NJ Department of Environmental Protection
Water Monitoring and Standards

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

December 2015

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

NJ Department of Environmental Protection
Bob Martin, Commissioner

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

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Cover Photo – South End View of Brigantine, Absecon Inlet, NJ

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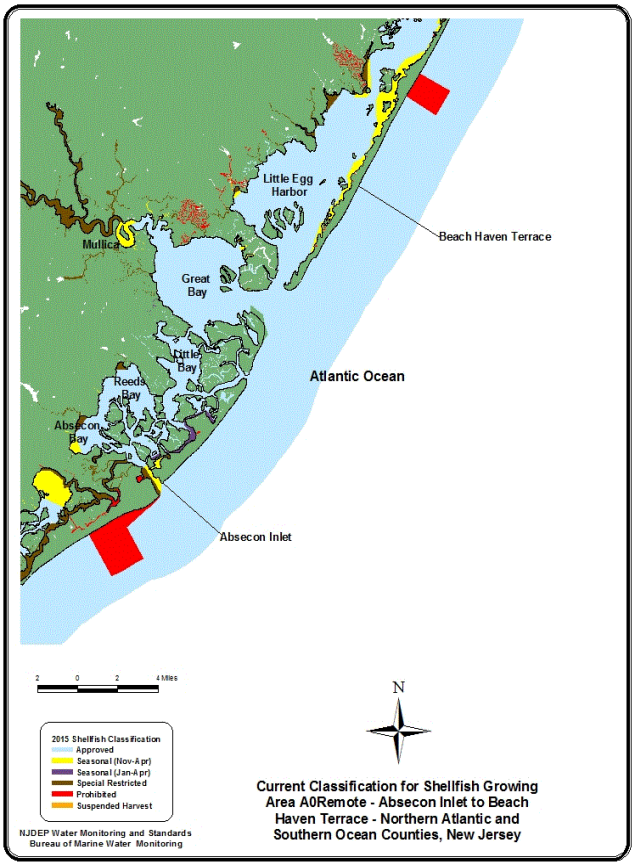
EXECUTIVE SUMMARY

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 Reappraisal is based solely on *Approved* water classification (see figure that follows). The State of New Jersey 2015 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 January 2009 and August 2015. 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.



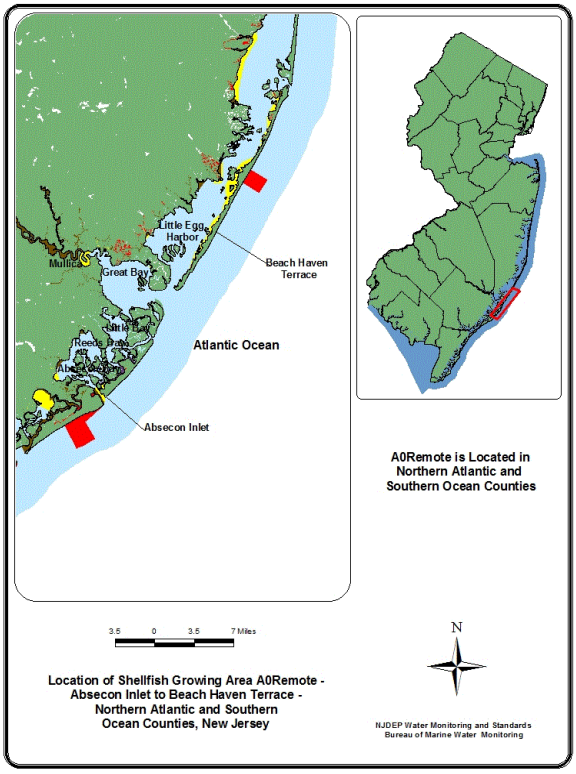
The lack of point and non-point sources in combination with acceptable water quality support the *Approved* shellfish growing water classification currently in effect and qualifies this section of coastline for its Remote Status designation. As such, the National Shellfish Sanitation Program's (NSSP) 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 map below) 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 stormwater 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.

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 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.

