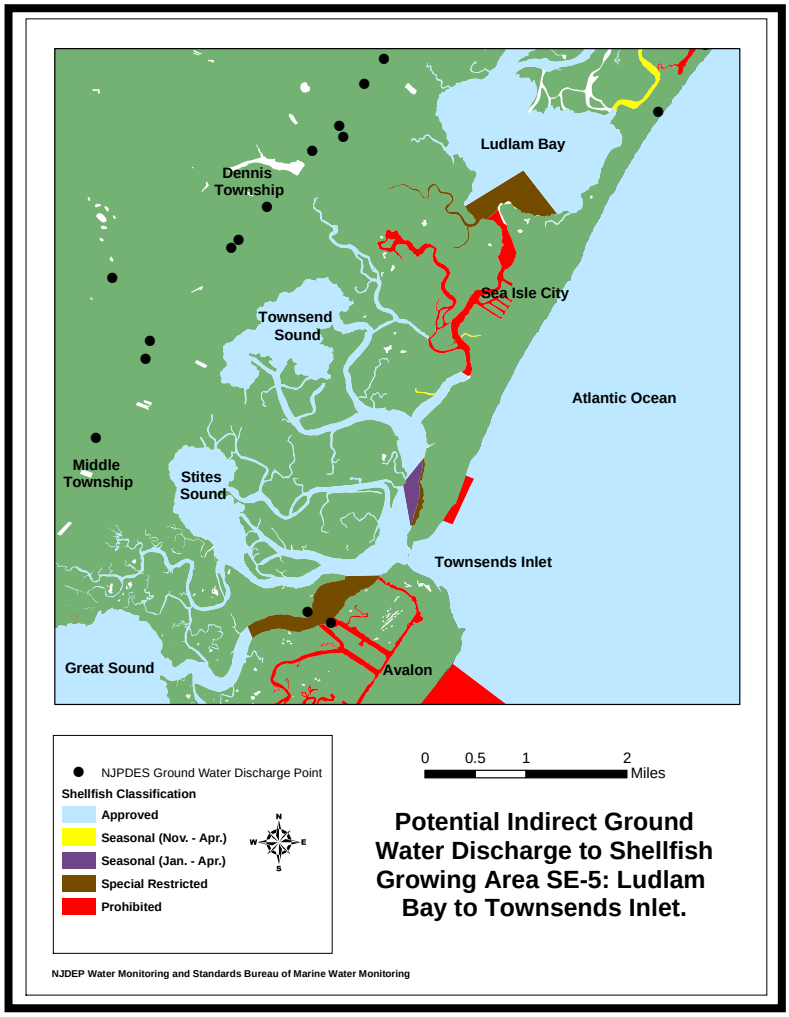


To protect waters from the pollution generated by marina related activities, NJDEP implemented the New Jersey Clean Marina Program. This is a volunteer based program for marinas. The program provides assistance and guidance to marinas as well as boaters on ways to reduce pollution, including sewage facility management, fueling operations, fish and solid waste management and boat cleaning. Currently, there are only a small percentage of marinas in the state that do participate in this program. The lists of marinas that are certified and/or pledged under this program are on http://www.njcleanmarina.org/.

Map Key	Marina Name	Location	# of Wet Slips Total/Boats > 24ft.	*Size of Buffer Area* (radius; feet)	*Average Water Depth (ft.)*	*Pumpout Facility*
1	Deauville Inn Docks	Upper Township	26/12	457	6	No
2	Frank's Boat Yard	Upper Township	20/20	517	6	No
3	Corsons Inlet Marina	Upper Township	25/25	578	6	No
4	Jersey Cape Boat Salvage	Upper Township	10/10	366	6	No
5	Whale Creek Marina	Upper Township	62/4	505	6	No
6	Party Boat Dockage	Sea Isle City	4/4	231	6	No
7	Capt. Bob's Commercial	Sea Isle City	4/4	231	6	No
8	Sea Isle City Marina	Sea Isle City	72/33	760	6	No
9	Minmar Marine Basin	Sea Isle City	115/20	773	6	Yes
10	Capt. Robbins Deep Sea Fishing Marina	Sea Isle City	40/40	732	6	No
11	Larsens Boat Rental	Sea Isle City	56/0	441	6	No
12	Larsens Marina	Sea Isle City	16/0	236	6	No
13	Sea Isle City Yacht Club	Sea Isle City	18/18	491	6	No
14	U.S. Coast Guard Station	Sea Isle City	1/1	116	6	No
15	Sunset Pier Marina	Sea Isle City	25/6	383	6	No
16	Yacht Club of Townsends	Sea Isle City	82/82	1283	4	No
17	Pier 88 Marina	Sea Isle City	75/75	1002	6	No
18	Avalon Yacht Club	Avalon	25/25	578	6	No
19	South Jersey Ship	Avalon	15/15	448	6	No
20	Commodore Bay Club M.	Avalon	110/110	1213	6	No
21	Avalon Sport Fishing/ Public Marina	Avalon	15/15	448	6	No
22	Avalon Anchorage	Avalon	15/15	448	6	No
23	Avalon Pointe Marina	Avalon	105/105	1185	6	Yes
24	54th & Bay Park Marina	Stone Harbor	30/30	317	24	No

