



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

**Sanitary Survey Report for Shellfish Growing Area A0Cent  
(Beach Haven Terrace to Bayhead)**



**April 2013**

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

NJ Department of Environmental Protection  
Bob Martin, Commissioner

# **Sanitary Survey Report for Shellfish Growing Area A0Cent (Beach Haven Terrace to Bayhead)**

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Cover Photo – Docking Up At Barnegat Inlet, Barnegat Light, NJ

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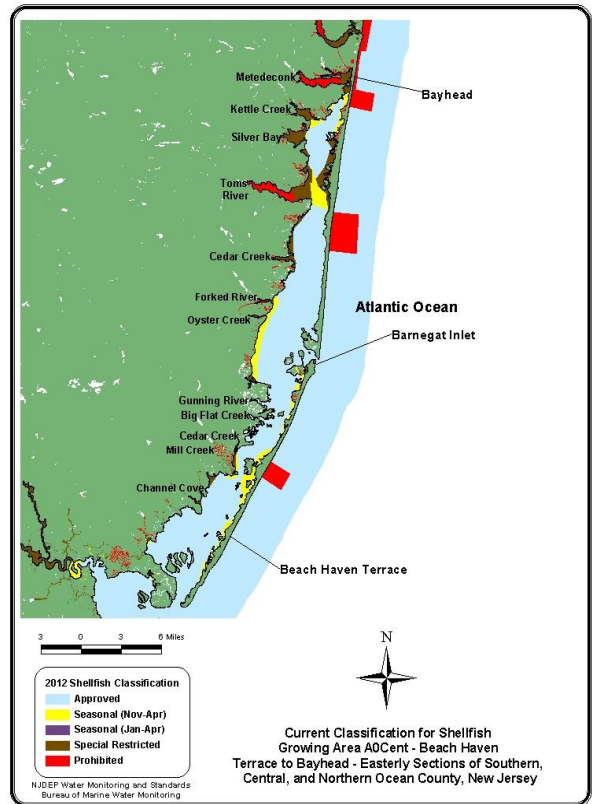
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## EXECUTIVE SUMMARY

For this Sanitary Survey, the results of water quality analyses for samples collected between May 2008 and October 2012 for Shellfish Growing Area A0Cent – Beach Haven Terrace to Bayhead (A0Cent) suggest there were no stations that exceeded the National Shellfish Sanitation Program (NSSP) classification criteria for their respective locations.

A0Cent is an ocean shellfish growing area that encompasses 31 miles of coastline from Beach Haven Terrace in the south to Bayhead in the north. This growing area then extends eastward from the coast out into the Atlantic Ocean for three miles. In total, A0Cent is currently comprised of 78,443 acres of shellfish growing waters.

The criteria used for shellfish growing water classification review in this Sanitary Survey is based on *Approved* or *Prohibited* water classifications as shown in the figure to the right, as these are the only two classifications used for New Jersey's ocean shellfish growing waters. Currently, there are 71,790 acres of *Approved* waters in A0Cent and 6,653 acres are designated as *Prohibited*. The New Jersey Shellfish Growing Water Classification Charts for 2012 provide an excellent tool for viewing the location and classifications for A0Cent (see charts 5 – 10 at [www.state.nj.us/dep/wms/bmw](http://www.state.nj.us/dep/wms/bmw)).



The Ocean County Utilities Authority – Southern, Central, and Northern Water Pollution Control Facilities (wastewater treatment facilities) discharge pipes and outfalls are present in this area. This requires the designation of three safety (*Prohibited*) zones for A0Cent.

NSSP also requires the use of Adverse Pollution Condition (APC) sampling strategy in shellfish growing areas where direct discharge from wastewater treatment facility effluent outfalls could potentially impact the water quality with increased bacterial contamination. During the time frame that this report was written, there were no ongoing impacts to the waters of A0Cent from treatment plant error, operations, or direct discharge. Continuous upgrades have helped the wastewater treatment facilities noted above, operate in an efficient and reliable fashion. This in turn has contributed to providing an ongoing record of acceptable water quality for this shellfish growing area.

In that no classification criteria were exceeded during the time frame of this report, current classifications will remain in effect for A0Cent. For this reporting period, there are no adjustments recommended for stations, monitoring, or sampling.

# GROWING AREA PROFILE

## LOCATION AND DESCRIPTION

A0Cent shellfish growing waters cover approximately 31 miles of coastline from Beach Haven Terrace in the south to Bayhead 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).

The coastal towns adjoining the shellfish growing waters of A0Cent are urban, comprised in large part by residential homes, although there are clusters of commercial properties. These towns generally act as seashore towns with populations expanding during spring and summer and reducing greatly in the winter.

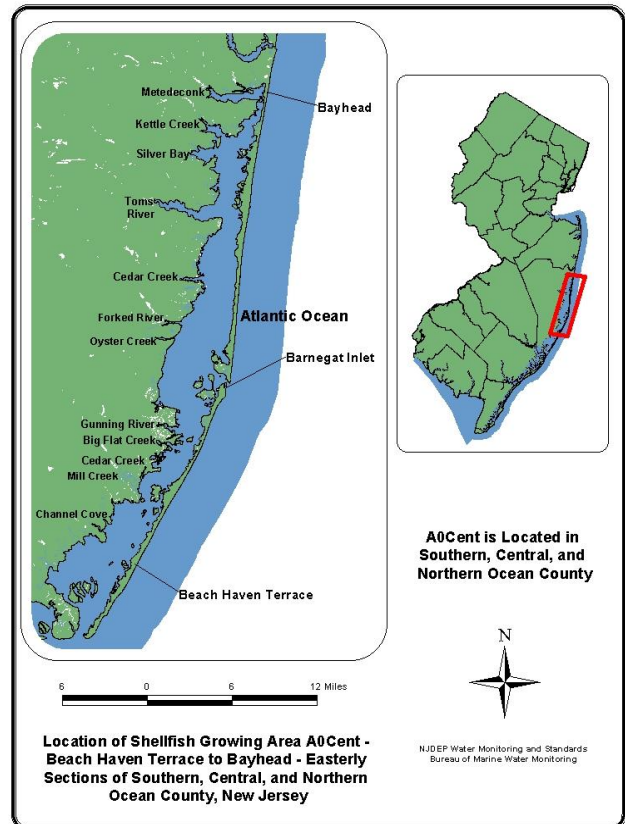
The southern half of coastal A0Cent is made up of the barrier island known as Long Beach Island or LBI. To the north of LBI, across Barnegat Inlet, is a substantial section of relatively undeveloped land belonging to Island Beach State Park. The remainder of the abutting coastal land mass for A0Cent is a composition of numerous shore towns beginning with South Seaside Park and extending north to Bayhead (see above shellfish growing area location figure).

As previously mentioned, the outfalls for OCUA's – southern, central, and northern water pollution control facilities' wastewater treatment discharge pipes and outfalls are located in A0Cent. The outfall locations for these plants represent the only point sources of pollution that could potentially impact this locations water quality.

Closed safety zones, or *Prohibited* waters surround all of the OCUA outfalls. Although limited in their total acreage, the *Prohibited* areas are primarily maintained as buffers for effluent dilution.

Island Beach State Park is not interconnected with a sewage system with the exception of the gatehouse at the entrance of the park. The gatehouse is connected via a pump to the regional system. The other structures in the park are on a subsurface disposal system (septic system).

Rainfall runoff appears to have little impact on this area's water quality and shellfish growing water classifications as stormwater drainage is directed primarily toward the bayside. Any waters having been impacted by stormwater runoff on the bayside have been significantly diluted upon reaching the ocean waters of A0Cent.





