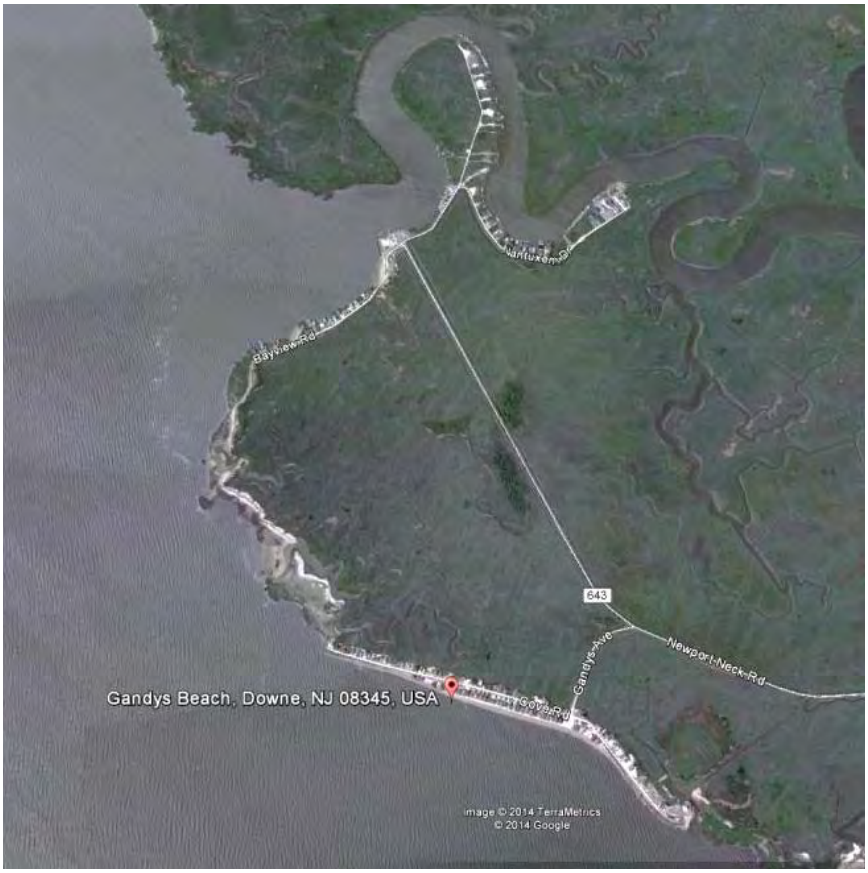
NJ Department of Environmental Protection
Water Monitoring and Standards
Bureau of Marine Water Monitoring

Money Island / Gandy's Beach Impact Study



August 2014

Money Island / Gandy's Beach Impact Study

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August 2014

Bureau of Marine Water Monitoring
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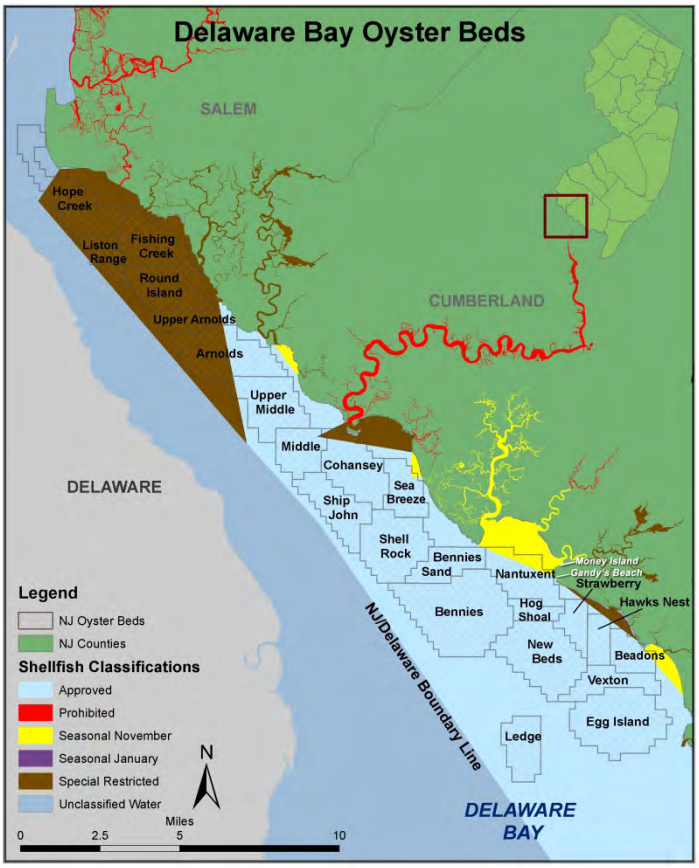
Background