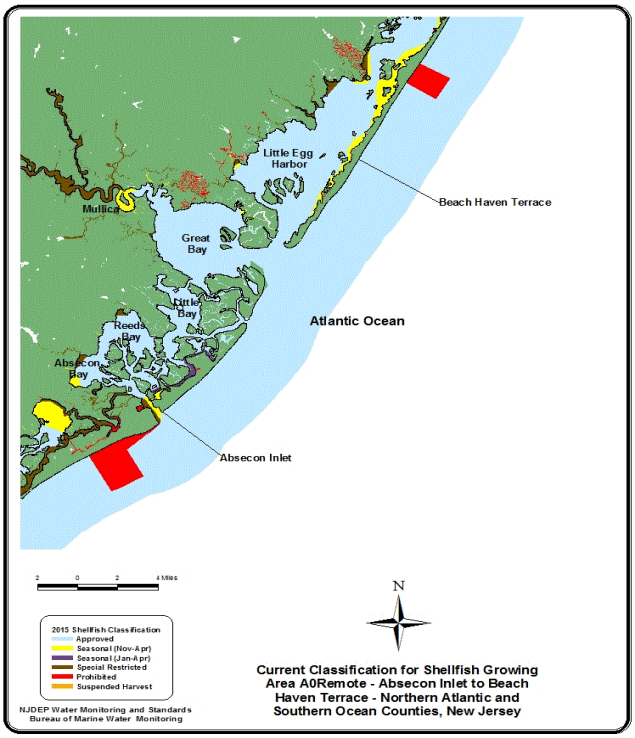
GROWING AREA CLASSIFICATION SUMMARY

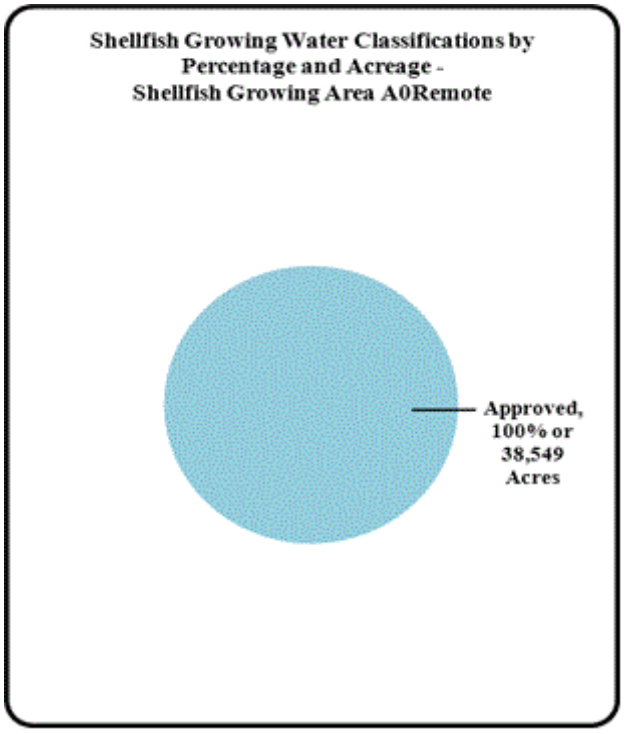
In a 1994 report for A0Remote covering the time frame 1991 to 1993, it was recommended this shellfish growing area be designated as having Remote Status. Remote Status, as suggested in the NSSP's shellfish guide, is applicable for shellfish growing waters which are not impacted by any actual or potential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

The last report written for Shellfish Growing Area A0Remote was a 2013 Reappraisal covering the years 2004 – 2012. 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 2012 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 Reappraisal for the years, 2009 – 2015 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 (Spisula solidissima) and blue mussels (Mytilus edulis) 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 DWM&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 generally holds the historical edge when compared to total annual landings presented for other surf clamming states, 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 2014. Figures for 2015 had not been verified and posted during the current reporting time frame.

Commercial Data for Surf Clams Showing Pounds of Meat and Ex-vessel Value for New Jersey Landings.
Source: NOAA - National Marine Fisheries Service – Report printed on: 12/01/15

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
2010	25,089,484	$ 16,010,934
2011	16,930,215	$ 10,980,834
2012	20,512,064	$ 12,352,632
2013	18,728,815	$ 10,918,271
2014	19,446,912	$ 11,454,848

At the time this report was written, the National Marine Fisheries Service reported the primary biological resources of commercial importance in pounds of meat landed and dollar value for New Jersey waters from 0 – 3 miles [w/in the State's three (3) mile jurisdictional limit] were Black Sea Bass, Bluefish, Common Eels, Croaker, Dogfish Sharks, Goosefish/Anglerfish, Menhaden, Skates, Summer Fluke, Atlantic Loligo Squid, American Lobster, Blue Claw Crabs, Conch, Ocean Quahogs, and Surf Clams.