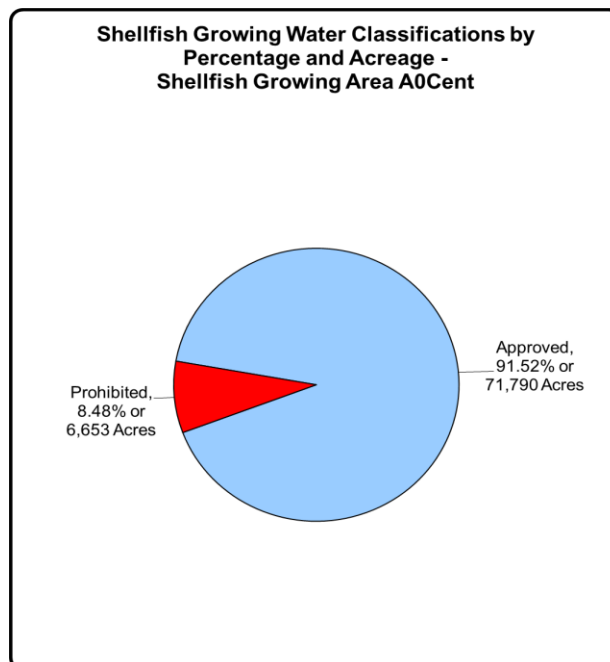
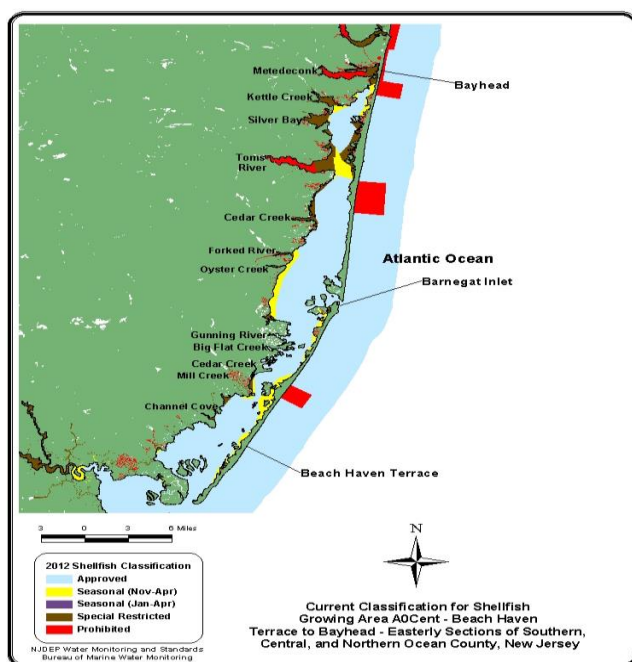
## GROWING AREA CLASSIFICATION SUMMARY

The last Sanitary Survey for this shellfish growing area covered the years from 1996 – 2000. The results of the water quality analyses from that report indicated WM&S/BMWM had the ability to reduce what had been 6,370 *Prohibited* acres to the current 4,478 acres. With that, *Approved* acreage increased to 73,965 acres.

The reduction in *Prohibited* waters or upgrade noted above, took place around the outfall for the Northern Water Pollution Control Facility Discharge Pipe. This decrease in *Prohibited* acreage was brought about because the water within the upgrade area met all criteria for classification as *Approved*. Additionally, continuous upgrades have helped the Ocean County Utilities Authority's (OCUA) wastewater treatment plants that have outfalls in this growing area operate efficiently and reliably, providing a lengthy record of *Approved* water quality within the upgrade area. Further, a more practical delineation of the *Prohibited* area surrounding the outfall was established from enforcement, regulatory, and shellfish industry points of views, as the delineation was changed to plot coordinates rather than reference landmarks. Although *Prohibited* acreage was reduced with that upgrade, an adequate dilution area was left to surround the discharge pipe and outfall location for incidental discharge.

In the most recent shellfish growing area report, a Reappraisal written in 2010 for the years 2005 – 2010, a downgrade based on water quality was required in the waters off Island Beach State Park. That downgrade required 2,174.51 acres of *Approved* waters to be reclassified as *Prohibited*. As a result, *Approved* waters decreased from 73,965 to 71,790 and *Prohibited* waters increased from 4,478 to 6,653.

The information contained within this currently prepared Sanitary Survey (2008 – 2012) suggests classifications, stations, monitoring and sampling strategy should remain unchanged as the data suggest there is no current need for adjustment. Current classifications along with growing water acreage and percentages 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 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 2011. Additionally, figures for 2012 had not been verified and posted at the time this Sanitary Survey was written.

Commercial Data for Surf Clams Showing Pounds of Meat and Ex-vessel Value for New Jersey Landings. Source: NOAA - National Marine Fisheries Service – February 27, 2013		
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

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, Blue Claw Crabs, Conch, Ocean Quahogs, Sea Scallops, 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, Red Hake, Scup/Porgy, Silver Hake, Skates, Summer Fluke, Swordfish, Tilefish, Yellowfin Tuna, American Lobster, Atlantic Squid, 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 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.

<b>New Jersey Surf Clam Quotas in Industry Bushels by Year (1996 – 2013). Source: New Jersey Department of Environmental Protection, Bureau of Shellfisheries</b>	
<b>Surf Clam Harvest Year</b>	<b>Surf Clam Quotas in Industry Bushels</b>
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



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. A shoreline survey of A0Cent was conducted on March 28, 2013, and the following sections detail information derived collectively from that survey, and those that preceded it.

### LAND USE

Areas for new development are generally limited within the municipalities or boroughs abutting A0Cent 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 A0Cent do undergo reconstruction and refurbishment from time to time.

The post Hurricane Sandy shoreline survey that was undertaken on 03/28/13 presented a great deal of interior and exterior damage to homes and businesses within the communities that abut the shellfish growing waters of A0Cent. In particular, the Long Beach Island communities of North Beach, and Loveladies had numerous homes that received a great deal of damage or in some cases, total losses occurred. The same could be said of the communities of South Seaside Park, Seaside Park, Seaside Heights, Ortley Beach, Lavallette, Mantoloking, and Bayhead. Much of the damage in these sectors was the result of the large volume of sand and water that swept through real estate as it moved from the ocean to the bay. And certainly, the interaction of Barnegat Bay storm surge and higher tidal event flooding caused a great deal of damage. With Hurricane Sandy, storm surge factors in both the ocean and bay presented the greatest destructive force for homes and businesses in shellfish growing area A0Cent.

Marinas and smaller boat dockage areas in all sectors of A0Cent showed signs of Hurricane Sandy's damage during the 03/28/13 shoreline survey. Although numerous docks had been lifted by the force of the storm and many top deck boards were missing or being repaired, most marinas throughout the area seemed to be near ready to open or already open for the coming season.

During the 03/28/13 shoreline survey, particular attention was paid to the condition of stormwater outfalls and their surroundings. In general, all outfalls visited appeared clear of debris, and if debris was present, it was located in limited quantities within areas near the outfalls. Little damage to stormwater outfalls was observed, and where damage had occurred, repairs had been done.

As with any significant storm, construction to repair damages will occur. It is important to note at this time that impact from construction is lessened or 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 A0Cent 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.

There are some areas of wetlands in close proximity to urban development in A0Cent as shown in the figures on the following page. Larger areas of wetland are situated on the western side of Ship Bottom, the High Bar Harbor sector near Barnegat Light, and Island Beach State Park.

The lands adjacent to Shellfish Growing Area A0Cent can geophysically be described as barrier islands. The predominant land use on these barrier islands is urban.