Money Island and Gandy's Beach have numerous homes (see Appendix A) with compromised holding tanks which are located near high tide or are under water at high tide. The proximity of the homes and holding tanks to the water is, in part, due to erosion of the Delaware Bay shore. The infrastructure issues at Money Island and Gandy's Beach were discovered during shoreline surveys conducted by NJDEP and the Food and Drug Administration (FDA). FDA has cited the Department in annual shellfish program audits for allowing untreated waste, via compromised holding tanks, to enter the Delaware Bay in proximity to economically important shellfish growing areas. FDA maintains that these untreated discharges pose a serious human health impact due to the raw consumption of shellfish and the potential of the shellfish containing pathogens and active virus. Current National Shellfish Sanitation Program (NSSP) monitoring stations in Delaware Bay are not properly located to quantify the impact of the failing infrastructure in Money Island and Gandy's Beach because of their distance from the discharges. To properly assess and quantify the impact of the discharge of untreated human waste, the Department needs to locate additional NSSP monitoring stations closer to the source. The Department prepared an intensive monitoring plan that includes near shore monitoring locations to quantify and identify the extent of the impact from the compromised infrastructure at Money Island and Gandy's Beach. Intensive monitoring was conducted in June and July of 2014, collecting samples from boats and shoreline closer to the homes located at Money Island/Gandy's Beach.

Economic Impact

The Delaware Bay maintains New Jersey's largest commercial oyster harvest. The potential impact of sewage infrastructure issues at Money Island/Gandy's Beach on Delaware Bay shell fishing may be significant.



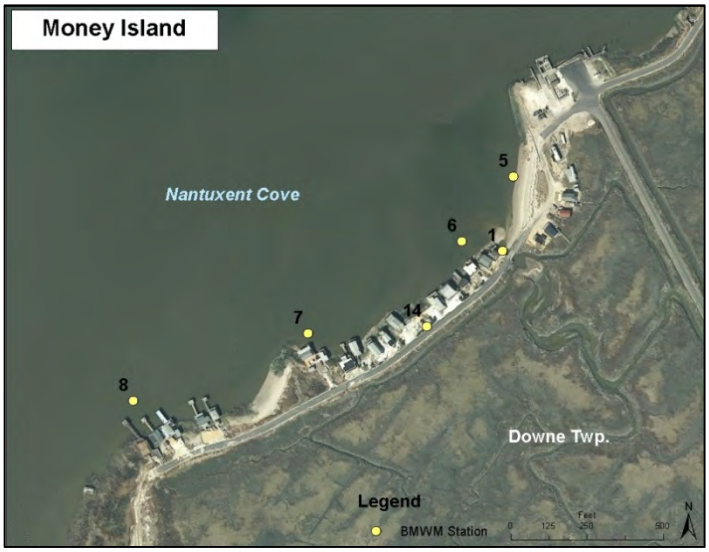
There are 3 ways of harvesting oysters on Delaware Bay; mechanical dredging, hand tonging and oyster culture. The vast majority of oysters are mechanically dredged from the natural seed beds maintained by the Department in cooperation with the Delaware Bay Shellfish Council. The other two harvest methods are hand tonging and oyster culture (where the oysters are gathered at low tide by hand). Money Island and Gandy's Beach are located on Nantuxent Cove, Delaware Bay. Nantuxent Cove contains a large number of leased lots use for tonging oysters. Adjacent to Nantuxent Cove in the main Delaware Bay are natural seed beds where oysters are mechanically dredged. The closest natural seed beds to Money Island and Gandy's Beach are Nantuxent, Strawberry, Hawks Nest, Hog Shoal, Bennies, New Beds, and Bennies Sands.

