Sanitary Survey Report for Shellfish Growing Area A0Remote
(Absecon Inlet to Beach Haven Terrace)

December 2014

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NJ Department of Environmental Protection
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Sanitary Survey Report for Shellfish Growing Area A0Remote (Absecon Inlet to Beach Haven Terrace)

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2000 - 2009

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Cover Photo – From the Forsythe National Wildlife Refuge – Brigantine Unit, Oceanville, NJ

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EXECUTIVE SUMMARY

The water quality in the 15 Nautical Miles of Atlantic Ocean from Absecon Inlet in Atlantic County to Beach Haven Terrace in Ocean County (Shellfish Growing Area A0Remote) is consistent with its current *Approved* classification. As the waters of A0Remote (38,549 acres) are classified in their entirety as *Approved*, the criteria used for shellfish growing water classification review in this Sanitary Survey is based solely on *Approved* water classification (see figure that follows). The State of New Jersey 2009 Shellfish Growing Water Classification Charts (i.e., 10 – 12) also provide an excellent tool for viewing the location and classification for A0Remote (see *www.state.nj.us/dep/wms/bmw*).

The data included in this report represents samples collected between May 2000 and April 2009. Analysis of the data indicates the waters of A0Remote met all criteria for its current classification. It should be noted that these ocean shellfish growing waters do not contain any point sources of contamination although A0Remote is flanked by point sources to the South (Atlantic County Utilities Authority – Wastewater Treatment Facility Discharge Pipe) and North (Ocean County Utilities Authority – Southern Water Pollution Control Facility Discharge Pipe). Further, A0Remote is not detectably affected by non-point sources.

The lack of point and non-point sources in combination with acceptable water quality support the *Approved* shellfish growing water classification currently in effect and qualifies this section of coastline for its Remote Status designation. As such, the National Shellfish Sanitation Program's (NSSP) Guide for the Control of Molluscan Shellfish suggests that a minimum of 2 samples shall be collected annually and an analysis of the most recent 15 samples be undertaken to maintain an area with Remote Status designation.

A Remote Status area, by NSSP definition, allows for a water sampling frequency reduction (minimum of two samples yearly as opposed to five) while removing concern for any public health consequences due to the proven quality of the samples analyzed over time. This enables valuable sampling resources to be concentrated in areas containing pollution sources. With A0Remote, acceptable water quality prevails as noted within this report. At this time, there are no changes recommended for the classification of this shellfish growing area.
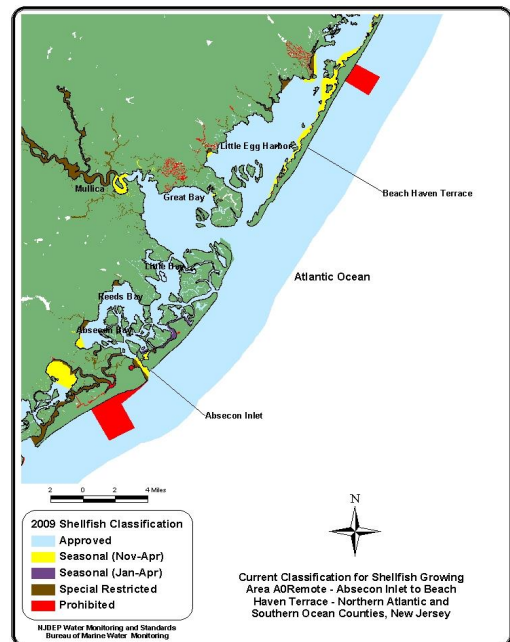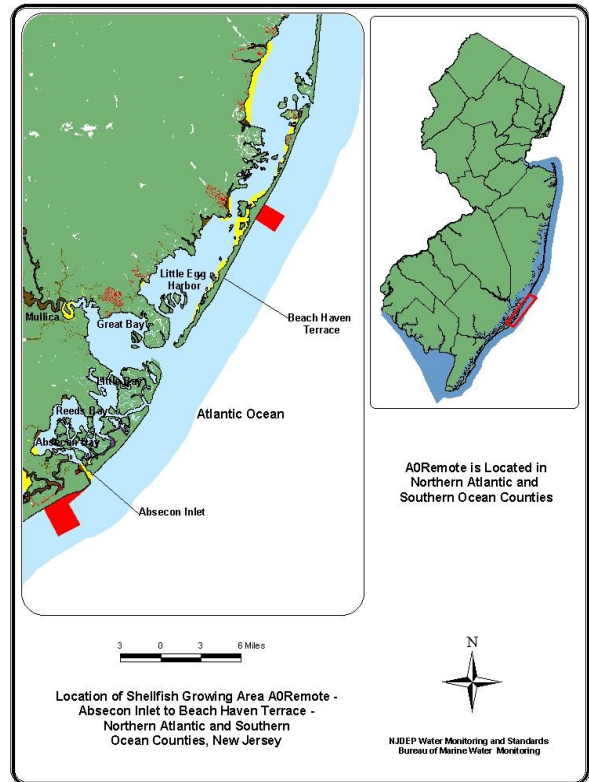
GROWING AREA PROFILE

LOCATION AND DESCRIPTION

The ocean shellfish growing waters discussed in this report include approximately 15 miles of coastline (see figure on right) from the north side of Absecon Inlet in the south to Beach Haven Terrace in the north, and offshore to the State's three (3) mile jurisdictional limit (Please Note: all references to "miles" in this report are in Nautical Measure, whereby, one Nautical Mile equates to 6,086 feet).

About half of the land comprising the adjoining beachfront of A0Remote is part of the Edwin B. Forsythe National Wildlife Refuge. As a result, there is relatively little impact from this area as storm water and treatment facility infrastructure is absent within the coastal composition of the wildlife refuge. The area that comprises the City of Brigantine (Brigantine) and a portion of the communities belonging to Long Beach Island, make up the remainder of coastal A0Remote. These urban locations are primarily comprised of residential homes. Commercial properties in these areas are relatively limited.

Location of Shellfish Growing Area A0Remote - Absecon Inlet to Beach Haven Terrace - Northern Atlantic and Southern Ocean Counties, New Jersey

A0Remote is Located in Northern Atlantic and Southern Ocean Counties

NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring

As previously mentioned, there are no direct or point sources of pollution associated with the waters of A0Remote. The closest direct sources would be the Atlantic County Utilities Authority (ACUA) – Wastewater Treatment Facility discharge pipe, situated 3.68 Nautical Miles to the south of the northern side of Absecon Inlet, where A0Remote begins. To the north, the Ocean County Utilities Authority (OCUA) – Southern Water Pollution Control Facility discharge pipe is situated 4.88 Nautical Miles from Beach Haven Terrace or the northern extent of A0Remote.

Based on sampling results, these outfalls have no significant impact on the bacterial levels of the waters of A0Remote. Lack of impact can be attributed to the significant distance between this growing area and the above mentioned outfalls. This distance provides for considerable dilution to the effluent produced by the treatment facilities.

Rainfall runoff provides little impact to the water quality of this shellfish growing area as stormwater drainage is directed toward the bayside. Any waters having been impacted by stormwater runoff on the bayside of Long Beach Island or Brigantine are substantially diluted before exiting the Absecon and Beach Haven Inlets and entering the ocean waters of A0Remote.