Groundwater Discharges

According to NJPDES, there are several facilities with active Discharge to Groundwater (DGW) permits in this area. Besides groundwater discharger, septic systems are widely used in remote area where public sewer lines are inaccessible. When septic systems fail to function properly, it could lead to groundwater contamination. The location of groundwater injection, surface water discharge (stormwater), areas are shown in the figure below.



Spills, Unpermitted Discharges, and Closures

Spills

There were no emergency closures of shellfish waters in area SE5 due to major spills or unpermitted discharges for the time period from January 2009 to August 2014.

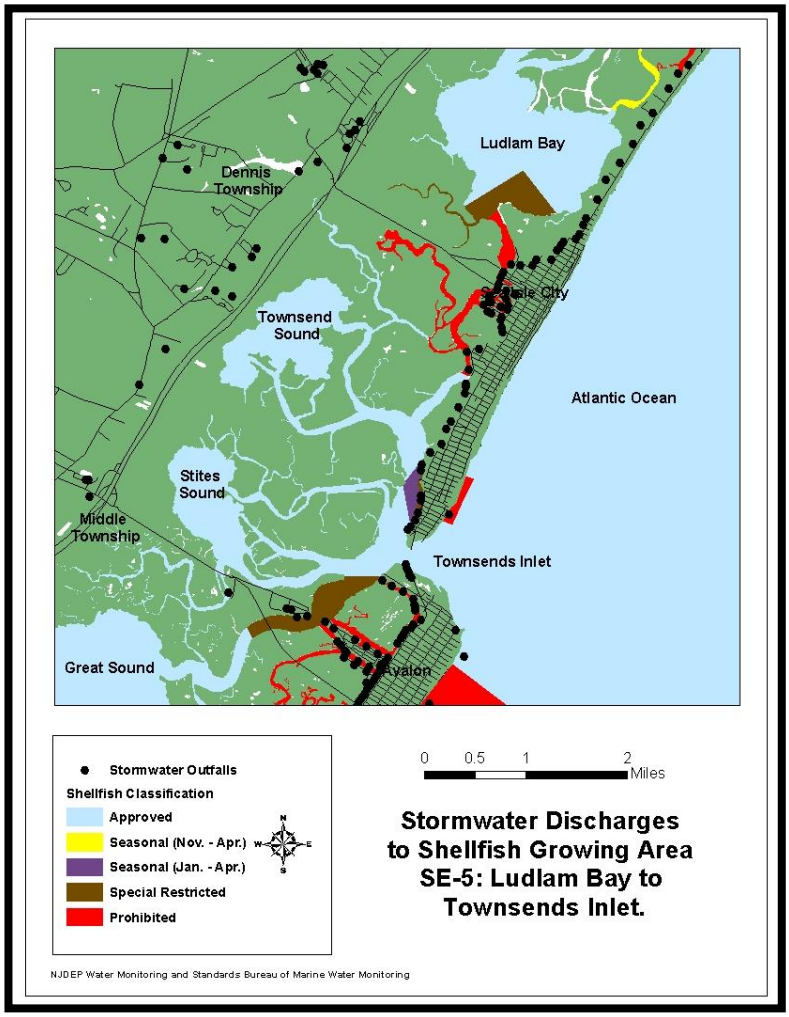
Dredging

The process of dredging can impair water quality and contaminate shellfish beds that are living near dredging and disposal sites. WM&S/BMWM is given the opportunity to review such project through CAFRA submission and will deny a project if the proposed dredging or disposal site can potentially contaminate shellfish beds or impair water quality. The bureau's comments are taken into consideration by the NJDEP, Division of Land Use Regulations (DLUR) when approving or denying a permit. There were no dredging projects submitted to DLUR between 2009 and 2014 for this area.

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 runoff is discharged untreated. The typical pollutants that are associated with stormwater run-off are bacteria, heavy metals, pesticides, herbicides, chlorides, petroleum, and nutrients. (NJStormwater.Org) Most of the stormwater outfalls within this growing area are near residential and urbanized district. About 120 outfalls in this area have the potential to impact water quality. The bulk of these outfalls are in Middle Township, Dennis Township, Sea Isle City, and Avalon.