The greatest potential for the raw sewage discharges to impact the seed lots is within Nantuxent Cove and the natural oyster beds in the immediate area of Money Island and Gandy's Beach. These areas could be impacted by both pathogen and viral contamination. In addition, FDA could require the Department to close these areas if they felt the raw sewage had the potential to impact public health.

The loss of tonging within Nantuxent Cove would have an economic impact of $380,500 /year due to loss of product landings. This would directly affect those Baymen who harvest within the cove. If the closures were to impact dredging operations, the economic loss would be $22-23 million/year based on current landings. A multiplier would need to be applied to determine the true economic impact of the loss of the oyster fishery on local economies.

Monitoring Plan

The Money Island and Gandy's Beach sampling plan consisted of 5 intensive sampling events (6/7, 6/16, 6/23, 6/30, and 7/10). Initially, Saturday was identified for sampling to ensure homes were in use since many of the homes are summer homes and frequented on weekends. After the first event, sampling was shifted to Mondays. The 7/10 event was moved to a Thursday due to weather conditions. Sampling was conducted at a total of 14 stations; 9 from boat and 5 from land (see maps). Four separate samples were collected at each monitoring station, 1 hour apart. Sampling for the 6/7 event was conducted at: 1 hour prior to high tide, high tide, 1 hour and 2 hours after high tide. Subsequent sampling events started at different times to quantify water quality during various tide cycles. The total number of samples collected at each sampling event was 56, and the total number of samples collected for the study was 280. The samples were analyzed for the bacterial indicators: E. coli, fecal coliform (used in shellfish classification), and enterococcus (used for primary recreational contact in marine waters). Any samples with high bacteria counts were then analyzed for optical brighteners (a measure of florescence), coliphage (an indicator of human virus), and antibiotic resistance analysis (ARA), which is used to distinguish sources of bacterial pollution (human vs. animal). Analysis for coliphage and optical brighteners was terminated after the 6/23



sampling event. Coliphage is only present in 15% of the human population and is a better indicator in large wastewater discharge like a catastrophic failure of a wastewater treatment plants. Optical brighteners are found in laundry waste from whitening detergents. A large deviation from background was not seen. All monitoring was completed on 7/10 and all data may be found in Appendix B and is available in excel format upon request.

National Shellfish Sanitation Program

This area of Delaware Bay is classified using Adverse Pollution Condition Strategy, which is applied in growing areas affected by point sources. The Adverse Pollution Condition Strategy requires that a minimum of five samples be collected each year under conditions that have historically resulted in elevated coliforms in the particular growing area. The criteria for approved classification is a geomean not to exceed 14 cfu/100ml and no more than 10% of the 15 samples can exceed 31. The criteria for special restricted classification is a geomean not to exceed 88 cfu/100ml and no more than 10% of the 15 samples can exceed 163 (see table below).

Results indicate that that all of the 14 monitoring locations exceeded the National Shellfish Sanitation Program classification criteria for "approved" shellfish classification - meaning that the geomean at each location exceeded 14 cfu/100ml and that more than 10% of the samples at each monitoring location exceeded 31 cfu/100ml. Monitoring Stations 1, 4, and 14 exceeded the geomean for special restricted classification of 88 cfu/100ml and more than 10% of the samples at each monitoring location exceeded 163 cfu/100ml. This supports FDA's contention that sanitary discharges are affecting water quality and their request that the Department downgrade these waters and suspend shellfish harvest in the immediate area. Additional sampling would be needed to delineate the size of the downgrade to prohibited status.