GROWING AREA CLASSIFICATION SUMMARY

In a 1994 report for A0Remote covering the time frame 1991 to 1993, it was recommended this shellfish growing area be designated as having Remote Status. Remote Status, as suggested in NSSP's shellfish guide, is applicable for shellfish growing waters which are not impacted by any actual or potential pollution sources, and those waters meet *Approved* classification criteria. The stations within A0Remote have had a continuous record of satisfying NSSP criteria for Remote Status both then and now.

The last report written for Shellfish Growing Area A0Remote was a 2007 Reappraisal (rewritten Dec. 2014) covering the years 1998 – 2006. The shellfish growing waters under analysis as A0Remote met the NSSP's criteria for *Approved* in that report, as well.

All such reviews have determined that there are no direct source inputs to the waters of this shellfish growing area. And, water quality represented by monitoring data suggests stormwater runoff, which is generally directed to the bayside in this area, appears to receive substantial dilution before reaching the ocean shellfish growing waters of A0Remote.

In the 2007 Reappraisal for A0Remote, it was decided that the area's *Approved* shellfish growing water classification would remain in effect and that this growing area's Remote Status designation should be continued. The information contained within this Sanitary Survey for the years, 2000 – 2009 will contend the same, as there are no changes recommended for A0Remote. The shellfish growing water classifications by percentage and acreage are shown in the figures below.
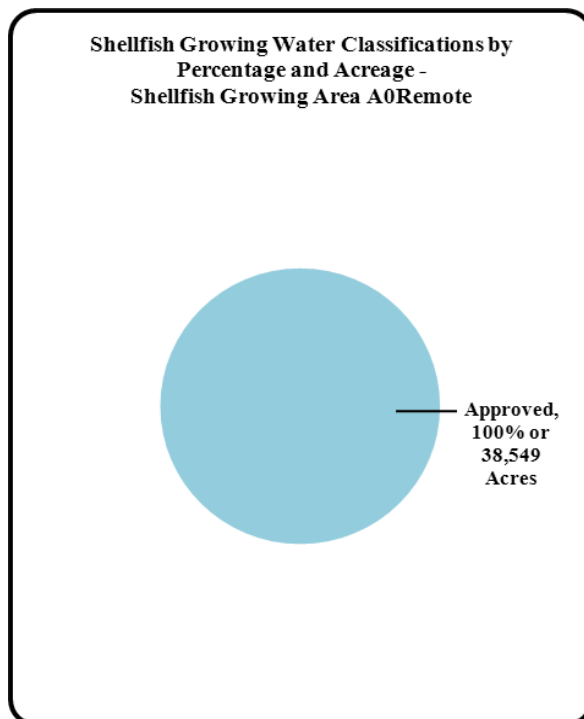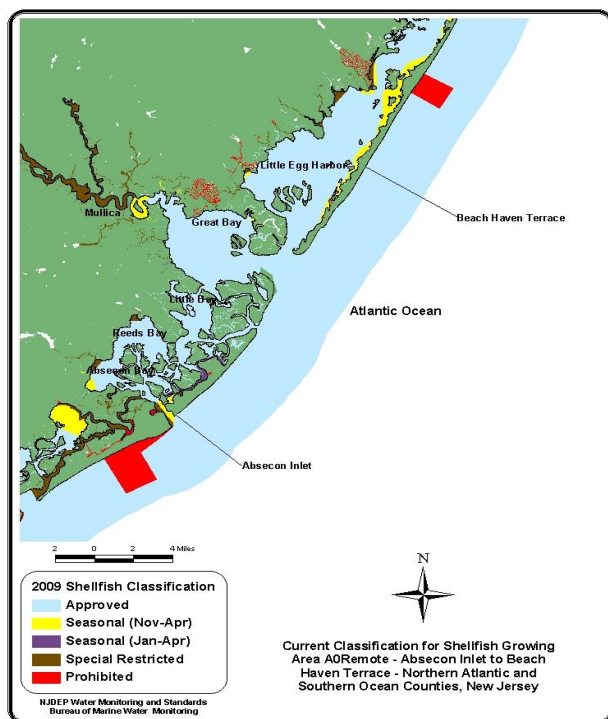
EVALUATION OF BIOLOGICAL RESOURCES

Historically, *Approved* ocean waters have been used for harvesting surf clams (<u>Spisula</u> <u>solidissima</u>) and blue mussels (<u>Mytilus</u> <u>edulis</u>) by dredge boats licensed by the Division of Fish and Wildlife. Surf clams (for bait purposes only – non-human consumption) can also be harvested from *Prohibited* areas under a special program administered by WM&S/BMWM and enforced by the Division of Fish and Wildlife.

In addition to being the State's largest molluscan fishery (i.e., regarding lbs. landed), New Jersey's surf clam fishery historically leads all other surf clamming states in total annual landings, and continues to do so according to the most recently released statistics from NOAA's National Marine Fisheries Service. The table below denotes commercial landings in pounds of meat and ex-vessel value for New Jersey surf clams from 1993 through 2009.

Commercial Data for Surf Clams Showing Pounds of Meat and Ex-vessel Value for New Jersey Landings (1993 - 2009). Source: NOAA - National Marine Fisheries Service		
Year	**Lbs. of Surf Clams Landed**	**Ex-vessel Value**
1993	47,978,097	$ 21,802,735
1994	48,572,236	$ 26,840,477
1995	46,329,437	$ 27,443,281
1996	48,740,881	$ 28,983,170
1997	45,603,401	$ 27,168,453
1998	44,751,327	$ 23,060,750
1999	49,299,900	$ 25,371,922
2000	58,047,629	$ 31,371,354
2001	52,872,341	$ 29,326,676
2002	53,590,740	$ 29,172,373
2003	51,336,955	$ 27,431,645
2004	43,521,704	$ 22,284,335
2005	38,967,993	$ 20,028,662
2006	43,643,726	$ 25,106,785
2007	44,791,212	$ 26,546,602
2008	39,346,425	$ 24,349,551
2009	32,893,521	$ 20,568,576

Since New Jersey's surf clam industry is at the national forefront in total landings, monitoring, management, and conservation of this resource is very important to the State. In this regard, the New Jersey Surf Clam Advisory Committee, comprised of industry and government representatives, in conjunction with the Commissioner for the New Jersey Department of

Environmental Protection, sets the quotas for harvest. A brief history of those quotas and the ocean bi-valves with the largest landings for the State are shown in the tables that follow.