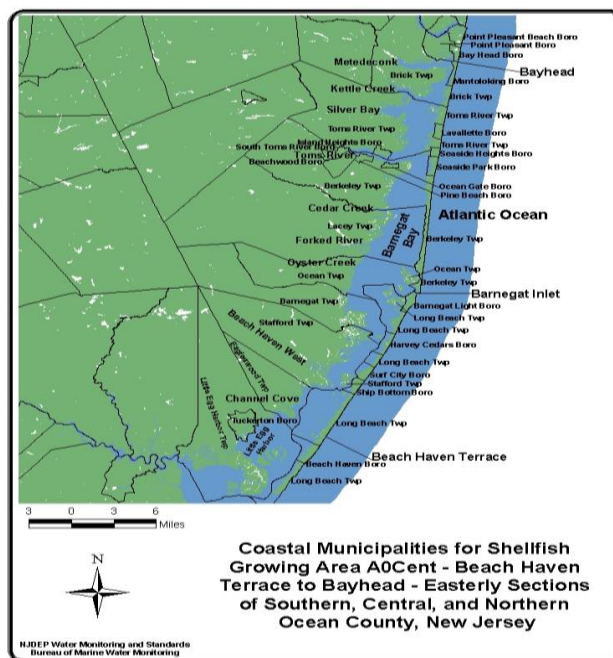
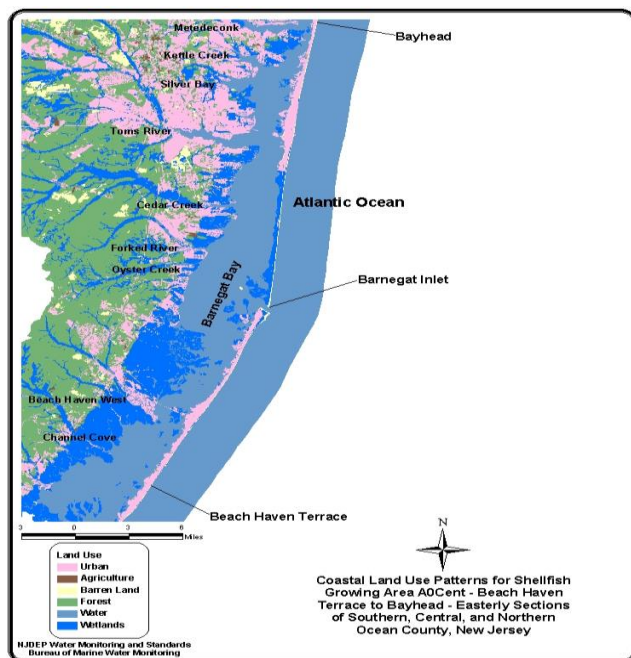
There are numerous mainland communities situated just to the west of A0Cent. Presently, BMWM/WM&S water quality testing shows minimal impact from these communities and their infrastructure on the waters of this growing area, as current bacteriology results do not require classification changes.

Sewage from areas abutting A0Cent and many adjacent communities is carried to wastewater treatment facilities by sanitary sewers. It is then treated by either the southern, central, or northern wastewater treatment facilities of the OCUA.

There are pockets of homes within the nearby Pinelands that utilize septic systems. 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.

Some communities that were utilizing septic systems have converted to city sewerage as they have grown in size. For example, Ocean Acres in Manahawkin (southern sector of A0Cent – Ocean County) has primarily moved in this direction. Population growth and enhanced development within Ocean County appear to have been a determining factor in the change from septic to sewerage infrastructure in Ocean Acres and other similar communities.



## 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*, 2009. 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 following page. And, the wastewater treatment facilities, discussed in this section do maintain the standards shown in that table.

From south to north, the three facilities with potential point sources of contamination in the A0Cent Shellfish Growing Area are the Ocean County Utilities Authority – Southern Water Pollution Control Facility (OCUA – SWPCF), Ocean County Utilities Authority – Central Water Pollution Control Facility (OCUA – CWPCF), and the Ocean County Utilities Authority – Northern Water Pollution Control Facility (OCUA – NWPCF).

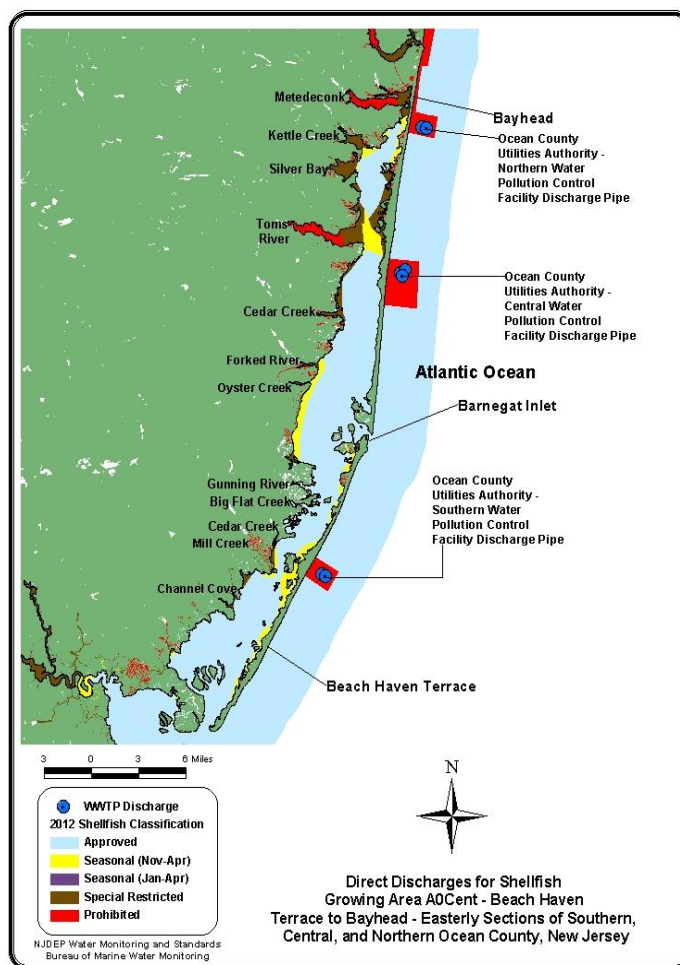
OCUA acts as a regional reclamation authority for wastewater treatment with the central plant serving as the location for their administrative offices. OCUA's three treatment facilities are capable of treating eighty-four million gallons of wastewater per day with forty pumping stations, two hundred miles of force main and gravity lines, and three ocean outfall lines that service 31 municipalities in Ocean County and Five Monmouth County municipalities.

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 <sub>5</sub> Level/Wk.	≤ 45 mg/L
Avg. BOD <sub>5</sub> Level/Mo.	≤ 30 mg/L
Avg. BOD <sub>5</sub> % Removal/ Mo.	≥ 85%
or Avg. CBOD <sub>5</sub> Level/Wk.	≤ 40 mg/L
or Avg. CBOD <sub>5</sub> Level/Mo.	≤ 25 mg/L
or Avg. CBOD <sub>5</sub> % 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

All of the wastewater treatment plant outfalls mentioned in this report are located in the Atlantic Ocean, east of Ocean County. The plants utilize secondary forms of sewage treatment, eventually releasing treated effluents through their ocean outfalls allowing for additional mixing and dilution. As mentioned previously, significant buffers (*Prohibited* areas) have been established around all ocean outfalls for safety zones.

To allow for additional mixing and dilution, these ocean outfalls are located at some distance offshore. In nautical miles, the approximate distances are as follows: OCUA - SWPCF (.80 n mi.), OCUA - CWPCF (.83 n mi.), and OCUA - NWPCF (.77 n mi.).

The Ocean County Utilities Authority wastewater treatment plant outfalls are located east of 5th street in Ship Bottom (southern outfall), 23rd avenue, south Seaside Park (central outfall), and off Princeton Avenue in Mantoloking (northern outfall).



The above right figure shows the outfall locations and the table on the next page shows the waste type, design flow, and discharge characteristics of each plant. Updated summaries of OCUA's southern, central and northern treatment facilities are presented in the following sections.

Map Key(s) - Direct Discharge(s) to Waters of Shellfish Growing Area A0Cent			
Facility Name	Waste Type	Waste Quantity (Design Flow - MGD)	Discharge
Ocean County Utilities Authority <u>Southern</u> Water Pollution Control Facility	Residential Wastewater Influent w/ Light Industrial Input	20	Secondary Treated Effluent
Ocean County Utilities Authority <u>Central</u> Water Pollution Control Facility	Residential Wastewater Influent w/ Light Industrial Input	32	Secondary Treated Effluent
Ocean County Utilities Authority <u>Northern</u> Water Pollution Control Facility	Residential Wastewater Influent w/ Light Industrial Input	32	Secondary Treated Effluent

### **Ocean County Utilities Authority – Southern Water Pollution Control Facility**

The Southern Water Pollution Control Facility for the Ocean County Utilities Authority is located at 150 Cedar Run Dock Rd., West Creek, NJ. This facility serves Long Beach Island, Tuckerton, and the Townships of Eagleswood, Stafford, and Little Egg Harbor, and has been online since 1977.

The OCUA - SWPCF has a design flow of 20 MGD and utilizes a conventional activated sludge processing system that produces secondary treated effluent. Influent primarily consists of residential sanitary wastewater although there is light industrial input entering this facility.

Bio-solids, a by-product of the OCUA – SWPCF treatment process are anaerobically digested, thickened, dried, and pelletized. This is a cooperative process that takes place between OCUA's treatment facilities and the OCUA - CWPCF Fertilizer Manufacturing Facility.