	Fecal Coliform Criteria	
	Geometric Mean (cfu/100ml)	No more than 10% can exceed (cfu/100ml)
Approved Classification	Not to exceed 14	31
Special Restricted Classification	Not to exceed 88	163

Recreational Water Quality Criteria

The EPA's 2012 Recreational Water Quality Criteria require that recreational bathing beaches not exceed a single sample value for enterococcus of 104 cfu/100ml and a 30 day geomean not to exceed 30 cfu/100ml (minimum of 5 samples).

Results also indicate that 5 out of 14 monitoring locations (1, 2, 4, 11, and 14) exceeded the recreational bathing criteria for enterococcus of 104 cfu/100ml. All, except monitoring location 11, had multiple exceedances. Four out of 14 monitoring locations (1, 2, 4, and 14) exceeded the

recreational bathing criteria for a 30-day geomean of 30 cfu/100ml. These exceedances of the geo-mean suggest the existence of a persistent pollution source and not a one-time occurrence. It should be noted that there are no recreational bathing areas in Gandy's Beach or Money Island, but the area is used for primary recreation and staff did observe on multiple instances people bathing/swimming in the water.

Male Specific Coliphage (MSC)

Coliphages are bacterial viruses that infect and replicate in E. coli. They are found in human and animal feces. Coliphages are potentially important microorganisms for monitoring the microbial quality of waters because: 1) traditional bacterial monitoring does not accurately indicate the presence of nonbacterial organisms such as human pathogenic viruses, 2) human virus detection is beyond the capabilities of most water laboratories, and 3) coliphage detection is relatively inexpensive, easy to perform, and provides overnight results. Male-specific coliphages have only limited replication in the environment. That is similar to human viruses which do not replicate outside the human body. The male-specific coliphages that possess an RNA genome are also similar to human enteroviruses in size, structure and resistance characteristics. Thus, male-specific RNA coliphages are promising candidate indicators of human viruses in waters. (USEPA Manual of Methods for Virology, Chapter 16, 2001)

Analysis for MSC was performed on 13 samples during the first 4 monitoring events. Of those 13, the only positive result was monitoring station 3 (1 pfu/100ml). There is no comparative standard for coliphage in the water column, but this does indicate the presence of human pathogenic viruses.

Coliphage was not analyzed after the 6/23 sampling event. Coliphage is only present in 15% of the human population and is a better indicator in large wastewater discharge like a catastrophic failure of a wastewater treatment plant rather than individual compromised holding tanks.

Antibiotic Resistance Analysis (ARA)

Antibiotic Resistance Analysis was conducted on samples that had the highest levels of E. coli. In total 22 ARA samples were analyzed. Of the 22 samples analyzed, 15 showed a human signature (E. coli exhibited a resistance to antibiotics administered to humans). Specifically, monitoring stations 1, 2, 3, 4, 5, 6, and 14 had a human signature. In addition 11 of the 22 samples indicated a domestic animal signature (E. coli exhibited a resistance to antibiotics administered to domestic animals including pets) and 13 of the 22 samples indicated a wildlife signature (E. coli exhibited a no resistance to antibiotics). See Appendix B for data.

Optical Brighteners

Optical brighteners are used in laundry products and toothpaste to enhance whitening. When they are put under an ultra violet light they fluoresce. The optical brighteners' results are a numerical expression of the degree of fluorescence. There was no significant deviation between the results at all monitoring stations during the first 4 rounds of sampling. This suggests that we are seeing background and no significant source of optical brighteners from a sanitary source, likely due to dilution and the transient nature of the population. As such, monitoring for optical brighteners was ceased after the 6/23 event.