New Jersey Surf Clam Quotas in Industry Bushels by Year (1996 – 2009). Source: New Jersey Department of Environmental Protection, Bureau of Shellfisheries	
Surf Clam Harvest Year	**Surf Clam Quotas in Industry Bushels**
1996 - 1997	600,000
1997 - 1998	600,000
1998 - 1999	700,000
1999 - 2000	700,000
2000 - 2001	700,000
2001 - 2002	600,000
2002 - 2003	600,000
2003 - 2004	275,000
2004 - 2005	350,000
2005 - 2006	237,000
2006 - 2007	240,000
2007 - 2008	198,000
2008 - 2009	58,368

Ocean Bi-Valves w/ Largest Landings Reported for New Jersey (0 - 3 Miles Distance from Shore highlighted in yellow)									
		DISTANCE FROM N. J. SHORE							
		0 - 3 MILES		3 - 200 MILES		HIGH SEAS		COMBINED TOTALS	
COMMON BI-VALVE NAME		Pounds of Meat (000)	Dollars (000)	Pounds of Meat (000)	Dollars (000)	Pounds of Meat (000)	Dollars (000)	Total Pounds of Meat (000)	Total Dollars (000)	Price/ Pound of Meat
Surf Clam		7,959	4,641	17,130	11,370	-	-	25,089	16,011	$.64
Sea Scallops		56	497	14,098	108,492	-	-	14,155	108,990	$7.70
Ocean Quahog		2,141	1,104	11,307	6,775	-	-	13,448	7,878	$.59
-- TOTALS --		10,156	6,242	42,535	126,637	-	-	52,692	132,879	

Adapted from: Landings by Distance from U.S. Shores, 2010, State of New Jersey, National Marine Fisheries Service - Fisheries Statistics and Economics Division - Report printed on: 02/27/13
* No Data Available

SHORELINE SURVEY: EVALUATION OF POTENTIAL POLLUTION SOURCES

Shoreline surveys or site specific tours of areas nearby or abutting shellfish growing waters can provide insight as to the location and nature of land use, surface water discharges, marinas, unpermitted discharges, and stormwater inputs. Shoreline surveys for A0Remote were conducted

on July 09, 2010 and November 19, 2010. The following sections detail information derived collectively from those surveys, and any that preceded them.

LAND USE

Areas for new development are generally limited within the municipalities or boroughs abutting A0Remote as much of the land that could be used for such projects has already been developed. Under normal circumstances, some new construction projects do take place in areas where homes are torn down and new homes are constructed. And, there are some new home projects taking place on previously vacant land. In addition, many of the homes and businesses within coastal A0Remote do undergo reconstruction and refurbishment from time to time.

Impact from construction is unlikely though due to the nature of the land and water abutting and surrounding this shellfish growing area. Construction projects bordering on eco-sensitive areas such as those in A0Remote are required by local, state, and federal regulations to utilize specific setbacks and buffers as a means of protecting flora and fauna specific to wetland, riparian, or estuarine locations. The use of these buffers can never be understated as their utilization suggests construction is unlikely to severely impact surrounding natural ecosystems.

Aside from contributing to productivity, wetland and estuarine zones provide valuable habitat for many marine species during some point of their life cycle. In addition, some plant species within these zones take up contaminants from the ecosystem.
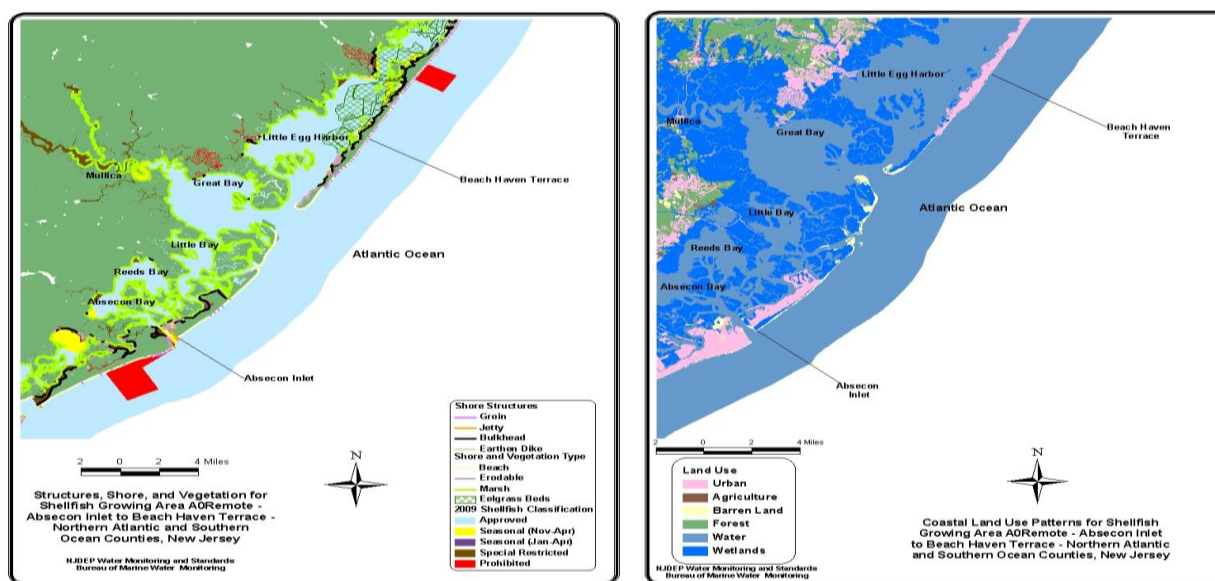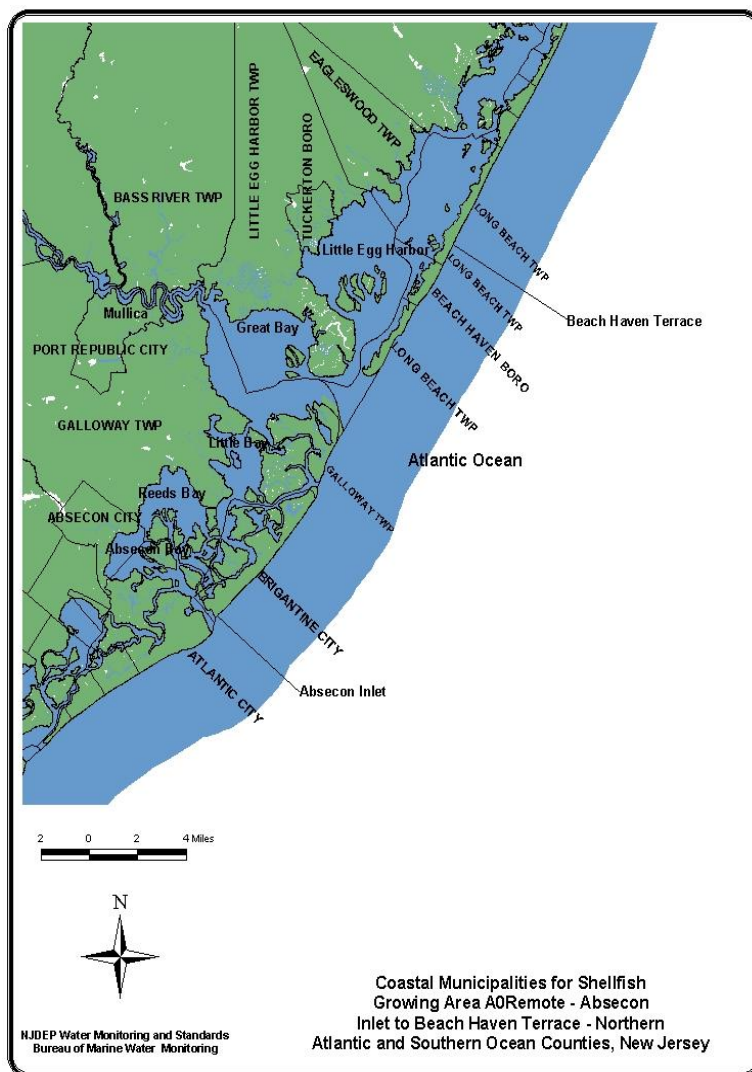

Large areas of wetlands and coastal vegetation can be found in close proximity to urban development in A0Remote. The largest of these areas are located in the Brigantine and Holgate units of the Edwin B. Forsythe National Wildlife Refuge (i.e., northern Brigantine and southern Long Beach Island), as shown in the above maps.