From three to two hundred miles out, the market species sought after by New Jersey fishermen (in terms of pounds of meat landed and dollar value) were the Albacore Tuna, Atlantic Mackerel, Atlantic Sea Herring, Bigeye Tuna, Black Sea Bass, Bluefin Tuna, Bluefish, Butterfish, Chub Mackerel, Croaker, Dogfish Shark, Dolphinfish, Goosefish/Anglerfish, Gray Sea Trout, Menhaden, Red Hake, Scup/Porgy, Silver Hake, Skates, Summer Fluke, Swordfish, Tilefish, Yellowfin Tuna, Yellowtail Flounder, Atlantic Illex Squid, Atlantic Loligo Squid, American Lobster, Jonah Crab, Ocean Quahog, Sea Scallops, and Surf Clams.

In terms of pounds landed for New Jersey species, Menhaden totals surpass all others for this reporting period. For State shellfish, surf clam totals are the largest, and for the shellfish growing water classification purposes of this report, surf clams as a molluscan shellfish and by number of pounds landed will remain the primary focus.

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 – 2015). Source: New Jersey Department of Environmental Protection, Bureau of Shellfisheries – 10/20/14

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
2009 - 2010	55,296
2010 - 2011	55,296
2011 - 2012	49,152
2012 - 2013	24,576
2013 - 2014	14,592
2014 - 2015	14,592

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	2,256	1,359	18,256	10,994	-	-	20,512	12,353	$.60
Sea Scallops	0	0	11,379	110,560	-	-	11,379	110,560	$9.72
Ocean Quahog	2,209	1,572	16,200	11,528	-	-	18,409	13,100	$.71
-- TOTALS --	4,465	2,931	45,835	133,082	-	-	50,300	136,013	

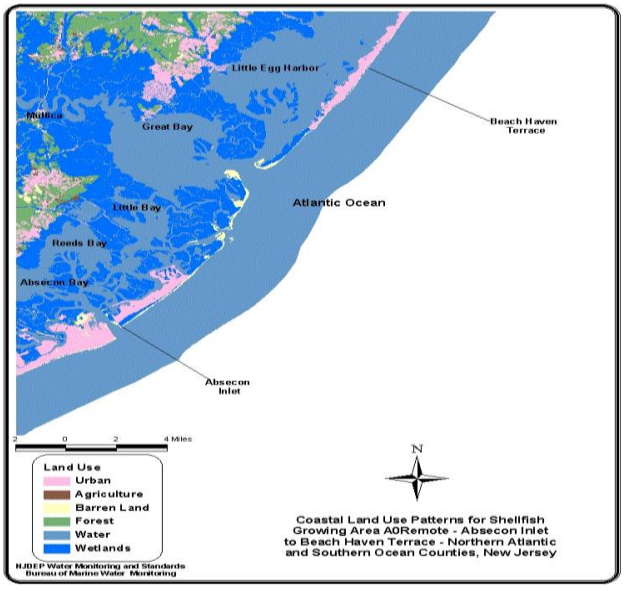
Adapted from: Landings by Distance from U.S. Shores, 2012, State of New Jersey, National Marine Fisheries Service - Fisheries Statistics and Economics Division - Report printed on: 12/01/15