The OCUA-SWPCF has 13 pump stations. These stations are located in the municipalities of Little Egg Harbor, Tuckerton, Eagleswood Twp., Stafford Twp., Long Beach Twp. (6), Harvey Cedars, Surf City, and Beach Haven.

The facility is staffed 24 hours a day and is equipped with a complete alarm system should a malfunction or breakdown occur. Plant personnel also have manuals describing all possible malfunctions and equipment failures that might occur within the system. These give step by step instructions to remedy specific problems. Also, all essential equipment has backup units available in the event of equipment breakdown or required scheduled maintenance.

Disinfection takes place with the aid of sodium hypochlorite. For this procedure, the concentration of chlorine in sodium hypochlorite is 15%. Disinfection is best described as manually adjusted to a desired feed rate in order to destroy pathogenic bacteria. There are automatic alarms for low and high end chlorine residuals. The southern plant takes six grab samples a day to test for chlorine concentration and bacterial testing for fecal coliform is done once a day on a year round basis.

### **Ocean County Utilities Authority – Central Water Pollution Control Facility**

The Ocean County Utilities Authority - Central Water Pollution Control Facility is situated at 501 Hickory Lane, Bayville NJ. It began its operation in November of 1979.

The design flow rating for the OCUA central plant is 32 MGD and it services the towns of Brick, Lavallette, Ortley Beach, Seaside Heights, Seaside Park, Island Heights, Toms River, South Toms River, Forked River, Waretown, Bayville, and Normandy Beach. It utilizes a conventional activated sludge with secondary treatment system and has minimal input from light industry.

Sludge, a by-product of the OCUA – CWPCF treatment process is thickened, anaerobically digested, dried, and pelletized. This is a cooperative process that takes place between OCUA's treatment facilities and the OCUA - CWPCF Fertilizer Manufacturing Facility.

OCUA's central wastewater treatment facility operates with 19 pump stations. Those stations are located in the municipalities of Brick, Lavallette, Seaside Heights, Seaside Park, Island Heights, South Toms River; four are situated in Dover, five are located in Berkeley, two are in Lacey, and Barnegat and Ocean Townships each have one pump station.

The increase of inflow by infiltration during storm events does not create significant issues for the central plant. The plant is equipped with automatic alarms for instances of greater influent intake (during storm events), power failure, and breakdowns. If a problem occurs, central operations at the facility are notified, as well as the NJDEP hotline. The facility is staffed 24 hrs. /day and the hotline is always on line to receive notification in emergency situations.

The plant does not have alarms for low chlorine residual but they do operate with a computerized monitoring system that constantly records all processes of disinfection. In the case of emergency, the sodium hypochlorite disinfection system picks up power from emergency generators.

The central OCUA plant utilizes one 5,000 gallon tank for dispensing sodium hypochlorite. It has a feed rate in the winter of 440 gal/day and 633 gal/day in the summer. The chlorine container is checked three times per day at a minimum. Plant engineers monitor chlorine content with six grabs per day, as required by permit, and effluent bacterial testing is done once per day.

### **Ocean County Utilities Authority - Northern Water Pollution Control Facility**

The OCUA northern facility is located at 255 Mantoloking Rd., Brick, NJ. Plant operations began in 1976.

The OCUA - NWPCF utilizes an activated sludge system to provide secondary treatment for wastewater. Aside from residential wastewater, influent for the northern facility is also composed of approximately six percent input from light industry.

Sludge, a by-product of the plants treatment process is thickened, anaerobically digested, dried, and pelletized. This is a cooperative process that takes place between OCUA's treatment facilities and the OCUA - CWPCF Fertilizer Manufacturing Facility.

OCUA – NWPCF has a design flow rating of 32 MGD and serves the communities of Bayhead, Point Pleasant Beach, Point Pleasant Boro, Bricktown, Lakewood, Jackson, and Mantoloking. This facility also receives sewage from the Manasquan River Regional Sewerage Authority, which serves Farmingdale, Howell, Freehold Boro, and Freehold Township.



It has been estimated that inflow and infiltration from sewer lines will increase flow into this facility by 10 percent at most. Actions to address inflow and infiltration are primarily initiated by the local municipalities whose lines feed into the facility.

There are eight pump stations connected to this treatment facility. They are located in Bayhead, Point Pleasant, Point Pleasant Beach, two in Jackson, and three in Brick. All pump stations have dual pumps and automatic alarms for high water, power failure, and breakdown.

Alarms go to the operator's panel in the treatment facility, which is manned 24 hours per day. The treatment facility also has its own automatic alarm systems for high water, power failure, and breakdown that route in similar fashion for appropriate action if an emergency were to arise. The plant also has two treatment formats to allow for uninterrupted processing during maintenance or repair of machinery at the facility.

Disinfection is achieved through a continuous manual feed of sodium hypochlorite. Two 6000 gallon tanks feed sodium hypochlorite. They average a daily feed rate of 500 gallons of sodium hypochlorite in the summer and winter. There are automatic alarms for low effluent chlorine residual, malfunction of the Chlorinator, or recorder, and plant personnel also play an integral role in monitoring and inspecting these, and all plant processes. For example, the chlorine container is checked for depletion daily by the operator, and chlorine residual is monitored with six grab samples per day and effluent bacterial testing is performed year round with one sample per day.

## **SPILLS, UNPERMITTED DISCHARGES, AND CLOSURES**

With the exception of Hurricane's Irene and Sandy, 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 A0Cent.

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.

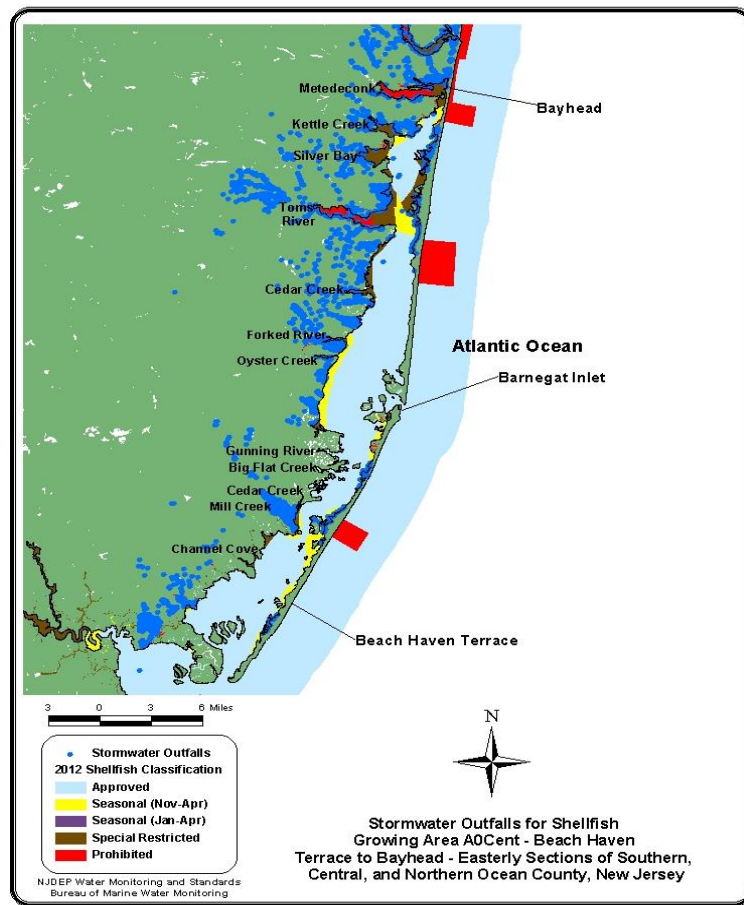
Often, the spills or unpermitted discharges noted above have limited impact on the chemical or bacteriological water quality in a shellfish growing area like A0Cent. Generally, the spills and discharges are rather small, and their distance to these shellfish growing waters is such that impact is reduced 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 A0Cent continue to show relatively good water quality. Again, no specific spill or discharge brought about the closure of shellfish growing waters for A0Cent 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 A0Cent) consists of directing flow into creeks, rivers, and back bays (away from the ocean). The stormwater outfalls that disperse their input into the back bay waters of this area can be seen in the map the right.