The lands adjacent to Shellfish Growing Area A0Remote can geophysically be described as barrier islands. The predominant land use on these barrier islands is urban.

There are a number of mainland communities situated just to the west of A0Remote, as shown in the figure to the right. Presently, WM&S/BMWM water quality testing shows that these communities have minimal impact on the waters of this growing area with regard to their septic/sewerage infrastructure and current population.

Although homes along coastal A0Remote utilize the wastewater treatment facilities associated with ACUA and OCUA's southern plant, there are pockets of homes that utilize septic systems within the nearby Pinelands. Septic is primarily utilized in areas of lower population density. Generally, the availability for access to city sewage infrastructure is less likely in these areas. There are always concerns regarding nutrient loading and elevated coliform levels within watersheds near communities utilizing septic. However, the distance from these communities to this growing area provides a safety zone for dilution.

Coastal Municipalities for Shellfish Growing Area A0Remote - Absecon Inlet to Beach Haven Terrace - Northern Atlantic and Southern Ocean Counties, New Jersey

NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring

SURFACE WATER DISCHARGES – TREATMENT FACILITY WASTEWATER EFFLUENTS

Evaluation and compliance of shellfish growing areas is ascertained using NSSP criteria as contained in the *Guide for the Control of Molluscan Shellfish*, 2013. Interaction between the State and treatment plants is important in determining plant efficiency, which integrally relates to the eventual effluent quality discharged into ocean waters off the coast of New Jersey. State effluent standards for direct discharge, and treatment facility wastewater effluent discharge locations near A0Remote are shown in the table and figure on the next page.

Effluent Standards for Direct Discharge to Surface Water from Publicly/Privately Owned Wastewater Treatment Facilities – NJPDES Permit Regulations (7:14A – 12.2 – 12.5)	
Avg. BOD5 Level/Wk.	≤ 45 mg/L
Avg. BOD5 Level/Mo.	≤ 30 mg/L
Avg. BOD5 % Removal/ Mo.	≥ 85%
or Avg. CBOD5 Level/Wk.	≤ 40 mg/L
or Avg. CBOD5 Level/Mo.	≤ 25 mg/L
or Avg. CBOD5 % Removal/ Mo.	≥ 85%
Avg. TSS Level/Wk.	≤ 45 mg/L
Avg. TSS Level/Mo.	≤ 30 mg/L
Avg. TSS % Removal/ Mo.	≥ 85%
Geo. Mean FC/Wk.	≤ 400 MPN/100 mL
Geo. Mean FC/Mo.	≤ 200 MPN/100 mL

Sewage from communities adjacent or near A0Remote is carried to wastewater treatment facilities by sanitary sewers. In the case of Brigantine, sewage is treated by the Atlantic County Utilities Authority – Wastewater Treatment Facility (ACUA – WTF) for eventual ocean discharge off Ventnor (south of Brigantine and A0Remote).

Beach Haven Terrace and communities south through Holgate on Long Beach Island, utilize the Ocean County Utilities Authority – Southern Water Pollution Control Facility (OCUA-SWPCF). Effluent from OCUA's southern facility is ultimately disposed of off Ship Bottom (north of Beach Haven Terrace and A0Remote).
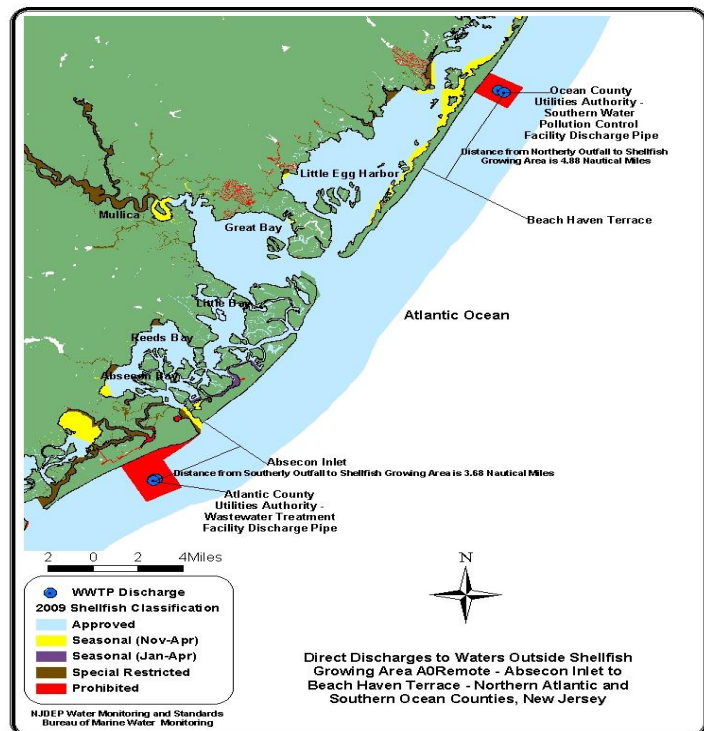
No effluent is discharged into the shellfish growing waters of A0Remote. The effluent discharge lines and outfalls for the above mentioned treatment facilities are located 3.68 to 4.88 nautical miles outside the borders of A0Remote.

Recent site visitations and current information for the above treatment facilities suggests that they are able to and can operate efficiently with regard to design, current population demands, and emergency events (e.g., storm situations – plant/operator failure). More specific evaluations for these plants can be found in reports for A0South and A0Cent, as the ACUA and OCUA treatment facilities can respectively be found in those shellfish growing areas. A0South and A0Cent reports can be found at *www.state.nj.us/dep/wms/bmw*.

SPILLS, UNPERMITTED DISCHARGES, AND CLOSURES

The map to the right shows the location of spills or unpermitted discharges that occurred in areas that have relative proximity to the A0Remote coastal boundary. These occurrences were reported within the time frame that this report was written. These spills or unpermitted discharges did not result in the closure of waters in shellfish growing area A0Remote.

Leaks or spills that do take place within New Jersey's shellfish growing waters are often the result of a variety of circumstances such as boats sinking; issues with sewage treatment plants such as pump station failure, broken sewer lines, sewer line back up, manhole overflow, broken pipes in commercial or residential locations, improper run off from commercial or residential locations, construction, and road runoff.

Location of Spills Near Shellfish Growing Area A0Remote - Absecon Inlet to Beach Haven Terrace - Northern Atlantic and Southern Ocean Counties, New Jersey
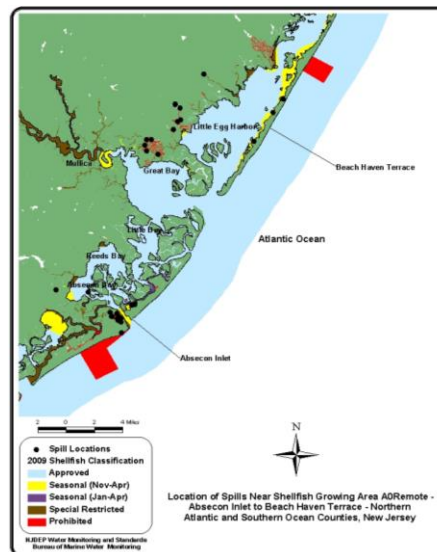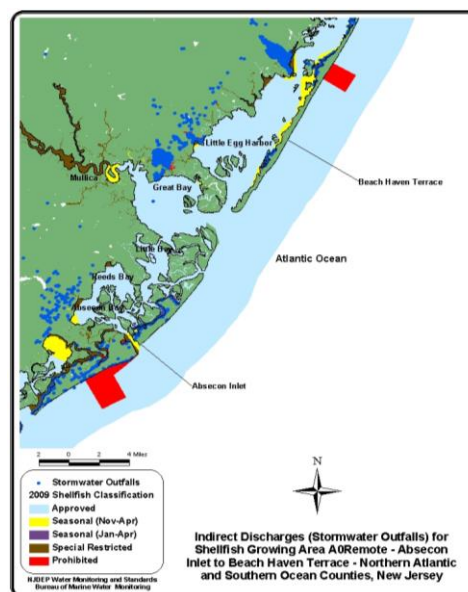
Often, the spills or unpermitted discharges noted above have limited impact on the chemical or bacteriological water quality in a shellfish growing area like A0Remote. Generally, the spills and discharges are rather small, and their distance to these shellfish growing waters is such that impact is reduced from dilution, percolation, and absorption. From the perspective of this report, which is generally founded on bacteriological results for fecal coliform, WM&S/BMWM station data for A0Remote continue to show good water quality. Again, no specific spill or discharge brought about the closure of shellfish growing waters for A0Remote during this reporting period.