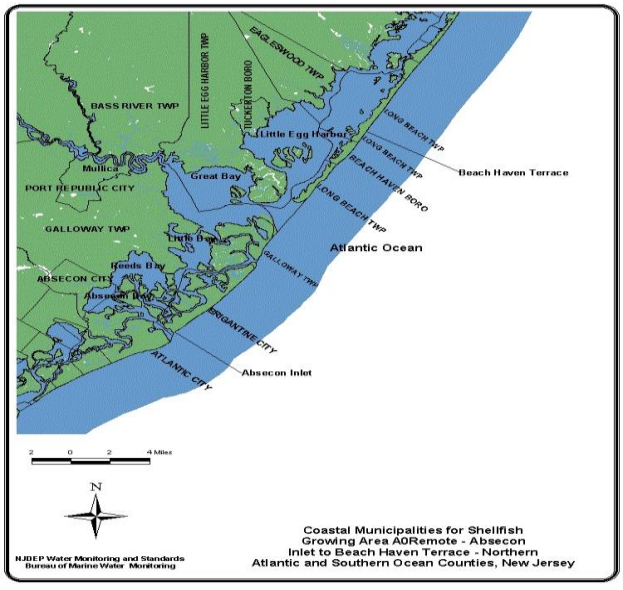
SHORELINE SURVEY: EVALUATION OF POTENTIAL POLLUTION SOURCES

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 October 21, 2015, April 13, 2016, and May 5, 2016. The following sections detail information derived collectively from those surveys, and those that preceded it.

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 there would be some new construction projects taking place in





areas where homes had been torn down. And, there might be 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.

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 figures on the previous page.

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. Presently, DWM&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 the ACUA and OCUA – 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.

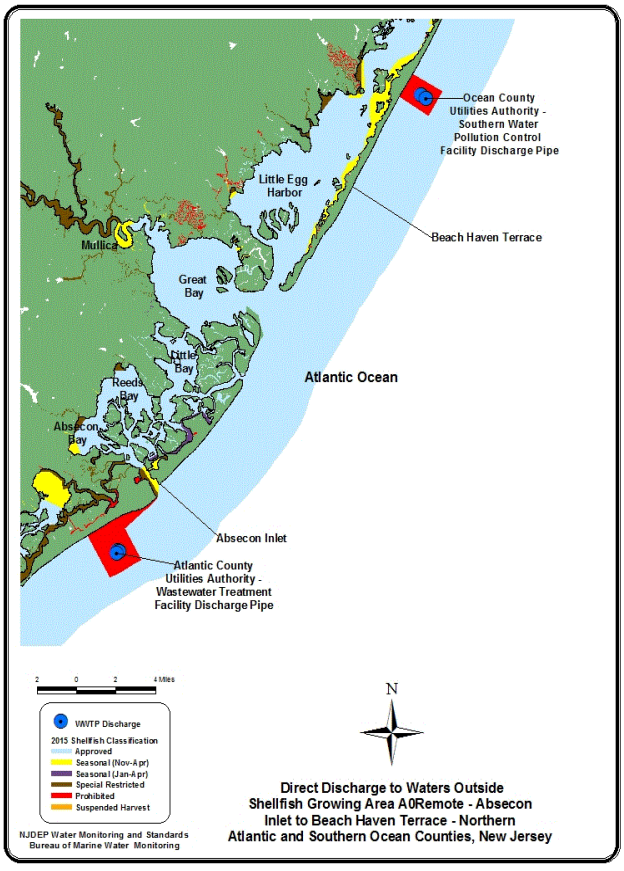
SURFACE WATER DISCHARGES – TREATMENT FACILITY WASTEWATER EFFLUENTS

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 are presented in the table on the next page, and treatment facility wastewater effluent discharge locations near A0Remote are shown in the figure on the following page.

Table 1: 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. BOD_5 Level/Wk.	≤ 45 mg/L
Avg. BOD_5 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 A0Remote and many adjacent communities 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). Effluents from OCUA's southern facility are ultimately disposed of off Ship Bottom (north of Beach Haven Terrace and A0Remote).



No biologically treated effluent is discharged into the shellfish growing waters of A0Remote. The effluent discharge lines and outfalls for these treatment facilities are located 3.68 to 4.88 nautical miles outside the borders of A0Remote.