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

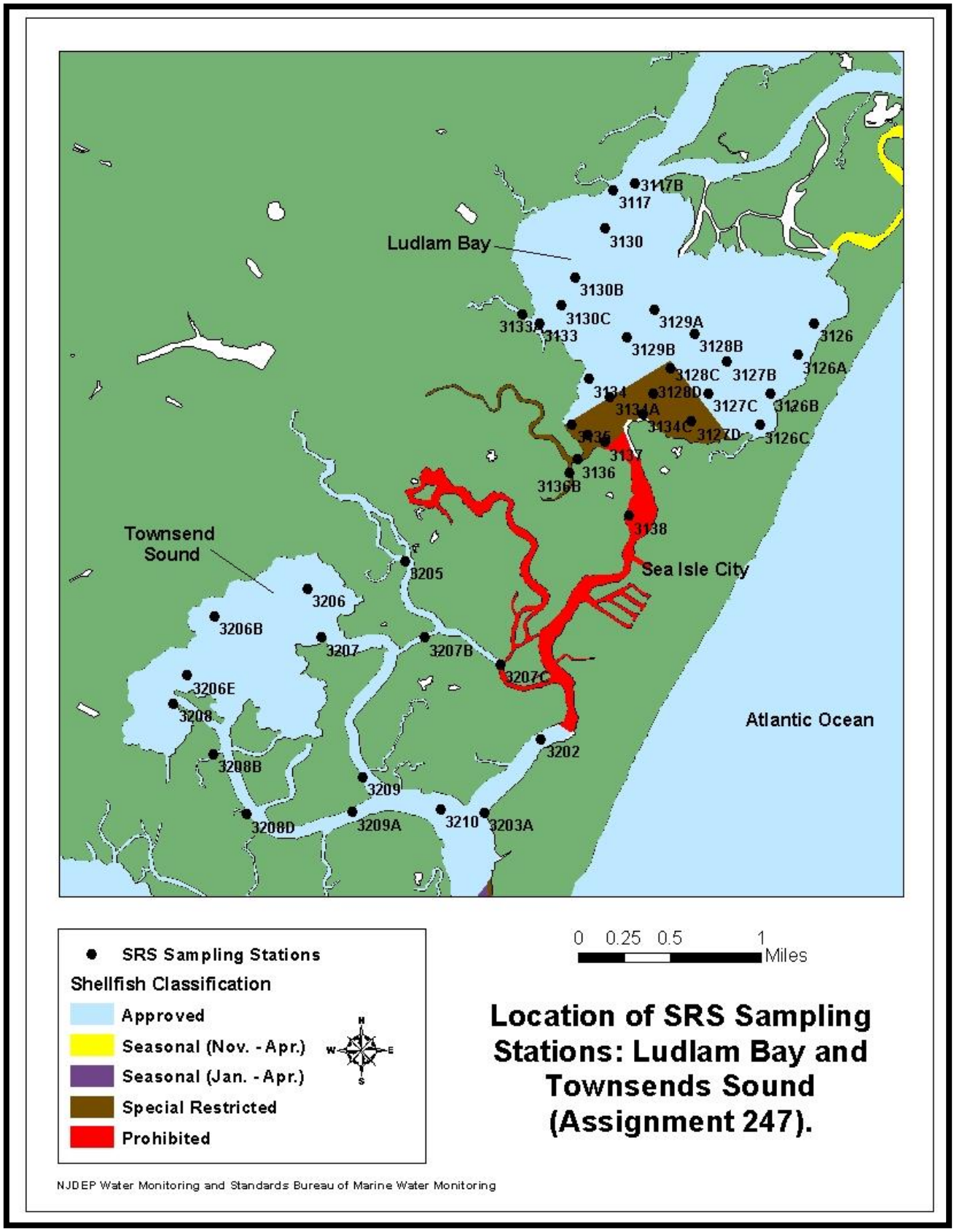

Ludlam Bay
Dennis Township
Townsend Sound
Atlantic Ocean
Stites Sound
Middle Township
Townsends Inlet
Great Sound
Avalon
Stormwater Outfalls
Shellfish Classification
Approved
Seasonal (Nov. - Apr.)
Seasonal (Jan. - Apr.)
Special Restricted
Prohibited
0 0.5 1 2
Miles
Stormwater Discharges to Shellfish Growing Area SE-5: Ludlam Bay to Townsends Inlet.
NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring

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.* The Systematic Random Sampling (SRS) strategy was used for the sampling stations from Ludlam Bay to Townsends Inlet because there are no adverse pollution sources that are directly discharging into these shellfish waters. The Adverse Pollution Condition (APC) strategy was used for the sampling stations from Townsends Inlet to Great Sound because there are some adverse pollution sources, such as marinas and storm water outfalls, that are indirectly discharging into these shellfish waters.