STORMWATER DISCHARGES

Environmental pressures on shellfish beds in New Jersey can originate in materials that enter growing waters via stormwater. These materials include bacteria, as well as other waste that enters the stormwater collection system. Management of stormwater runoff along this section of coastline (adjacent to A0Remote) consists of directing flow into rivers and back bays (away from the ocean), as shown in the map to the right.

As suggested in the section on Land Use, shoreline surveys were conducted for A0Remote during July 2010 and November 2010. The field work conducted during those surveys continued to be supportive of past surveys, in that it validated statements in previous reports suggesting stormwater runoff is extremely limited in its potential to impact A0Remote due to dilution, percolation, and absorption.

Indirect Discharges (Stormwater Outfalls) for Shellfish Growing Area A0Remote - Absecon Inlet to Beach Haven Terrace - Northern Atlantic and Southern Ocean Counties, New Jersey

For the town of Brigantine, the topography is fairly flat. As a result, a limited amount of stormwater infrastructure is designed to direct stormwater towards drainage systems which empty into the base of sand dunes at the top of ocean block streets, where percolation and filtration take place. In these instances, there can be up to 200 feet of dune expanse (width) and another 300-foot width of beach for stormwater to travel before possibly reaching the ocean. Stormwater runoff in these areas is absorbed through substantial layers of vegetation and sand.

In other cases, Brigantine uses catch basins located near the dune line to capture storm water inputs for disposal, percolation, and in many cases, redirection away from the ocean. Catch basins are more commonly utilized as replacement infrastructure today.

Where topography allows for drainage to the back bay for dilution of stormwater inputs, the town of Brigantine frequently attempts to capture stormwater debris and floatables prior to their entering the bay. This is done with the help of a rubber boot that is placed over some outfall openings.

Rubber boots are helpful in retaining stormwater debris providing a town routinely cleans and maintains the capture basins. Shoreline surveys suggest the town of Brigantine does do a good job keeping up on debris removal from such retention areas.

In the northern sector of this growing area, we find that Long Beach Island's topography slopes away from the ocean. As such, stormwater runoff is primarily directed and discharged toward the bay. Although surface runoff from Long Beach Island eventually enters the ocean shellfish growing waters of A0Remote through Beach Haven Inlet, any input of this type should be substantially diluted upon arrival.

A large portion of the water flowing into the southerly sector of this growing area from Beach Haven Inlet and, to a lesser degree, from Absecon Inlet, comes from estuarine areas classified in large part as *Approved* shellfish growing waters. Those estuarine areas include Little Egg Harbor, Great and Little Bays, along with large portions of Reeds and Absecon Bays. These embayment's do receive many of the stormwater inputs that might otherwise be directed into the ocean waters of A0Remote. These inputs are substantially diluted within these systems when considering the total area or acreage these bays comprise. As these embayment's eventually feed into the ocean shellfish growing waters of A0Remote, it is important to understand that their water quality in terms of bacteriological monitoring and related data is generally good, despite stormwater inputs they receive. This lends support to the suggestion that impacts from stormwater inputs are fairly limited for this shellfish growing area.

As previously mentioned, major portions of the shoreline bordering the central to south central sections of A0Remote are comprised of the Holgate Unit (more than 400 acres) and Brigantine Unit (approx. 1415 acres) of the Edwin B. Forsythe National Wildlife Refuge. These refuge areas contain vast indigenous and migratory bird populations as shown by shoreline surveys. Together, the sectors of refuge adjoining A0Remote represent a portion of more than 46,000 acres of national coastal preserve and habitat, specifically set-aside for birds and other wildlife.

Inputs from wildlife and avian populations can contribute higher levels of FC to the water

column from direct input or indirect runoff. In the case of A0Remote, bacteriological levels suggest there is no impact derived from these populations. Distance between A0Remote waters and wildlife populated areas of the refuge appears substantial enough to reduce or limit coliform inputs to these shellfish growing waters by dilution processes.

WATER QUALITIES STUDIES

SAMPLING STRATEGY

Shellfish growing area A0Remote was sampled using the Remote Status Sampling Strategy. As summarized in the Executive Summary, remote status consists of a sampling strategy requiring a minimum 15 sample composite of data [similar to the Adverse Pollution Condition (APC) Sampling Strategy], collectively supported by a minimum requirement of two samples per year.

Each shellfish producing state is directed to adopt either the total coliform or fecal coliform criterion to classify its waters. The criteria were developed to ensure that shellfish harvested from designated waters would be free of pathogenic (disease-producing) bacteria. Combinations of coliform analysis criterion may also be used.

This report was written in 2010, and at that time, FC analysis was accomplished using direct 3 tube, A-1. While New Jersey had been using fecal coliform analysis (direct 3 tube, A-1) and criteria for its ocean waters and total coliform analysis (3 tube, three dilution) and criteria for its back bay areas, BMWM/WM&S switched all State shellfish growing areas over to the criteria for fecal coliform in February, 2012, and the method for analysis changed as well.