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

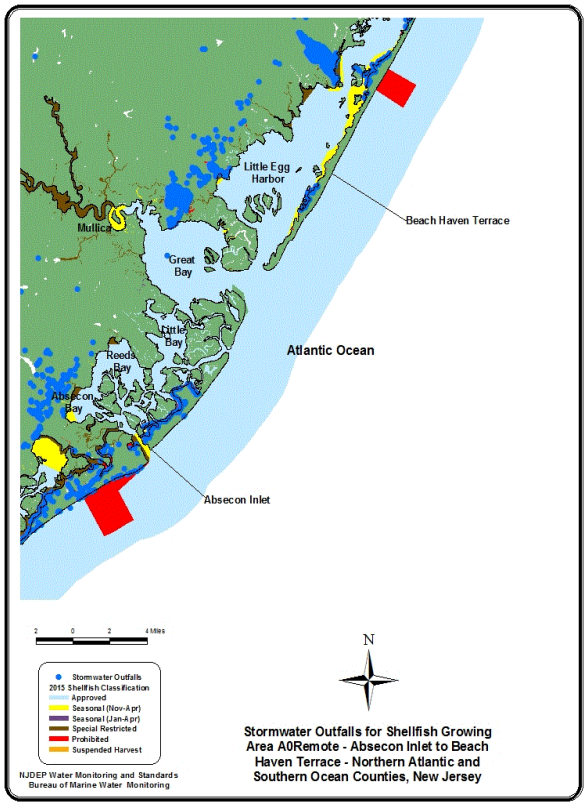
With the exception of Hurricane's Irene (08/26/11) and Sandy (10/29/12), which temporarily brought about the closure of all State shellfish growing waters as a precaution for public health and safety, there have been no spills or unpermitted discharges that resulted in the closure of waters in shellfish growing area A0Remote, during this reporting period.

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.

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, DWM&S/BMWM station data for A0Remote continue to show relatively 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.



The field work performed for the October 21, 2015 and April 13, 2016 shoreline 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.

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 stormwaters 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, 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 catching floatable materials in stormwater providing a town routinely cleans and maintains the capture basins. Unfortunately, little is accomplished with regard to cleansing or eliminating stormwaters, as they continue to be released with the boot collection concept.

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 embayments 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 any stormwater inputs they eventually 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 (more than 400 acres) and Brigantine (approx. 1415 acres) units 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 coastal habitat specifically set-aside for birds and other wildlife, as a national preserve. As the coliform levels found in A0Remote are fairly low, it would additionally appear that the avian and wildlife populations of the refuge do not impact the growing area, as a result of animal waste mixing with stormwater runoff.

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 requires a sampling strategy that provides 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 these criterion may also be used. 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, DWM&S/BMWM switched all State shellfish growing areas over to the criteria for fecal coliform in February, 2012, and the method for analysis changed as well.

DWM&S/BMWM 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 below shows the statistical criteria for the APC strategy.