As suggested in the section on Landuse, a review of the stormwater discharge locations for A0Cent was conducted in the shoreline survey that took place on 03/28/13. Stormwater outfall locations were for the most part, clear of debris with little surrounding debris, and they were functional, showing little damage had occurred during hurricane Sandy. And, if damage had occurred, it appeared repairs had been made.



Past and present surveys for A0Cent support the idea that stormwater runoff is extremely limited in its potential to impact the area, as no stormwater outfalls empty toward the ocean in this shellfish growing area. It is likely that a small amount of storm runoff enters the ocean waters from non-channeled runoff but most stormwater inputs pass through storm drain infrastructure that empties into back bay waters.

Barnegat Bay receives stormwater inputs prior to their flowing into Shellfish Growing Area A0Cent. A great deal of Barnegat Bay waters then flow into A0Cent through Barnegat Inlet. Little Egg Harbor may additionally provide some contribution from the Beach Haven Inlet which is located just south of these shellfish growing waters.

Vast portions of Barnegat Bay and Little Egg Harbor waters are *Approved*. Although these embayment's do receive many of the stormwater inputs that might otherwise be directed into the ocean waters of A0Cent, substantial dilution appears to be occurring within these systems when considering the total area of *Approved* acreage these bays comprise. As these embayment's eventually feed into the ocean shellfish growing waters of A0Cent, it is important to understand that their water quality in terms of bacteriological monitoring and related data is generally good, despite the stormwater inputs they receive from runoff, creeks, and rivers. This lends support to the suggestion that impacts from stormwater inputs are fairly limited for this shellfish growing area.

# WATER QUALITIES STUDIES

## SAMPLING STRATEGY

Shellfish growing area A0Cent was sampled using the Adverse Pollution Condition (APC) sampling strategy. The APC sampling strategy requires a minimum 15 sample composite of data, collectively supported by a minimum requirement of five 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, 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 A0Cent 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 90<sup>th</sup> percentile. 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.

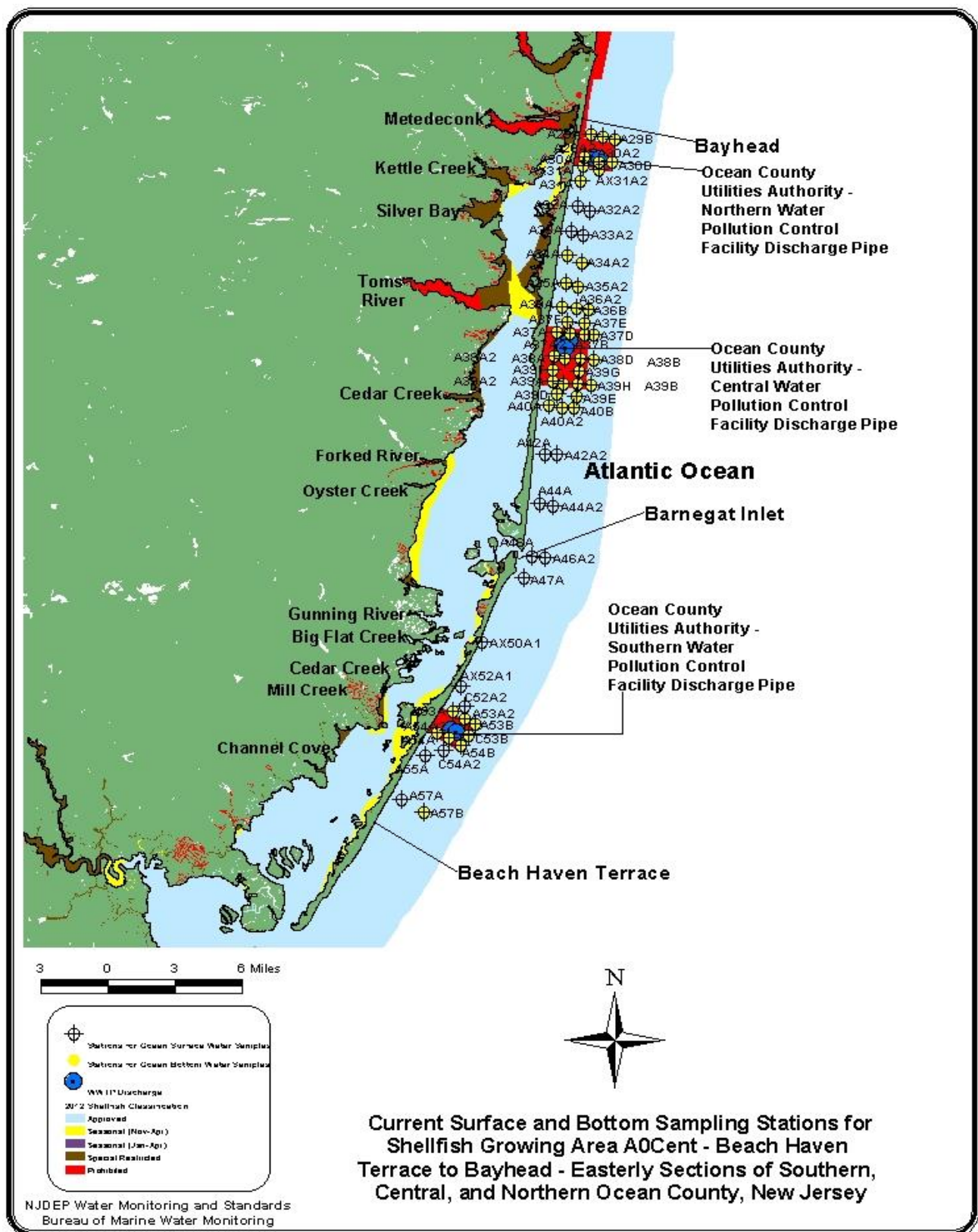
Statistical Criteria for Adverse Pollution Condition Sampling Strategy					
	Total Coliform Criteria		Fecal Coliform Criteria		
	Geometric mean (MPN/100 mL)	No more than 10% of samples can exceed (MPN/100 mL)	Geometric mean (MPN/100 mL)	No more than 10% of samples can exceed (MPN/100 mL)	
Approved Water 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 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*, 2009.

The results were compiled from the 62 surface and 45 bottom stations that comprise Assignments 481, 491, and 501. A review of the records suggests that 1,694 water samples were collected for fecal coliform bacterial analysis between 2008 and 2012 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 Beach Haven Terrace to Bayhead (A0Cent) are presented on the next page. They were analyzed by WM&S/BMWM at Leeds Point. Classification of these shellfish growing waters has been based on these data.



## BACTERIOLOGICAL QUALITY

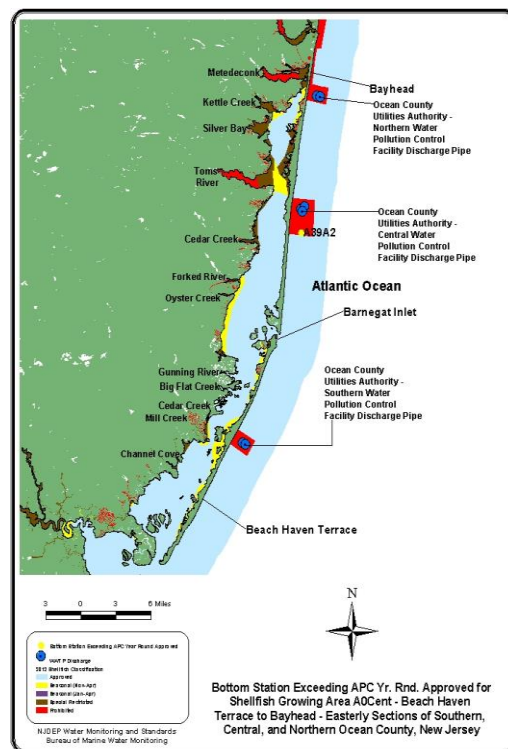
### Compliance with NSSP APC Approved Year Round Criteria

For this Sanitary Survey, final analyses in conjunction with NSSP requirements for *Approved* waters suggests *Prohibited* bottom station A39A2 [A39A2 (P - B)] exceeded APC *Approved* yr. rnd. criteria with 17 samples when reviewing the Statistical Summary and the Shellfish Growing Water Data Listings.

A39A2 is located 1.43 nautical miles south of the OCUA-Central Water Pollution southerly Wye Diffuser. Its location can be viewed in the map to the right.