Conclusion / Recommendations

There is no single definitive source tracking technique. The scientific community suggests using a "weight of evidence" approach and looking at a number of indicators. Monitoring for fecal coliform

and enterococcus indicted elevated levels at nearly all monitoring locations. Results support the downgrading of waters near Money Island and Gandy's Beach to prohibited classification for shellfish harvest. Enterococcus levels indicate that primary recreational contact should be avoided and that recreating in the waters near Money Island and Gandy's Beach exceed EPA's acceptable risk factor of an estimated 32 illnesses/1000. Coliphage analysis, which is an indicator of pathogenic viruses, only revealed one positive result. This is likely due to the small population contributing the discharge as coliphage is present in only 15% of the population. Optical brightener levels never spiked, indicating that either there was very little gray water being discharged or dilution mitigated the results. Antibiotic Resistance Analyses indicated that in 68% of the samples analyzed, E. coli bacteria showed resistance to antibiotics typically administered only to humans.

Using a weight of evidence approach suggests that the compromised holding tanks are causing a real public health issue for both shellfish consumption and primary contact recreation and that the source of the pollutants is from human waste. The discharge of sanitary waste needs to be addressed. As long as compromised infrastructure at Money Island and Gandy's Beach exists, the Department will need to take actions to ensure public health and safety. In addition, to properly assess and quantify the impact of the discharge of untreated human waste, the Department needs to consider the permanent location of additional NSSP monitoring stations closer to the source.

Appendix A
Inventory of Homes

Based on NJDEP inspections there are 71 homes located in Gandy's Beach (35 bayside and 36 bayfront) and 50 homes in Money Island (5 bayside and 45 bayfront). Below are addresses, GPS locations and photos of 17 homes in the area that illustrate some of the conditions observed.

For Houses at Gandy's Beach (35 bayside and 36 bayfront)			
Home Address	GPS for Septic Tank	Active/ Inactive	Picture #
270 Cove Rd. North	39 degrees 16' 20.4" 75 degrees 14' 10.1"	Inactive/ Disconnected	1
268 Cove Rd. North	39 degrees 16' 20.8" 75 degrees 14' 09.7"	Active	2
266 Cove Rd. North	39 degrees 16' 20.7" 75 degrees 14' 09.3"	Inactive/ Disconnected	3
226 Cove Rd. North	39 degrees 16' 18.5" 75 degrees 13' 59.4"	Active	4
222 Cove Rd. North	39 degrees 16' 17.9" 75 degrees 13' 58.4"	Inactive	5
200 Cove Rd. North	39 degrees 16' 16.6" 75 degrees 13' 52.7"	Active	6
192 Cove Rd. South	39 degrees 16' 16.3" 75 degrees 13' 50.9"	Inactive	7

For Houses at Money's Island (5 bayside and 45 bayfront)			
Home Address	GPS for Septic Tank	Active/ Inactive	Picture #
284 Bayview Rd.	39 degrees 17' 04.1" 75 degrees 13' 58.9"	Inactive/ Disconnected	8
226 Bayview Rd.	39 degrees 17' 08.8" 75 degrees 14' 07.5"	Inactive	9
222 Bayview Rd.	39 degrees 17' 07.08" 75 degrees 14' 07.5"	Inactive	10
164 Bayview Rd.	39 degrees 16' 58.4" 75 degrees 14' 16.3"	Inactive/ Disconnected	11
160 Bayview Rd.	39 degrees 16' 57.2" 75 degrees 14' 17.6"	Inactive	12
158 Bayview Rd.	39 degrees 16' 57.9" 75 degrees 14' 18.2"	Inactive	13
156 Bayview Rd.	39 degrees 16' 56.1" 75 degrees 14' 19.6"	Active	14
Small Gray Vinyl Sided Ranch House	39 degrees 16' 52.8" 75 degrees 14' 28.2"	Inactive	15
Small Beige Vinyl Sided House	39 degrees 16' 52.7" 75 degrees 14' 28.5"	Inactive	16
114 Bayview Rd.	39 degrees 16' 52.1" 75 degrees 14' 30.1"	Inactive	17