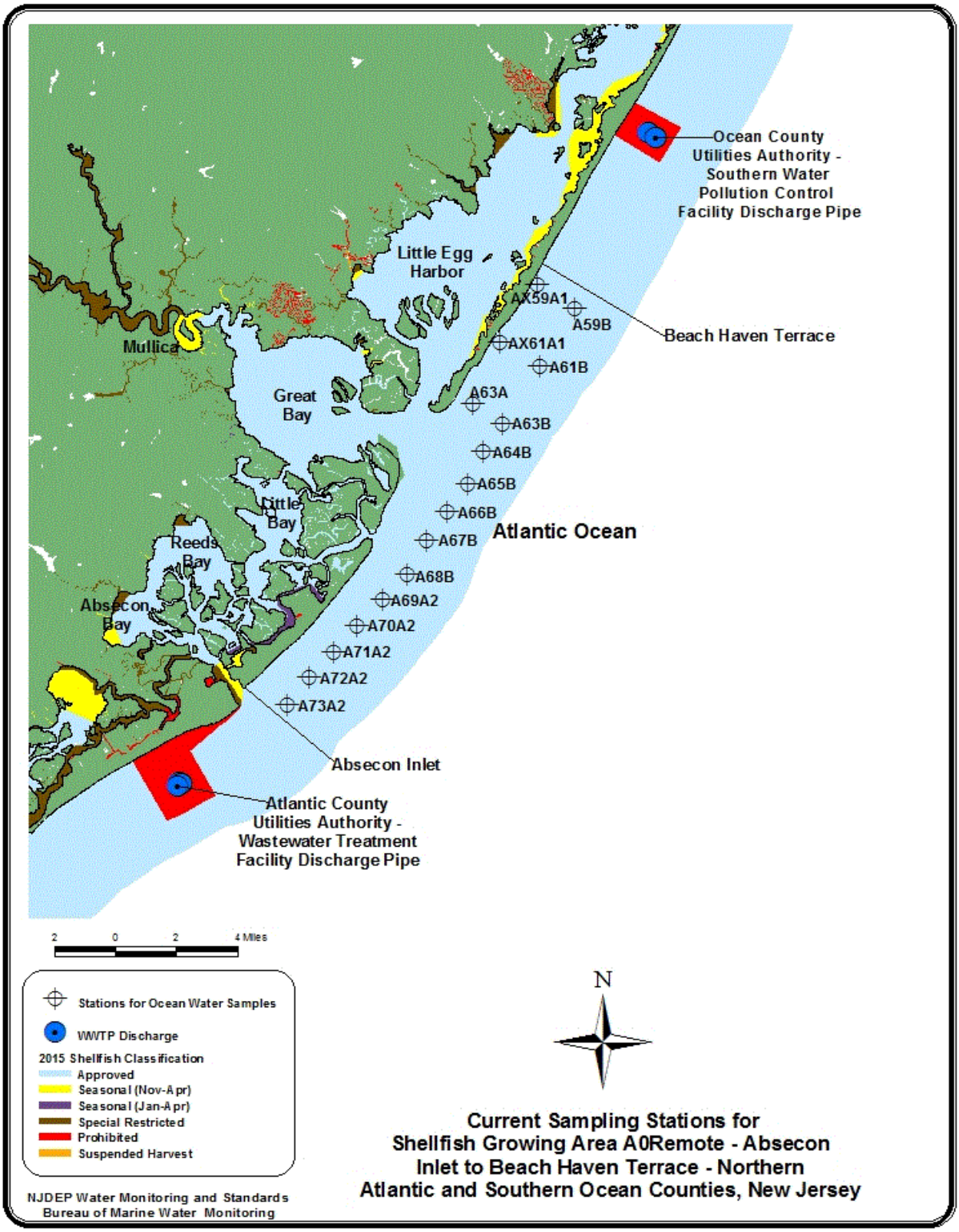
Statistical Criteria for Adverse Pollution Condition Sampling Strategy					
	Total Coliform Criteria		**Fecal Coliform Criteria**		
	Geometric mean (MPN/100 mL)	**No more than 10% of samples can exceed (MPN/100 mL)**	**Geometric mean (CFU/100 mL)**	**No more than 10% of samples can exceed (CFU/100 mL)**	
***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 stations that comprise Assignment 471. A review of the records suggests that 240 water samples were collected for fecal coliform bacterial analysis between 2009 and 2015 and analyzed using mTEC agar plating analysis. Additional information on lab methodology and sampling strategy can be found in the Shellfish Growing Area Report Guidance Document.

The Shellfish Growing Water Monitoring Stations for Absecon Inlet to Beach Haven Terrace (A0Remote) are presented on the next page. They were analyzed by DWM&S/BMWM at Leeds Point. Classification of these shellfish growing waters has been based on these data.


Ocean County Utilities Authority - Southern Water Pollution Control Facility Discharge Pipe
Little Egg Harbor
AX59A1
A59B
Beach Haven Terrace
Mullica
AX61A1
A61B
Great Bay
A63A
A63B
A64B
A65B
Little Bay
A66B
Atlantic Ocean
Reeds Bay
A67B
A68B
A69A2
Absecon Bay
A70A2
A71A2
A72A2
A73A2
Absecon Inlet
Atlantic County Utilities Authority - Wastewater Treatment Facility Discharge Pipe
2 0 2 4 Miles
Stations for Ocean Water Samples
WWTP Discharge
2015 Shellfish Classification
Approved
Seasonal (Nov-Apr)
Seasonal (Jan-Apr)
Special Restricted
Prohibited
Suspended Harvest
N
Current Sampling Stations 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