Water sampling was performed in accordance with the Field Procedures Manual (NJDEP, 2005). From 2009 through 2014, approximately 2,560 water samples were collected for fecal coliform bacteria from 75 monitoring stations. The locations of these sampling stations are shown in the figures on the next two pages. 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 2011. 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).


Ludlam Bay
Townsend Sound
Sea Isle City
Atlantic Ocean
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3130B
3130C
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3133
3129A
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3128C
3127B
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3128D
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3207B
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3206E
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3202
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3210
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SRS Sampling Stations
Shellfish Classification
Approved
Seasonal (Nov. - Apr.)
Seasonal (Jan. - Apr.)
Special Restricted
Prohibited
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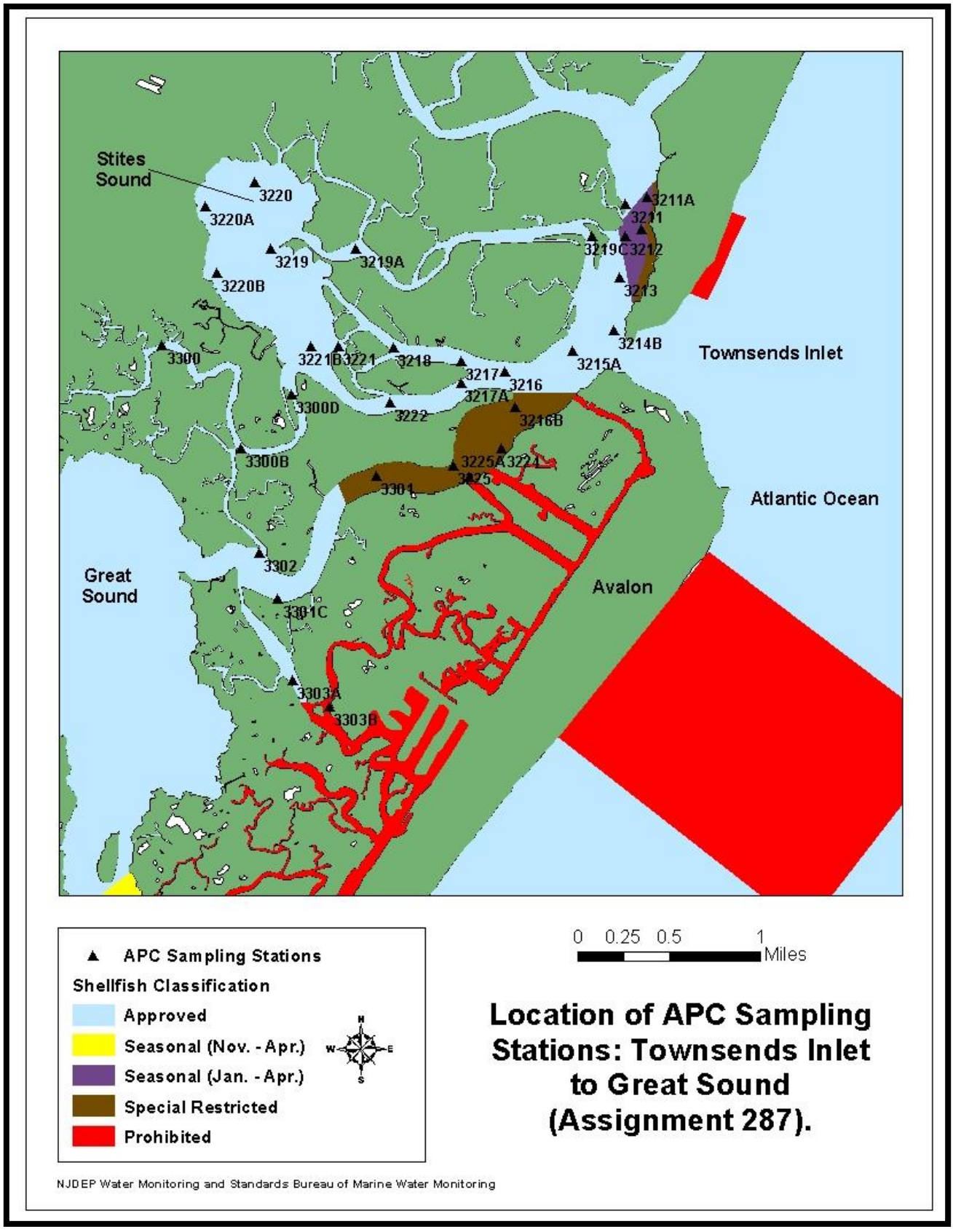
0 0.25 0.5 1
Miles
Location of SRS Sampling Stations: Ludlam Bay and Townsends Sound (Assignment 247).
NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring


Stites Sound
3220
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3301
3302
3301C
3303A
3303B
3211A
3211
3219C
3212
3213
3214B
3215A
Townsends Inlet
Atlantic Ocean
Avalon
Great Sound
APC Sampling Stations
Shellfish Classification
Approved
Seasonal (Nov. - Apr.)
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Special Restricted
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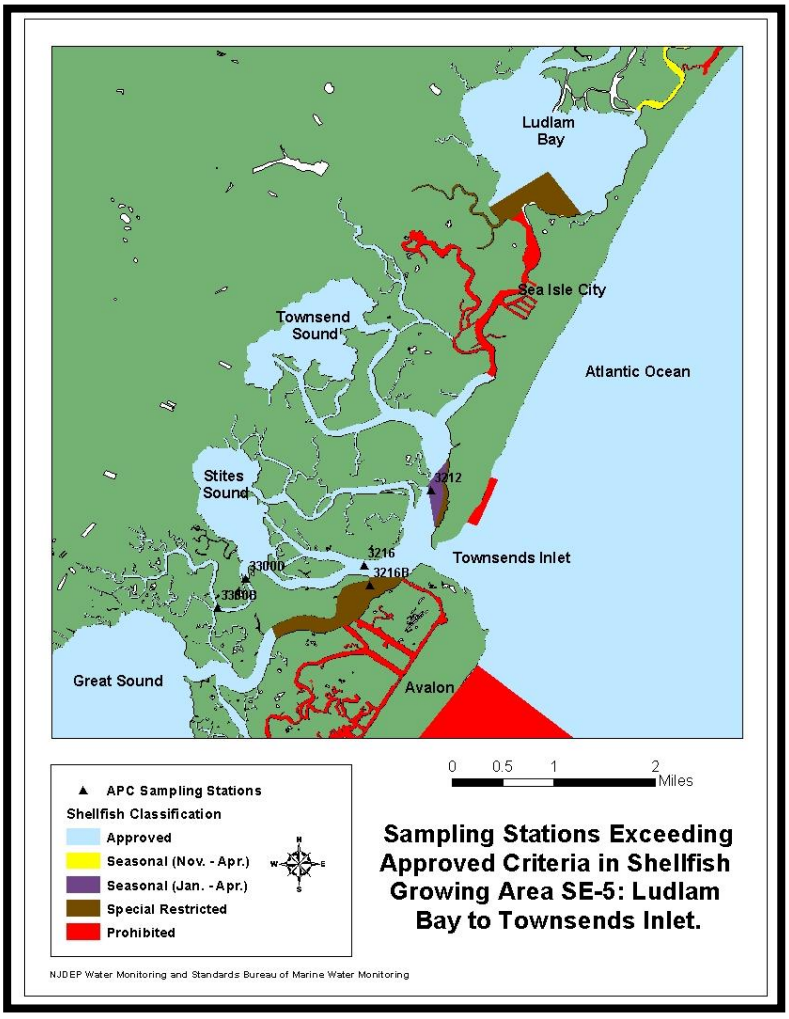
Miles
Location of APC Sampling Stations: Townsends Inlet to Great Sound (Assignment 287).
NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring

Bacteriological Quality

This report includes data analyzed from January 2009 to March 2014. This shellfish growing area is composed of two assignment areas, Assignment 247 (Ludlam Bay and Townsends Sound) is sampled using the SRS sampling strategy year-round, and Assignment 287 (Great Sound and Townsends Inlet) is sampled using the APC sampling strategy year-round. The figures on pages 16 and 17 show 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 at the end of this report in the Appendix.

Compliance with NSSP SRS and APC Criteria

Three of the sampling stations in this shellfish growing area (APC Sampling Stations **3216**, **3300B,** and **3300D**) exceeded the *Approved* shellfish classification criteria, year-round, in the summer, and in the winter. Sampling Station **3216** is located in North Channel in *Approved* shellfish waters and **3300B and 3300D** are located in Leonard Thorofare and Deep Creek in *Approved* shellfish waters. All three of these sampling stations meet the *Special Restricted* shellfish classification criteria. However, the shellfish waters near these three sampling stations will not be downgraded to the *Special Restricted* shellfish classification. Instead, the assignment they are part of (Assignment 287) will be changed from the Adverse Pollution Condition (APC) strategy to the Systematic Random Sampling (SRS) strategy to obtain more samples for analysis.