Picture #1 – 270 Cove Rd North, Gandy's Beach


Picture #2 – 268 Cove Rd North, Gandy's Beach

Picture #3 – 266 Cove Rd North, Gandy's Beach

Picture #4 – 226 Cove Rd North, Gandy's Beach

Picture #5 – 222 Cove Rd North, Gandy's Beach

Picture #6 – 200 Cove Rd North, Gandy's Beach

Picture #7 – 192 Cove Rd South, Gandy's Beach

Picture #8 – 284 Bayview Rd, Money Island

Picture #9 – 226 Bayview Rd, Money Island

Picture #10 – 222 Bayview Rd, Money Island

Picture #11 – 164 Bayview Rd, Money Island

Picture #12 – 160 Bayview Rd, Money Island

Picture #13 – 158 Bayview Rd, Money Island

Picture #14 – 156 Bayview Rd, Money Island

Picture #15 – Unknown address on Bayview Rd, Money Island (small gray vinyl sided ranch house)

Picture #16 – Unknown address on Bayview Road, Money Island (small beige vinyl sided house)

Picture #17 – 114 Bayview Rd, Money Island

Appendix B
Data*

Money Island / Gandy's Beach, Delaware Bay									
Station	Collection Date	Collection Time	Run	Fecal Coliform mTec (CFU's/100mL)	*Enterococcus* MEI (CFU's/100mL)	*Escherichia coli* Mod. mTec (CFU's/100mL)	Coliphage (PFU's/100mL)	Antibiotic Resistant Analysis	Optical Bright-ners
1	06/07/14	400	1	240	120	220	< 8	Domestic/Human	23.0
2	06/07/14	415	1	6	< 3	3			20.9
3	06/07/14	420	1	80	18	18			21.3
4	06/07/14	425	1	870	2500	830	< 8	Domestic/Wildlife	21.9
5	06/07/14	400	1	18	9	27			23.4
6	06/07/14	402	1	12	< 3	9			23.3
7	06/07/14	404	1	21	12	21			24.4
8	06/07/14	405	1	21	6	9			23.0
9	06/07/14	408	1	9	< 3	6			20.8
10	06/07/14	410	1	12	3	6			20.8
11	06/07/14	412	1	9	< 3	6			21.0
12	06/07/14	414	1	18	< 3	3			20.9
13	06/07/14	416	1	< 3	< 3	< 3			20.6
1	06/07/14	500	2	30	6	21			22.9
2	06/07/14	515	2	67	< 3	48			20.3
3	06/07/14	520	2	42	45	21			20.0
4	06/07/14	525	2	70	24	77			21.4
5	06/07/14	500	2	9	6	6			19.8
6	06/07/14	502	2	18	< 3	9			22.1
7	06/07/14	504	2	33	9	6			23.6
8	06/07/14	505	2	12	9	18			22.1
9	06/07/14	508	2	6	< 3	3			18.9
10	06/07/14	510	2	21	< 3	6			19.7
11	06/07/14	512	2	12	9	6			19.0
12	06/07/14	514	2	12	< 3	6			19.2
13	06/07/14	516	2	3	< 3	< 3			19.1
1	06/07/14	600	3	61	9	67			22.4
2	06/07/14	615	3	15	3	3			18.1
3	06/07/14	620	3	52	12	21			18.6
4	06/07/14	625	3	42	12	24			18.5
5	06/07/14	600	3	18	21	24			21.5
6	06/07/14	602	3	21	< 3	9			22.2
7	06/07/14	604	3	21	9	12			21.8
8	06/07/14	605	3	15	3	12			22.1