BACTERIOLOGICAL QUALITY

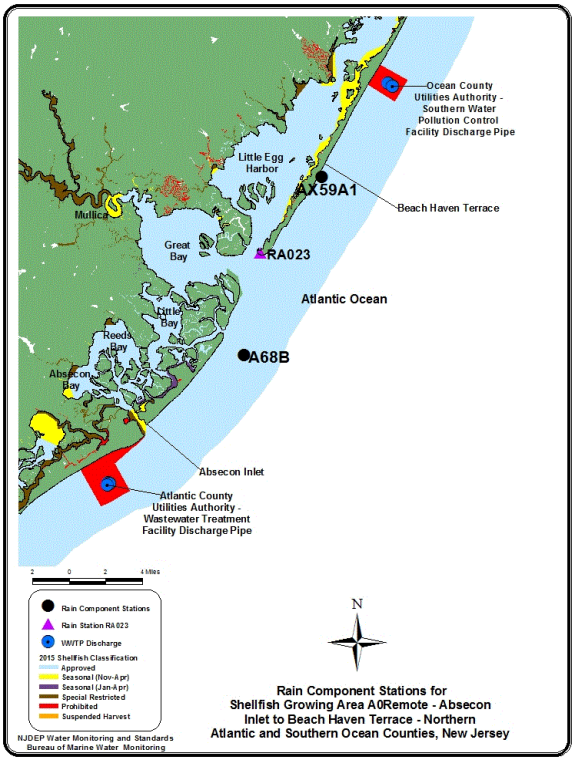
Compliance with NSSP APC *Approved* Criteria

For this Reappraisal, final analyses in conjunction with NSSP requirements for *Approved* waters in Remote status suggests this shellfish growing area is appropriately classified, as *Approved* in its entirety. There were no stations when analyzing fecal coliform with the Statistical Summary or the Shellfish Growing Water - Data Listings where final Geometric Means or 90th Percentile scores exceeded *Approved* requirements for these shellfish growing waters using combinations of direct 3 tube, A-1, and mTEC analyses.

The appropriate data analysis for this shellfish growing area, using the statistical analysis noted above would be the geometric mean shall not exceed 14 CFU/100 mL, and not more than 10% of the samples should exceed 38 CFU/100 mL with 15 samples for the 90th percentile. As the geo-means and 90th percentiles statistically comply with these descriptions, this data set supports the current classification for this area. If the two analyses were not combined, and the analysis was for mTEC only, the 90th percentile for mTEC would normally be no more than 10 % of the samples should exceed 31 CFU/100 mL.

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.



With the exception of Hurricane's Irene and Sandy, which occurred on August 26, 2011 and October 29, 2012, respectively, precipitation, accumulation, and the nature of storm events have not changed drastically for this reporting period. However, as pointed out in the section, Spills, Unpermitted Discharges, and Closures, these hurricanes did bring about the temporary closure of all State shellfish growing waters as a precaution for public health and safety.

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

Based on Wet/Dry statistics, there were two sampling stations that showed a rainfall component in relation to water quality for this shellfish growing area. Those stations were AX59A1 and A68B. Rainfall components must register a t-statistical probability less than 0.05 (but not zero). The components for AX59A1 and A68B registered t-statistical probabilities of 0.040 and 0.023, respectively.

The Wet/Dry Statistics were calculated based on an impact time of 72 hours prior to the day of sampling and a wet/dry cutoff of 0.10 inches of rain, as these criteria produced the most results for impact. The above sampling stations are located within *Approved* waters in the northern and south-central portions of this shellfish growing area, as presented in the map on the previous page. These stations showed higher geometric means during wet conditions as opposed to dry.

The highest year round geometric mean reported for any one of the above mentioned rain component stations (3.5 CFU/100 mL) continues to meet the existing shellfish classification criteria for these waters. And, all rain component stations showed 0 % greater than 38 CFU/100 mL for the 90th percentile. The water quality in this shellfish growing area report suggests extremely limited rainfall impact in relation to fecal coliform levels, and there was absolutely no direct effect on shellfish classifications noted from precipitation in the analysis.

RELATED STUDIES

Nutrients

DWM&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 DWM&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.

Chlorophyll data are also contained within the nutrient data. As such, DWM&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 for the Bureau's phytoplankton monitoring program.