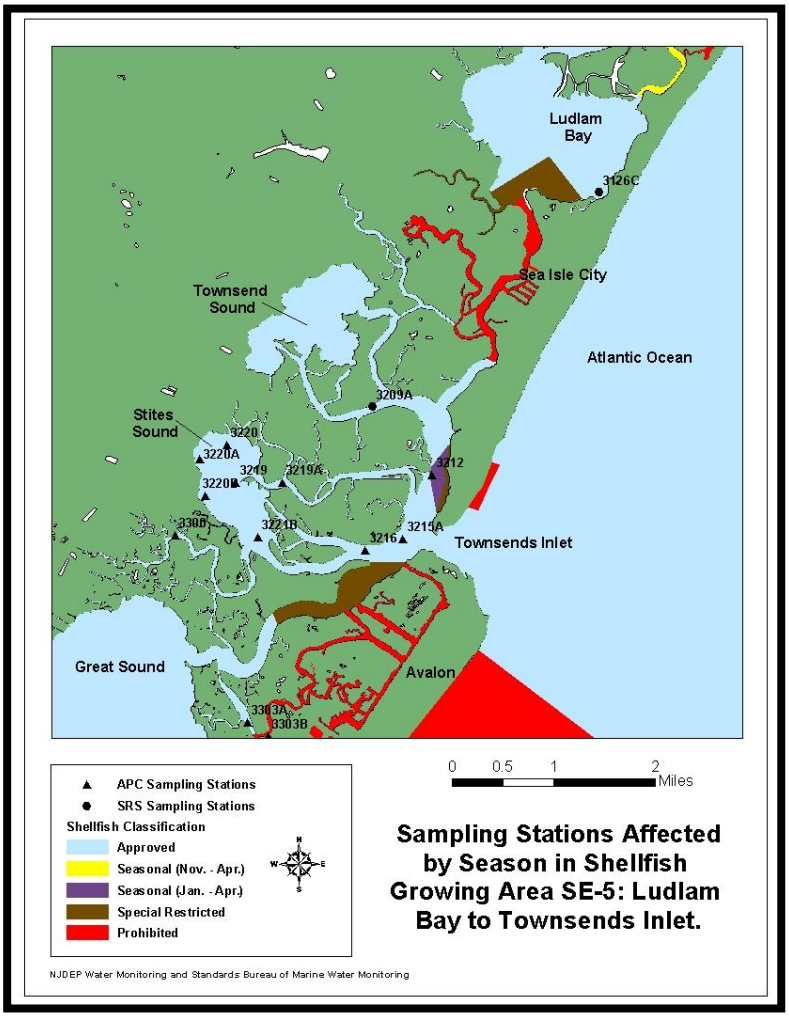


Seasonal Effects

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.