BMWM/WM&S now use mTEC agar plating to facilitate the fecal coliform bacteriological analysis for samples taken within New Jersey shellfish growing areas, and had been acquiring adjunct mTEC data for its growing areas for some time in order to statistically facilitate the transition to mTEC. Statistical facilitation, in the case of Shellfish Growing Area A0Remote refers to the combination of past, 3 tube, A-1 data with current mTEC data in order to obtain statistically valid measurements during the transition.
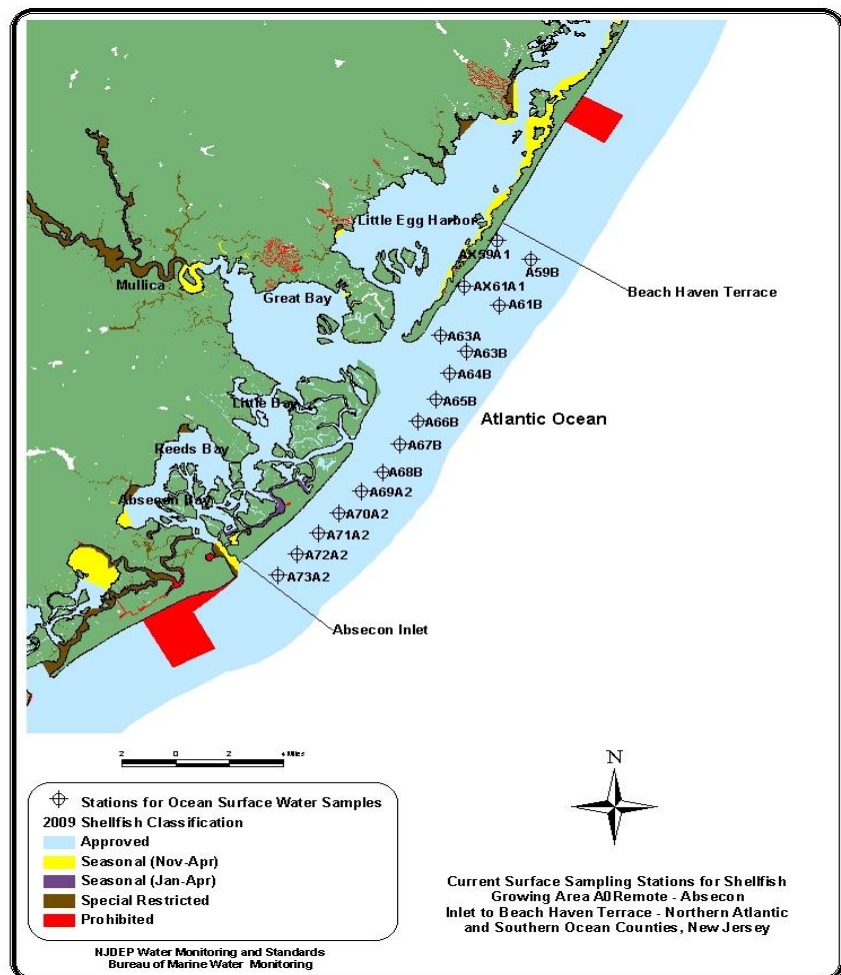
Each classification criterion is composed of a measure of the statistical "central tendency" (geometric mean) and the relative variability of the data set. For the Adverse Pollution Condition sampling strategy, variability is expressed utilizing the 90th percentile, and this statistical analysis is also expressed or utilized when analytically reviewing stations located in areas of Remote Status. Although the State has only *Approved* and *Prohibited* classifications in its ocean waters, an area to be *Approved* under the *Seasonal* classification using APC would have to be sampled and meet the criterion during the time of year that it is *Approved* for the harvest of shellfish. The table that follows shows the statistical criteria for the APC strategy. The area on the chart highlighted in yellow represents the criteria used when analyzing with direct 3 tube, A-1, which was utilized in the preparation of this report.

Statistical Criteria for Adverse Pollution Condition/Remote Status Sampling Strategy				
	Total Coliform Criteria		Fecal Coliform Criteria	
	Geometric mean (MPN/100 mL)	No more than 10% of samples can exceed (MPN/100 mL)	Geometric mean (MPN/100 mL)	No more than 10% of samples can exceed (MPN/100 mL)
Approved Water Classification	70	330	14	49 w/ direct 3-tube, A1 / 31 w/ mTEC Agar
Special Restricted Water Classification	700	3300	88	300 w/direct 3-tube, A1 / 163 w/ mTEC Agar

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: ARCMAP).

Water sampling was performed in accordance with the Field Sampling Procedures Manual (NJDEP, 2005). Water quality sampling, analysis, and shoreline/watershed surveys were conducted in accordance with the NSSP *Guide for the Control of Molluscan Shellfish,* 2013.

The results were compiled from the 16 surface stations that comprise Assignment 471. A review of the records suggests 240 water samples were collected for fecal coliform bacterial analysis between 2000 and 2009 and analyzed using direct 3 tube, A-1 analysis. Additional information on lab methodology and sampling strategy can be found in the Shellfish Growing Area Report Guidance Document.

Current Surface Sampling Stations for Shellfish Growing Area A0 Remote - Absecon Inlet to Beach Haven Terrace - Northern Atlantic and Southern Ocean Counties, New Jersey

NJDEP Water Monitoring and Standards Bureau of Marine Water Monitoring

Stations for Ocean Surface Water Samples
2009 Shellfish Classification
Approved
Seasonal (Nov-Apr)
Seasonal (Jan-Apr)
Special Restricted
Prohibited

The shellfish growing water monitoring stations from Absecon Inlet to Beach Haven Terrace (A0Remote) are presented in the figure on the previous page. Classification determinations were made by WM&S/BMWM at Leeds Point based on the data gathered from monitoring and analysis.

BACTERIOLOGICAL QUALITY

Compliance with NSSP APC Approved Criteria

For this Sanitary Survey, final analyses in conjunction with NSSP requirements for *Approved* waters suggests this shellfish growing area is appropriately classified, as *Approved* in its entirety. No stations had geometric means or 90th percentile scores that exceeded requirements for *Approved* shellfish growing waters using fecal coliform direct 3 tube A-1 analysis.

The raw data provided just one instance of elevated fecal coliform levels (one of 240 samples with an MPN of 43/100 mL on 6/05/03 - station A69A2). As this occurrence was rare, it registered no impact for statistical summaries on final evaluation.
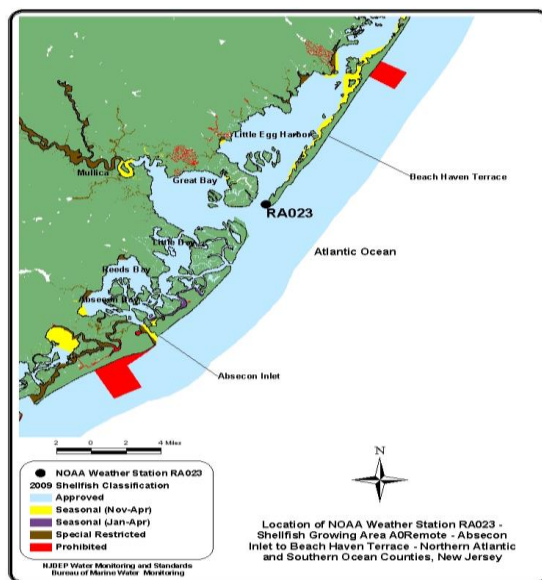
The appropriate data analysis for this shellfish growing area (geometric mean shall not exceed 14 MPN/100 mL and not more than 10% of the samples should exceed 49 MPN/100 mL) produced no stations exceeding statistical criteria on summary evaluation for *Approved* waters. The data presented in this report show most stations had geometric means of 2.6 MPN/100 mL and none were higher than 3.2 MPN/100 mL. And, all monitoring stations for A0Remote showed 0 % greater than 49 for the 90th percentile in the raw data with 15 or more samples.

With this, the bacteriological water quality for this growing area is conducive for harvesting shellfish that are safe for human consumption. All data sets support the currently classified *Approved* waters for A0Remote.

Rainfall Effects

Precipitation patterns in the coastal areas of New Jersey are typical of the Mid-Atlantic coastal region. Summer storms are localized and often associated with thunder and lightning activity. Winter storms are frequently associated with northeasters. Hurricanes can occur during the summer and early fall. Additional information on annual storm averages, duration, intensity, and event volume is provided in the Shellfish Growing Area Report Guidance Document.

Precipitation data for A0Remote was provided by the National Oceanic and Atmospheric Administration (NOAA) with WM&S'/BMWM's use of station RA023 (see map to the right) for the shellfish growing area.