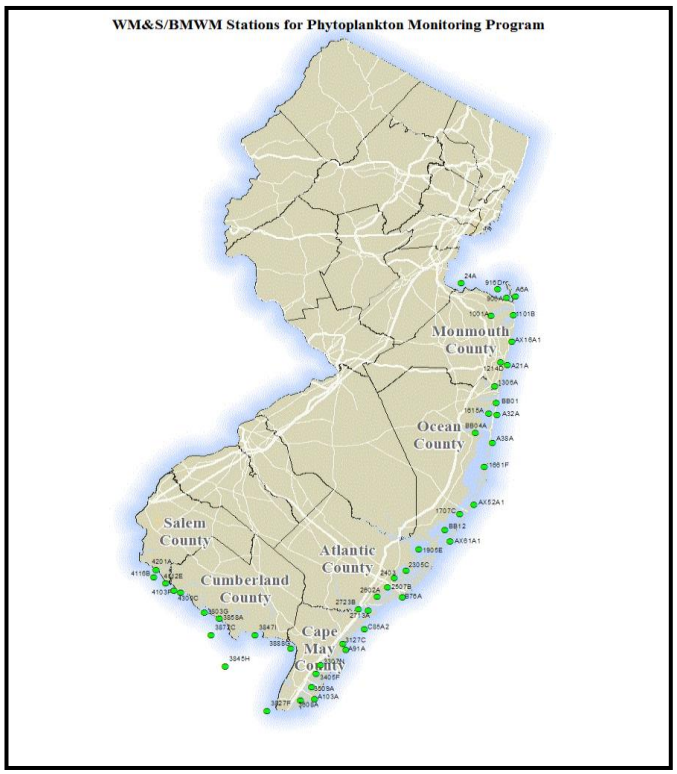
Increased chlorophyll levels are also identified by DWM&S/BMWM with the aid of a remote chlorophyll flight sensor. DWM&S'/BMWM's remote aircraft sensing began in 2007, and involves partnerships with New Jersey's Forest Fire Service (plane services), Rutgers (data storage); USEPA Region 2 (funding). With 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, DWM&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 DWM&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 Jersey's 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 DWM&S/BMWM Phytoplankton Monitoring Program consists of 48 marine water stations (see figure upper 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 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*.

Generally, toxic species in large blooms over prolonged periods have not been associated with these shellfish growing waters (again see *www.state.nj.us/dep/wms/bmw*).

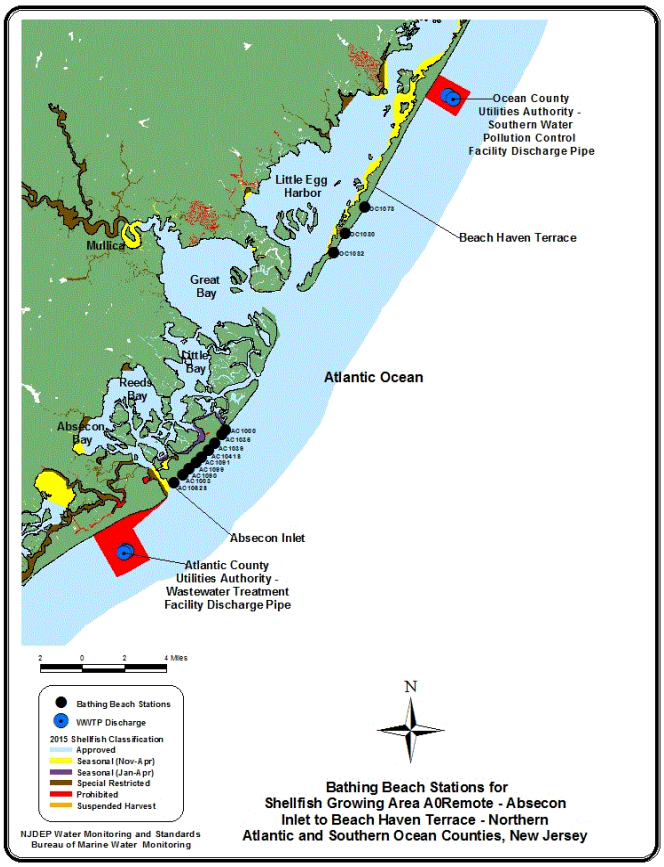
There are occasional occurrences of algal blooms in all ocean waters in New Jersey, and these can occur throughout the year. The warmer months of spring and summer provide a very common period for algal growth, though.

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

DWM&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. Stations for A0Remote bathing beaches are shown in the map to the right.



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. Data for Cooperative Coastal Monitoring or bathing beach stations is available at http://www.njbeaches.org.

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).

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 reports.

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 January 01, 2009 through August 10, 2015. 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 influences were minimal and seasonal influences were absent for this Reappraisal 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 discharges associated with A0Remote, substantial dilution also seems to occur to coliform input by avian 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 Reappraisal. The monitoring data derived from DWM&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 (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 supports 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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