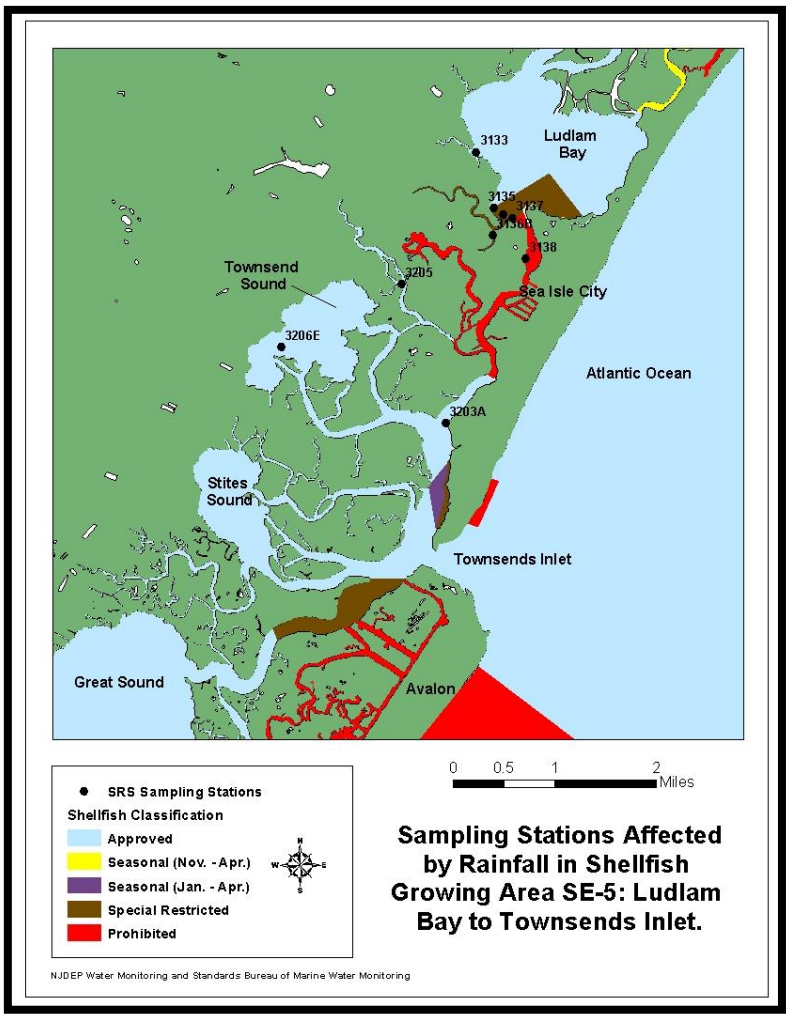
To determine whether seasonal variation can influence bacteria counts, WM&S/BMWM uses a t-test to compare the fecal coliform MPN values from samples collected during the summer season versus samples collected during the winter months. Based on the t-test results, 14 monitoring stations had a t-statistical probability of less than 0.05. The 12 APC monitoring stations showed a higher geometric mean during the summer than during the winter, while the two (2) SRS monitoring stations showed a higher geometric mean during the winter. This shellfish growing area was sampled with no seasonal preference.



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 fecal coliform MPN values from water samples collected during wet weather to water samples collected during dry weather from 1/1/2009 to 3/12/2014. The Wet/Dry Statistics were calculated based on a post impact time of 24 hours prior to the day of sampling and a wet/dry cutoff of 0.3 inches of rain. Any rainfall amounts above 0.3 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 1/1/2009 to 3/12/2014.



Based on a significant correlation between fecal coliform MPN values from wet/dry data for 1/1/2009 to 3/12/2014, an impact from rainfall was found to occur at nine (9) sampling stations in this shellfish growing area. These nine SRS sampling stations are located throughout this shellfish growing area, in *Approved*, *Special Restricted, and Prohibited* shellfish waters and showed a higher fecal coliform geometric mean during wet than dry conditions. However, the fecal coliform levels still meet the existing 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.

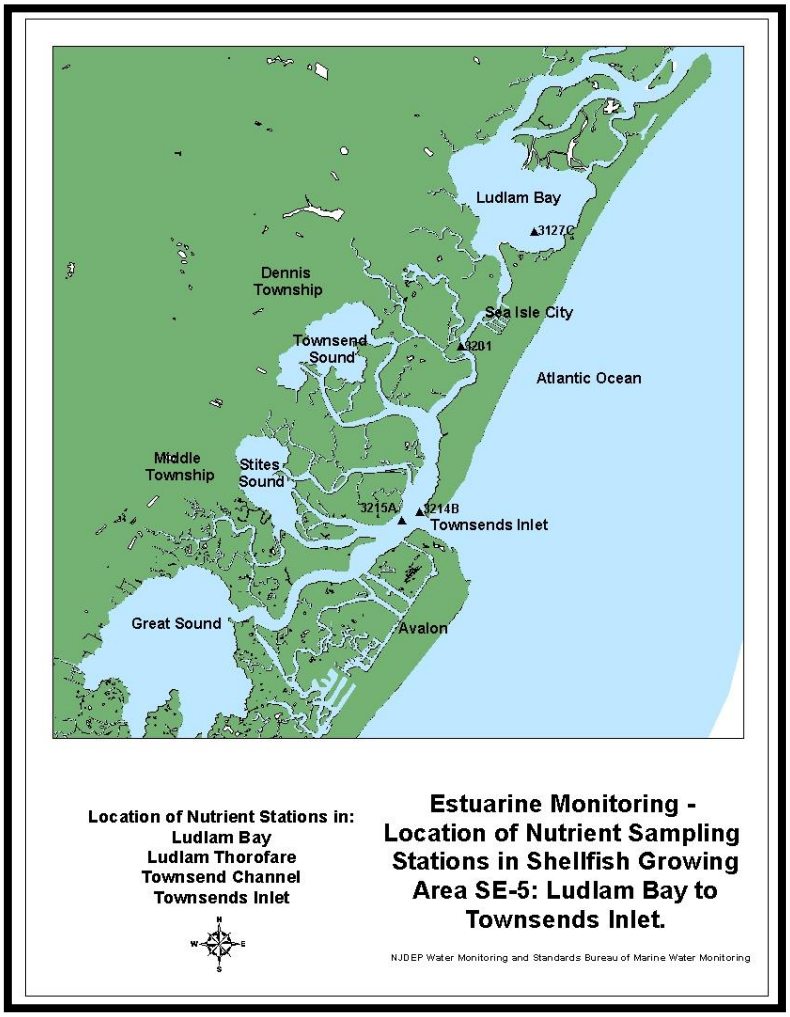
The Bureau of Marine Water Monitoring has begun to identify particular stormwater outfalls that discharge excessive bacteriological loads during storm events. In some cases, specific discharge