Location of NOAA Weather Station RA023 - Shellfish Growing Area A0Remote - Absecon Inlet to Beach Haven Terrace - Northern Atlantic and Southern Ocean Counties, New Jersey

The bacteriological water quality analysis for precipitation in this shellfish growing area report revealed no impact or effect from rainfall for this reporting period. As a result, no change in sampling strategies or shellfish classifications, related to precipitation are required at this time. In addition, large storms, or severe winter, cyclonic events ("nor'easters"), have not been all that significant during this review period, and impact from hurricanes was limited during that same time frame.

RELATED STUDIES

Nutrients

WM&S/BMWM perform additional water quality studies related to the bacteriological monitoring program. Nutrient monitoring and the collection of nutrient data is an example of one of those studies, and is part of WM&S'/BMWM's Ambient Marine Water Monitoring Program.

Stations for the Ambient Marine Water Monitoring Program are derived from an area weighted probabilistic sampling design. This provides a broader assessment, based on acreage of estuarine waters. Ocean waters are also sampled although in lessor frequency than State back bay waters.

Currently, there are 40 + nutrient sampling stations within the estuarine waters of New Jersey. At the time this shellfish growing area report was written, ocean nutrient sampling for this growing area involved seven stations, as shown in the map below.

Chlorophyll data are also contained within the nutrient data. As such, WM&S'/BMWM is able to maintain an ongoing picture of algal activity within State waters. This chlorophyll data also proves to be useful as adjunct information to the Bureau's phytoplankton monitoring program.

Increased chlorophyll levels are also identified by WM&S/BMWM with the aid of a remote chlorophyll flight sensor. WM&S'/BMWM's remote aircraft sensing began in 2007, and involves partnerships with New Jersey's Forest Fire Service (plane services), Rutgers (data storage); USEPA Region 2 (funding). With this program, flights take place six days a week, weather permitting, during spring and summer. These flights provide estimates of State coastal chlorophyll levels and a perspective on bloom conditions/trends.
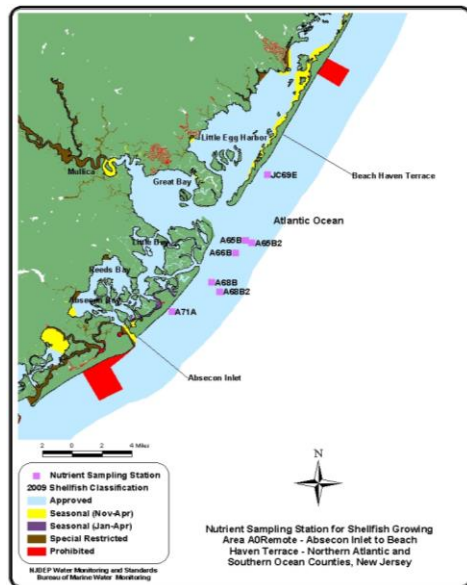
If chlorophyll sensing suggests an area of the State is experiencing a bloom, WM&S/BMWM target sample from shore or by boat. Subsequently, such samples are analyzed at the Leeds Point Lab so species type and concentration levels are known.

Further information on nutrients within State waters is available at *www.state.nj.us/dep/wms/bmw* in report sections such as those referring to Estuarine and Coastal Water Quality. Ambient results and nutrient data additionally serve other reports such as the States' Integrated Assessment Report.

Phytoplankton Monitoring

The WM&S/BMWM phytoplankton monitoring program involves the collection of water column samples in order to evaluate and determine the presence of marine biotoxins associated with certain algal species, as NSSP requires shellfish harvesting states to have a Biotoxin Contingency Plan. Were there to be a toxic algal bloom for some duration, shellfish tissue samples would also be analyzed, and if found to contain toxins, the State would be required to close impacted shellfish growing waters.

Although New Jerseys marine waters are generally not associated with toxic algal species or blooms of this type, the Biotoxin Contingency Plan is required for public health and safety, as ingestion of shellfish that have fed on toxic algal species, can cause an array of human health issues.

Currently, the WM&S/BMWM Phytoplankton monitoring program consists of 48 marine water stations (see figure on right), located in both estuarine and front ocean waters. The data and information gathered in this sampling is used as adjunct information, if necessary (bloom and species dependent), in

WM&S/BMWM Stations for Phytoplankton Monitoring Program
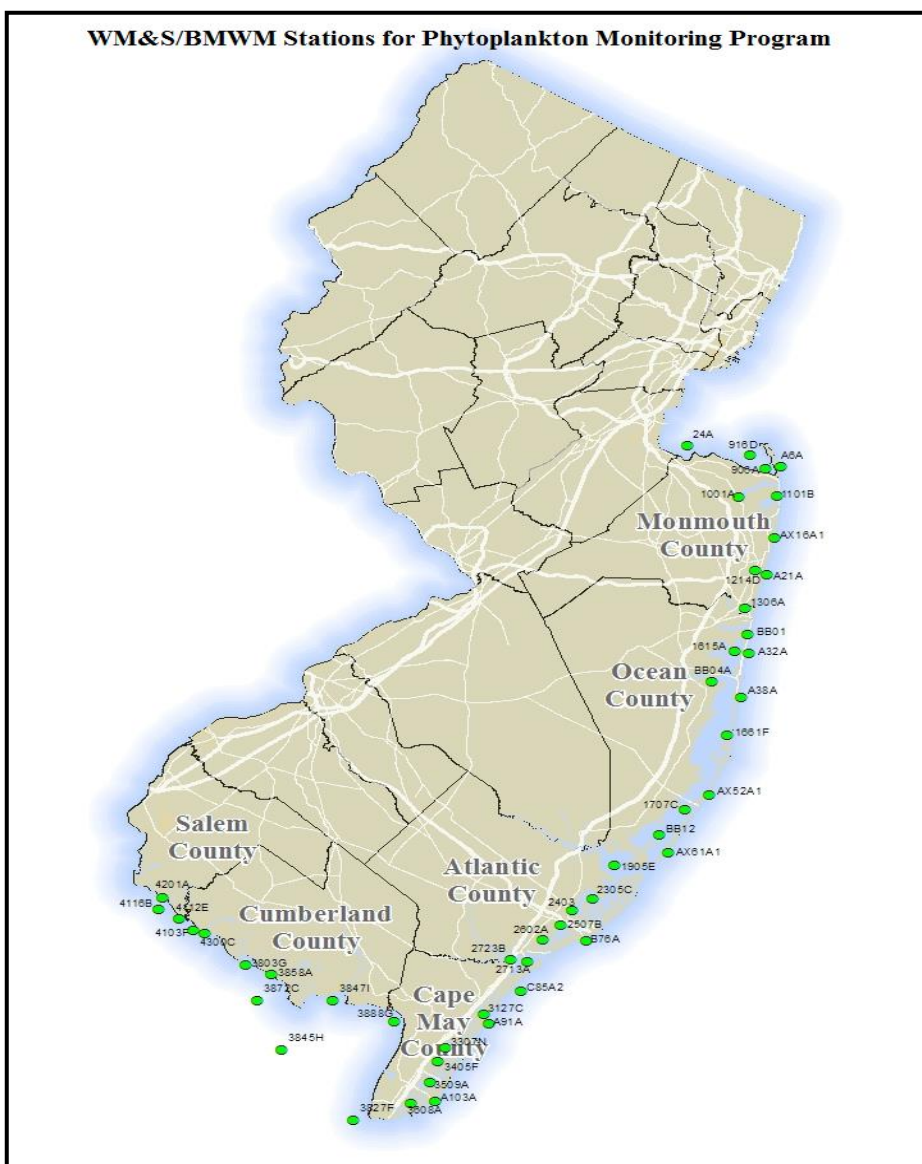
State Annual, Reappraisal, and Sanitary Survey reports for shellfish growing areas. Additionally, reports denoted as Summary of Phytoplankton Blooms have been compiled and are available electronically at *www.state.nj.us/dep/wms/bmw*.