A combined analysis using fecal coliform direct 3 tube A-1, and mTEC was utilized. A39A2 (P - B) had a year round geo-mean of 5.6 MPN/100 mL which was acceptable for yr. rnd. *Approved*. It exceeded the 90th percentile with 11.8% > 44 MPN/100 mL.

The appropriate data analysis for *Approved* shellfish growing water criteria requires the geometric mean not exceed 14 MPN/100 mL and no more than 10% of the samples should exceed 44 MPN/100 mL with 17 samples.



Because bottom station A39A2 is in *Prohibited* waters, the 90th percentile score that exceeded *Approved* criteria remains important but does not exceed the current classification of waters where that station is located. Additionally, the exceedance for station A39A2 (P - B) w/ regard to its 90th percentile is a result of three sampling dates from 07/25/08, 05/19/09, and 06/16/09 where the sample results were recorded at 93.0, 150.0, and 43.0 MPN/100 mL, respectively for those dates. This data and data from preceding years, presented in the 2010 Reappraisal for A0Cent, produced the 2,174.51 *Approved* to *Prohibited* acreage downgrade, previously referenced in the Growing Area Classification Summary section of this report. Prior to that downgrade, station A39A2 (P - B) was an *Approved* station.

Although the required data, acquired for this current Sanitary Survey retains a portion of the data from the 2010 Reappraisal for A0Cent, the current data pull shows bacteriological results for A39A2 (P - B) have improved over the last three years. BMWM/WM&S will continue to monitor this station, and four other stations (two of which were also in *Approved* waters), which were found to have data that exceeded *Approved* criteria during the 2010 Reappraisal.

### 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.

The precipitation data for this area was provided by the National Oceanic and Atmospheric Administration (NOAA), and stations RA012, RA014 and RA021.

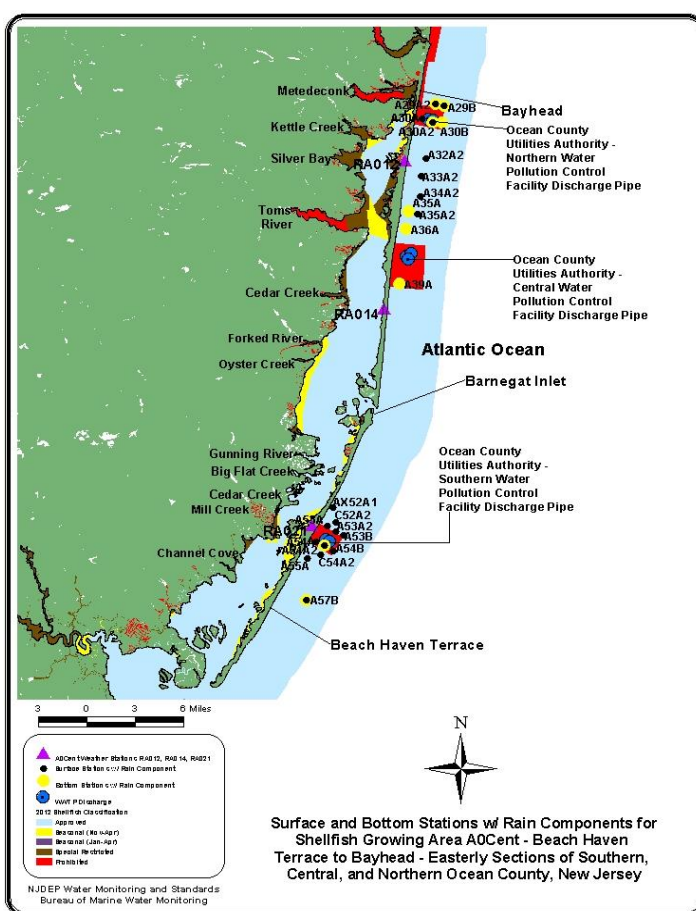
Based on Wet/Dry statistics, there were 19 surface sampling stations and nine bottom stations (28 total – see map to the right) that showed rainfall components in relation to water quality for this shellfish growing area. Of the 19 surface stations, 14 were in *Approved* waters and five were in *Prohibited*. For the nine bottom stations, six were in *Approved* waters and three were in *Prohibited* waters.

Rainfall components must register a t-statistical probability less than 0.05. The Wet/Dry Statistics were calculated based on an impact time of 24 hours prior to the day of sampling and a wet/dry cutoff of 0.1 inches of rain, as these criteria produced the most results for impact. These stations were generally located in the northern and southern waters of this shellfish growing area.

Fifteen rain component stations showed higher geometric means during wet conditions with two - four samples.

Thirteen rain component stations had higher geometric means during dry conditions with 15 to 17 samples. The highest geo-mean for any rain component station was shown under wet conditions at 11.8 MPN/100 mL for *Prohibited* bottom station A30A2 with 4 wet counts.

No stations with rain components exceeded *Approved* criteria in the wet/dry data sheets. In the Statistical Summary, the highest year round geometric mean recorded for any one of these stations was 4.4 MPN/100mL. Ninetieth percentiles were no higher than 4.5 % > 42 MPN/100 mL with 22



samples. With this, impact was apparent from rainfall but required no change in shellfish classifications.

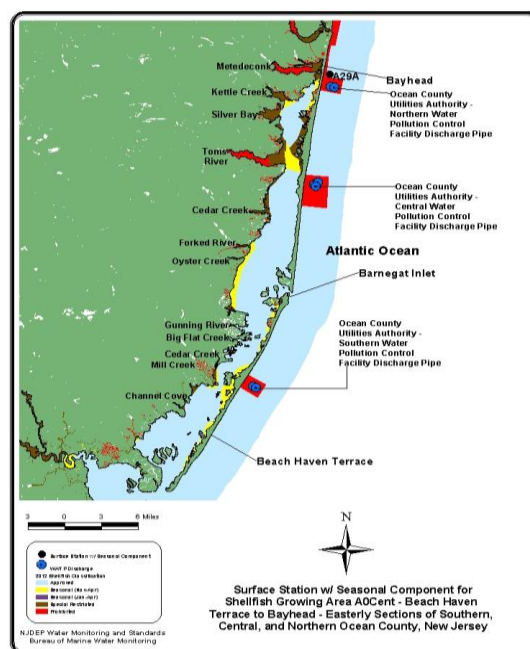
## Seasonal Effects

Some of the urban communities in the shore area abutting the waters of A0Cent experience seasonal fluctuations in populace. For those towns, which show an increase in population due to summer resort activities, the summer months can result in increased impacts to nearby water sources. This can be due to a number of things such as petroleum wastes from additional car and boat traffic, or other residuals released into the environment from summer's flexing population, and their activities. However, impacts to State ocean waters are not necessarily isolated as warmer month occurrences. Various circumstances such as storm activity can create impact during the winter.

As this is a populated New Jersey coastal area, bacterial data analyzed by WM&S/BMWM provides support for the specific classifications attributed to portions of the creeks, rivers, and bays that eventually flow into the waters of A0Cent. These classifications can encompass *Seasonal*, *Special Restricted*, and *Prohibited* designations because these water sources are prone to receiving various inputs, and have multiple marinas in their waters.

There was one station [A29A (S-A)] that had a seasonal component with the T-Probability being  $< 0.05$ . A29A is a surface station in *Approved* waters as shown in the map to the right. This station is situated in the northern sector of the growing area near the Ocean County Utilities Authority - Northern Water Pollution Control Facility Discharge Pipe.

The component for seasonality showed a higher winter geo-mean. The highest geo-mean shown for this station in the *Seasonal* statistics summary was 3.8 MPN/100 mL (winter with five samples). Surface station A29A had a year round geo-mean of 3.2 MPN/100 mL and its 90<sup>th</sup> percentile was  $0.0 > 42$  MPN/100 mL with 21 samples. As the data suggest, A29A (S-A) is within *Approved* criteria on summary evaluation, and impact is implied from seasonality but no change is required in shellfish classifications.