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

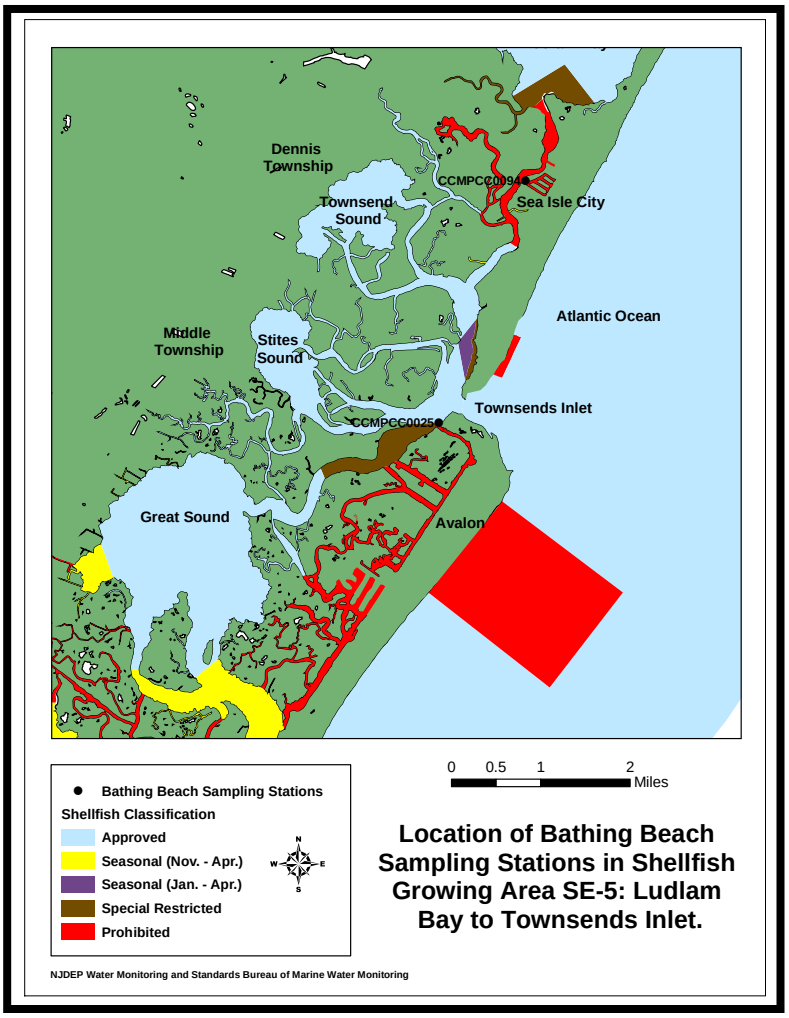
Nutrients

In this growing area, four 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. For full nutrient assessment, see the Estuarine Monitoring Reports, available electronically at:
http://www.state.nj.us/dep/bmw/



Bathing Beach

A review of the bathing beach data for 2009 to 2014 showed that there are two bathing beach sampling stations in this shellfish growing area. One of these bathing beach sampling stations is located in Ludlam Thorofare near Sea Isle City and the other bathing beach sampling station is located in Ingram Thorofare near Avalon. 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: www.njbeaches.org.



CONCLUSIONS

Based on the bacteriological data assessed, all but three of the sampling stations within this growing area meet their current shellfish classifications. The overall water quality for this growing area is good. No significant changes to landuse pattern, hydrography, or discharges that would change the shellfish waters classification in this area. However, it was proposed that the entire shellfish growing area would be sampled using the Systematic Random Sampling (SRS) strategy. Therefore, Asignment 287 (Great Sound and Townsends Inlet) would be changed from the APC to the SRS sampling strategy.

RECOMMENDATIONS

Continue sampling using the existing Systematic Random Sampling (SRS) Strategy for Assignment 247 and change the Adverse Pollution Condition (APC) strategy of Assignment 287 to SRS sampling strategy.

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