Currently station AX61A1 has been allocated as the phytoplankton station within the A0Remote shellfish growing area. Limited results exist for this station thus far but a review of WM&S'/BMWM's Annual Summary of Phytoplankton Blooms and Related Conditions in New Jersey Coastal Waters suggests populations of phytoplankton are generally sparse to the north and south of this station, where phytoplankton stations have been located for some time. And, toxic species blooms of any duration have not been associated with the areas where those stations are located (again see *www.state.nj.us/dep/wms/bmw*).

There are occasional occurrences of algal blooms in all ocean waters in New Jersey, and these can occur throughout the year. The warmer months of spring and summer provide a very common period for algal growth, though.

It is more frequently the discoloration of the water from algal blooms that causes issues along New Jersey's coastal waters rather than the toxicity of the phytoplankton. For example, brown tides resulting from one of New Jersey's more frequent algal blooms can be spotted in back bay waters, inlets, and occasionally the ocean, near inlet passageways. This generally occurs during May and June. However, aside from the bloom causing discoloration of the water, there are no known threats to human health from brown tides. For this reason, they are not considered in classifying waters for shellfish harvest.

Cooperative Coastal Monitoring

WM&S/BMWM also oversee the Cooperative Coastal Monitoring Program (CCMP). CCMP involves coastal water quality assessments and pollutant source investigation. There are two components to this program. These are recreational water quality monitoring at New Jersey bathing beaches and aerial surveillance of State coastal waters.

Water quality monitoring for the bathing beach component is administered by NJDEP, the Department of Health and local environmental health agencies interacting within their regions of coastal New Jersey. These agencies collect water samples each week at 180 ocean and 35 bay monitoring stations from mid-May through mid-September. Samples are taken on Monday and continued sampling through the week is performed as required. Samples are analyzed for enterococci bacteria concentrations at these monitored stations.

Enterococci are used as a fecal coliform indicator in marine recreational waters (US EPA, 1986). The acceptable rate for the "steady state geometric mean indicator density" for enterococci in the waters of marine bathing beaches is 35 MPN/100 mL or less, and 104 enterococci/100 mL is also considered acceptable as a one time exposure (Cabelli, 1983).

At the time this report was written, A0Remote had 14 bathing beach stations as shown in the map to the right. Data for these stations is available at http://www.njbeaches.org.

The other component of the CCMP program, aerial surveillance, is conducted six days a week, weather permitting. Having this component provides an evaluative tool to aerially observe coastal water quality and potential pollution sources.

Flight paths are coordinated to observe the eastern coastal and inter-coastal waters of the State during the week. The aerial component of the CCMP program works in conjunction with the United States Army Corps of Engineers. It is part of the NY/NJ Harbor Estuary Program Floatables Action Plan. If floating solid waste and debris are spotted by aerial surveillance, the Army Corps attempts to respond with water-skimming vessels.
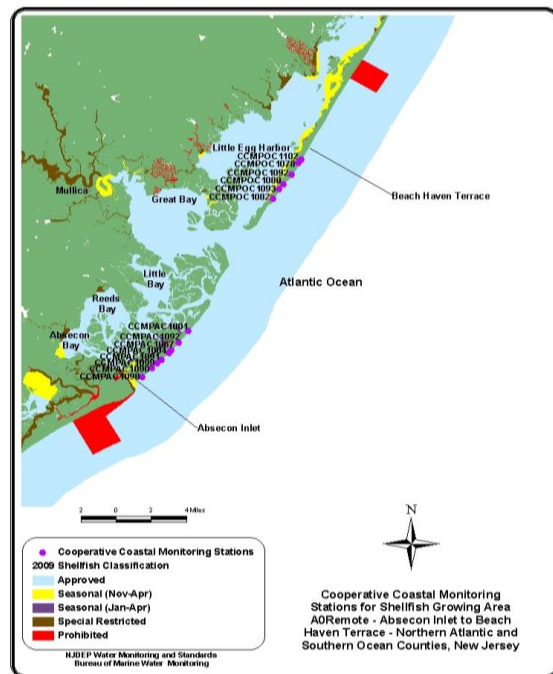
CONCLUSIONS

The following was concluded based on the water quality data from July 12, 2000 through March 05, 2009. The shellfish growing waters within this 15-mile stretch, known as A0Remote, continue to meet NSSP criteria for classification as *Approved* in their entirety.

Remote Status had been previously designated for these waters due to the lack of direct and indirect pollutant sources, and good water quality. This status shall remain unchanged with regard to the data presented in this report. In addition, rain and seasonal effects were absent for this Sanitary Survey with regard to the data.

The effluents from outfalls of the Atlantic County Utilities Authority – Wastewater Treatment Facility Discharge Pipe (South of A0Remote) and the Ocean County Utilities Authority – Southern Water Pollution Control Facility Discharge Pipe (North of A0Remote) are not impacting the shellfish growing waters of this area with significant coliform levels.

There were no indications that indirect discharges such as spills impacted the *Approved* waters of this growing area. The general absence of indirect discharges and stormwater outfalls along the coastal shoreline of A0Remote greatly reduces concern for impact to the *Approved* waters of this growing area. In addition, stormwater discharge into back bay waters appears to be significantly diluted prior to reaching the ocean waters of A0Remote.

As in the case of indirect sources associated with A0Remote, substantial dilution seems to occur to coliform input by avian or wildlife populations utilizing the closely situated Edwin B. Forsythe National Wildlife Refuge.

Coliform levels are far too low in the data that supports this report to suggest there is substantial impact from any of the potential sources mentioned in this section and throughout this Sanitary Survey. The monitoring data derived from WM&S/BMWM analysis, supports a characterization of good water quality for A0Remote.

RECOMMENDATIONS

With regard to the summarizations presented in this report, there are no changes proposed for A0Remote, Assignment 471 monitoring stations, or sampling strategy (APC/Remote Status) planned at this time. The area's *Approved* shellfish growing water classification should remain in effect and the growing area's Remote Status designation should be retained. The confirmation of acceptable water quality and the continued positive nature of shoreline surveys support the *Approved* shellfish growing water classification and the remote status, currently in effect for these waters.

With A0Remote, acceptable water quality prevails. There are no changes recommended for classification or monitoring in this shellfish growing area.

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SUPPORTING DOCUMENTATION

Data sheets - Sanitary Survey Report for Shellfish Growing Area A0Remote (Absecon Inlet to Beach Haven Terrace), December 2014 (see the Shellfish Growing Area Reports section at *www.state.nj.us/dep/wms/bmw*).

Shoreline survey field notes and pictures - Sanitary Survey Report for Shellfish Growing Area A0Remote (Absecon Inlet to Beach Haven Terrace), December 2014 (see the Shellfish Growing Area Reports section at *www.state.nj.us/dep/wms/bmw*).