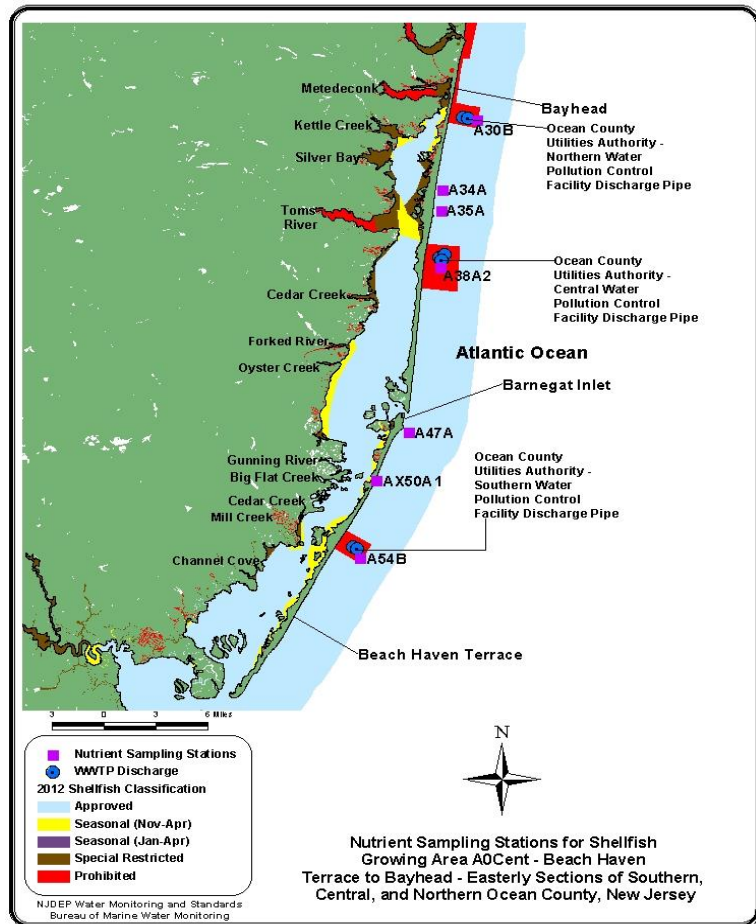


## RELATED STUDIES

### Nutrients

WM&S/BMWM perform additional water quality studies related to the bacteriological monitoring program. Nutrient monitoring and the collection of nutrient data as part of the NJ Coastal Monitoring Network is an example of one of those studies.

Nutrient stations are sampled on a quarterly basis. There are approximately 250 nutrient sampling stations within the coastal and inner coastal waters of New Jersey. Twenty-four of those stations are located within the ocean waters off the New Jersey coast. The 226 remaining nutrient stations are spread throughout the States back bay waters. The Bureau compiles the results of nutrient levels from such stations and then prepares a separate report. Shellfish growing area A0Cent has the following nutrient samplings stations: A30B, A34A, A35A, A38A2, A47A, AX50A1 and A54B. The figure to the right shows the locations for A0Cent nutrient stations.



Chlorophyll data are also contained within the nutrient data. As such, WM&S'/BMWM is able to maintain a quarterly 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. Further information on nutrients within State waters is available at [www.state.nj.us/dep/wms/bmw](http://www.state.nj.us/dep/wms/bmw) in sections such as those referring to Estuarine and Coastal Water Quality.

## Phytoplankton Monitoring

In the WM&S/BMWM phytoplankton monitoring program, data are collected from samples that are gathered bi-weekly from May through August (Memorial Day through Labor Day). The data are evaluated by WM&S/BMWM in order to determine the presence of marine biotoxins in accordance with NSSP requirements. Reports denoted as Summary of Phytoplankton blooms have been compiled and are available electronically at [www.state.nj.us/dep/wms/bmw](http://www.state.nj.us/dep/wms/bmw).

There are 16 phytoplankton stations within the waters of New Jersey. Of those 16, four are located off the coast from the southerly portion of Sandy Hook down to Cape May. The other 12 phytoplankton stations are situated within New Jersey's back bay waters. Station A54B is a phytoplankton station location in shellfish growing area A0Cent (location for A54B is shown in figure denoting nutrient sampling stations). Current monitoring (again see [www.state.nj.us/dep/wms/bmw](http://www.state.nj.us/dep/wms/bmw)) suggests that populations of phytoplankton are generally sparse for samples taken at this station, or they are found in non-bloom concentrations where toxic species are concerned.

Nutrient and phytoplankton stations are generally arranged so samples for both are taken from matching locations. In this regard, data can be uniformly compared and analyzed where those stations occur and overlap.

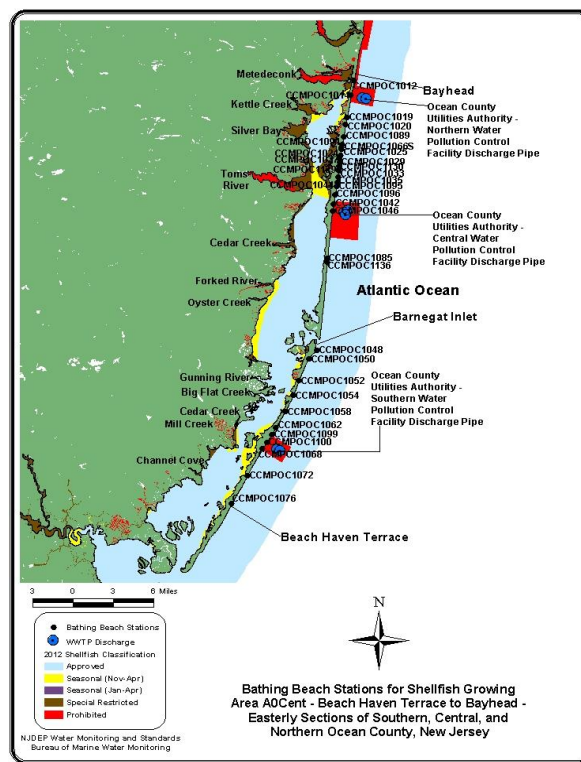
There are occasional occurrences of algal blooms in all ocean waters in New Jersey, and these can occur throughout the year. However, the warmer months of spring and summer provide a very common period for algal growth.

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 Senior Services, and local environmental health agencies interacting within their regions of coastal New Jersey. These agencies collect water samples each week at 175 ocean and 43 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).



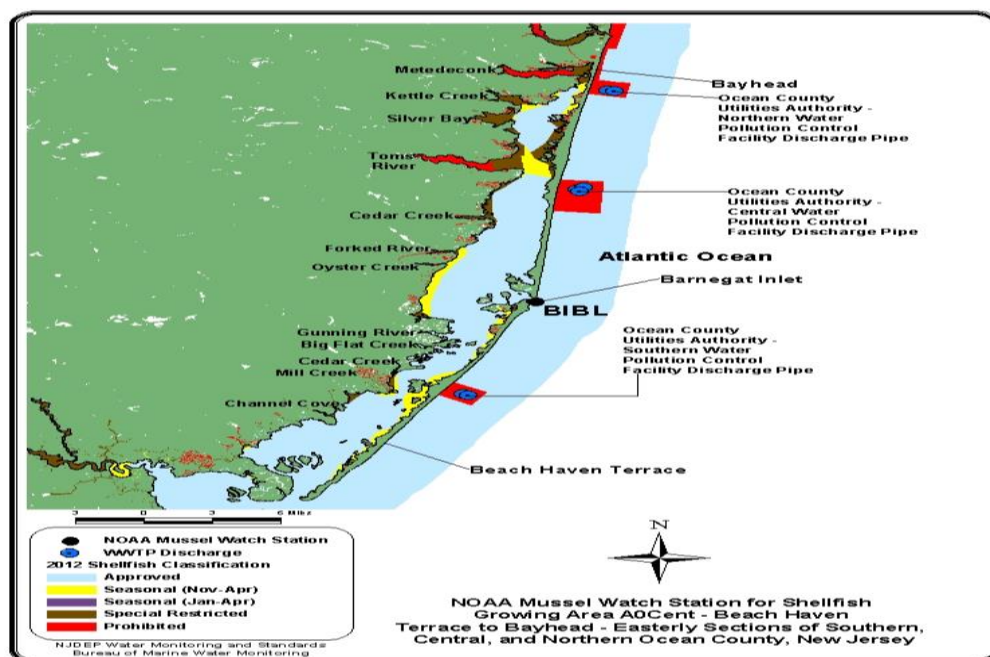
A0Cent has 33 bathing beach stations as shown in the map on the previous page. Data for these stations is available at <http://www.njbeaches.org>.

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.

## NOAA Mussel Watch

WM&S/BMWM track projects such as the NOAA Mussel Watch in order to obtain data relating to toxins or metals within specific marine species and ecosystems. A0Cent has NOAA Mussel Watch station BIBL within its growing waters. Station BIBL is shown in the figure to the right, and data for this station is available at <http://ccma.nos.noaa.gov/about/coast/nsandt/musselwatch.aspx>.



## CONCLUSIONS

The water quality data from May 01, 2008 through November 01, 2012 for the shellfish growing waters located within 31 miles of coastline from Beach Haven Terrace in the south to Bayhead in the north (A0Cent) presented no stations that exceeded NSSP criteria for the classifications in which they were located.

Data review of 17 sample dates for this Sanitary Survey did show *Prohibited* bottom station A39A2 (P - B) had a year round geo-mean of 5.6 MPN/100 mL which was acceptable for year round *Approved* criteria but the station exceeded its 90th percentile when reviewing APC year round criteria for *Approved* waters with 11.8% > 44 MPN/100 mL.

The appropriate data analysis for *Approved* shellfish growing water criteria requires the geometric mean not exceed 14 MPN/100 mL and no more than 10% of the samples should exceed 44 MPN/100 mL with 17 samples.

The 90<sup>th</sup> percentile exceedance by station A39A2 (P - B) is important to note as part of this section as it is rare to see any stations exceed *Approved* criteria in State shellfish growing waters within the ocean. However, this station is located in *Prohibited* waters, which is why no classification criteria were exceeded, and no downgrades were considered in relation to this exceedance.

Generally, *Prohibited* classifications within State ocean waters are the result of buffer/dilution requirements for wastewater treatment outfalls, and stations within those buffers rarely have counts that exceed *Approved* criteria. The current data pull, utilized for this report shows bacteriological results for A39A2 (P - B) have improved over the last three years but a portion of the data gathered in order to obtain a minimum of 15 samples per station dates back to samples collected in 2008 and 2009. There were three sample dates in those years that cause the 90<sup>th</sup> percentile for A39A2 (P - B) to exceed APC *Approved* year round criteria.

Generally, the secondary treated effluents from the Ocean County Utilities Authority – Southern, Central, and Northern Water Pollution Control Facilities (wastewater treatment facilities) which are discharged through the pipes and outfalls present in this area do not appear to be impacting the shellfish growing waters of this area with significant coliform levels. There were questions raised about the OCUA central plant outfall and effluent quality in relation to the downgrade that resulted around that outfall following the 2010 Reappraisal for A0Cent. During that Reappraisal, the data for bottom station A39A2 (P - B), which had been in *Approved* waters prior to that downgrade, and the data for two other *Approved* stations near that outfall required an enlargement of the buffer that surrounds that outfall. Actually, four stations were reported with data exceeding *Approved* criteria in that Reappraisal but one station was already positioned within the *Prohibited* buffer area that existed before the downgrade.

During data review and analysis for the 2010 Reappraisal, BMWM/WM&S reviewed the methodology for collection by the assigned boat captain, and lab analysis procedures for the assignments and stations where higher counts had been observed in the data. In addition, BMWM/WM&S and OCUA central staff also reviewed bacteriological data, and analytical processes for the plant. Reviews of all these processes showed no particular reason for higher counts. Cause and effect reasons for higher bacteriological counts in the data, at the time of the 2010 Reappraisal, remained unknown. None the less, data is improving and continued monitoring of the stations involved in the 2010 downgrade continues.

Although limited in their impact, there were seasonal and rainfall components noted for some stations. In these cases, impact is suggested to have been limited due to the relatively low fecal coliform levels in relation to those components.

There were no indications that inputs such as spills caused significant impact to the waters of this growing area. The absence of inputs from stormwater outfalls along the coastal shoreline of A0Cent greatly reduces concern for impact to the waters of this growing area, as well. In addition,



stormwater discharge into back bay waters appears to be significantly diluted prior to reaching the ocean waters of A0Cent.

At present, 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 by WM&S/BMWM, supports a predominately good characterization for water quality in A0Cent at present.

## **RECOMMENDATIONS**

With regard to the summarizations presented in this report, there are no changes proposed for A0Cent assignments 481, 491, and 501 monitoring stations, sampling strategy (APC) or classifications planned at this time. Continuous data monitoring practices are specifically recommended for *Prohibited* bottom station A39A2, and surrounding stations.

## LITERATURE CITED

- APHA. 1970. Recommended Procedures for the Examination of Seawater and Shellfish, 4th ed., American Public Health Association, Washington, DC.
- APHA. 2012. Standard Methods for the Examination of Water and Wastewater, 22nd ed., American Public Health Association, Washington, DC.
- Budin, Ray. 2010. Ocean County Utilities Authority, Brick, NJ (personal communication).
- Cabelli, V.J. 1983. Health Effects Criteria for Marine Recreational Waters. EPA-600/1-80-031, U.S. Environmental Protection Agency Corlis, Harry. 2010. Ocean County Utilities Authority, Bayville, NJ (personal communication).
- Curtis, Mike. 2010. Reappraisal Beach Haven Terrace to Bayhead. New Jersey Department of Environmental Protection, Bureau of Marine Water Monitoring, Leeds Point, NJ.
- Curtis, Mike. 2010. Reappraisal Absecon Inlet to Beach Haven Terrace. New Jersey Department of Environmental Protection, Bureau of Marine Water Monitoring, Leeds Point, NJ.
- FDA. 2001. Applied Concepts in Sanitation Surveys of Shellfish Growing Areas, Volume I, Course #FD2042. Food and Drug Administration, Division of Human Resource Development, Rockville, Md.
- FDA, 2008. Sanitary Surveys of Shellfish Growing Areas I, FD242. Food and Drug Administration, Division of Human Resource Development, Rockville, Maryland.
- FDA, 2008. Sanitary Surveys of Shellfish Growing Areas II, FD242. Food and Drug Administration, Division of Human Resource Development, Rockville, Maryland.
- Gastrich, Mary Downs. 2000. Harmful Algal Blooms in Coastal Waters of New Jersey. New Jersey Department of Environmental Protection, Division of Science, Research and Technology, Trenton, NJ.
- Griffiths, James. 2010. Ocean County Utilities Authority, West Creek, NJ (personal communication, photo provision).
- NJDEP. 2005. Field Sampling Procedures Manual. New Jersey Department of Environmental Protection, Trenton, NJ.
- NJDEP. 2008. Annual Summary of Phytoplankton Blooms and Related Conditions in New Jersey Coastal Waters Summer 2005. New Jersey Department of Environmental Protection, Water Monitoring and Standards/Bureau of Marine Water Monitoring, Trenton, NJ.
- NJDEP. 2012. State of New Jersey Shellfish Growing Water Classification Charts. New Jersey Department of Environmental Protection, Marine Water Monitoring, Leeds Point, NJ.
- NJDEP. Shellfish Growing Area Report Guidance Document, Trenton, NJ.
- NOAA Fisheries. 2013. Office of Constituent Services. Silver Spring, MD.
- Normant, Jeff. 2013. New Jersey Department of Environmental Protection, Bureau of Shellfisheries, Nacote Creek, NJ. (personal communication).
- U.S. Environmental Protection Agency. 1986. Ambient Water Quality Criteria for Bacteria-1986. EPA-440/5-84-002, U.S. Environmental Protection Agency, Washington, D.C.
- USPHS. National Shellfish Sanitation Program *Guide for the Control of Molluscan Shellfish*, 2009. US Public Health Service, Food and Drug Administration, Washington, DC.

## **SUPPORTING DOCUMENTATION**

Data sheets – Sanitary Survey Report for Shellfish Growing Area A0Cent (Beach Haven Terrace to Bayhead), April 2013 (see the Shellfish Growing Area Reports section at [www.state.nj.us/dep/wms/bmw](http://www.state.nj.us/dep/wms/bmw)).

Shoreline survey field notes and pictures – Sanitary Survey Report for Shellfish Growing Area A0Cent (Beach Haven Terrace to Bayhead), April 2013 (see the Shellfish Growing Area Reports section at [www.state.nj.us/dep/wms/bmw](http://www.state.nj.us/dep/wms/bmw)).