9	06/07/14	608	3	9	3	3			17.7
10	06/07/14	610	3	3	< 3	3			17.4
11	06/07/14	612	3	3	< 3	6			17.6
12	06/07/14	614	3	6	3	6			17.9
13	06/07/14	616	3	3	3	6			17.6
1	06/07/14	700	4	130	12	83	< 8	Domestic/Wildlife	23.0
2	06/07/14	715	4	9	3	9			18.4
3	06/07/14	720	4	12	15	< 3			18.9
4	06/07/14	725	4	410	83	440	< 8	Domestic/Wildlife	18.8
5	06/07/14	700	4	61	18	42			22.6
6	06/07/14	702	4	21	12	45			22.0
7	06/07/14	704	4	24	12	33			21.4
8	06/07/14	705	4	6	< 3	12			20.8
9	06/07/14	708	4	3	< 3	< 3			17.7
10	06/07/14	710	4	< 3	< 3	9			17.8
11	06/07/14	712	4	3	< 3	< 3			17.6
12	06/07/14	714	4	9	< 3	< 3			17.5
13	06/07/14	716	4	12	< 3	6			17.2

Money Island / Gandy's Beach, Delaware Bay

Station	Collection Date	Collection Time	Run	Fecal Coliform mTec (CFU's/100mL)	*Enterococcus* MEI (CFU's/100mL)	*Escherichia coli* Mod. mTec (CFU's/100mL)	Coliphage (PFU's/100mL)	Antibiotic Resistant Analysis	Optical Bright-ners
1	06/16/14	1035	1	110	45	67	< 1		27.7
2	06/16/14	1050	1	150	58	130	< 1	Domestic/Wildlife	26.0
3	06/16/14	1055	1	93	15	64	1		25.8
4	06/16/14	1060	1	100	250	77	< 1		25.5
5	06/16/14	1035	1	20	20	23			26.4
6	06/16/14	1037	1	37	17	30			26.5
7	06/16/14	1039	1	57	30	53			26.3
8	06/16/14	1040	1	47	30	27			25.5
9	06/16/14	1043	1	47	30	30			25.2
10	06/16/14	1045	1	37	33	73			25.3
11	06/16/14	1047	1	43	27	67			25.1
12	06/16/14	1049	1	70	27	50			25.3
13	06/16/14	1051	1	67	23	73			24.8
14	06/16/14	1040	1	1100	230	670	< 1	Human/Wildlife	28.1
1	06/16/14	1135	2	120	30	90			26.8
2	06/16/14	1150	2	83	24	64			24.7
3	06/16/14	1155	2	70	24	93			24.3
4	06/16/14	1160	2	150	24	180		Human/Wildlife	24.3
5	06/16/14	1135	2	63	10	43			25.0

6	06/16/14	1137	2	33	10	37			25.2
7	06/16/14	1139	2	47	7	53			24.5
8	06/16/14	1140	2	43	27	40			24.3
9	06/16/14	1143	2	23	30	33			23.4
10	06/16/14	1145	2	47	10	57			23.1
11	06/16/14	1147	2	40	17	27			22.5
12	06/16/14	1149	2	30	17	20			23.3
13	06/16/14	1151	2	13	< 3	60			23.2
14	06/16/14	1140	2	1000	160	570			26.1
1	06/16/14	1235	3	120	260	97		Human/Wildlife	25.0
2	06/16/14	1250	3	60	36	61			23.3
3	06/16/14	1255	3	21	55	48			22.3
4	06/16/14	1260	3	110	27	77			22.5
5	06/16/14	1235	3	47	17	50			23.4
6	06/16/14	1237	3	53	20	47			23.6
7	06/16/14	1239	3	53	13	53			24.4
8	06/16/14	1240	3	33	3	67			23.3
9	06/16/14	1243	3	13	3	10			21.6
10	06/16/14	1245	3	17	17	37			22.1
11	06/16/14	1247	3	17	3	17			22.4
12	06/16/14	1249	3	43	3	33			23.0
13	06/16/14	1251	3	43	13	37			23.3
14	06/16/14	1240	3	140	73	130			26.0
1	06/16/14	1335	4	73	140	80			25.3
2	06/16/14	1350	4	48	18	80			23.2
3	06/16/14	1355	4	39	6	39			22.8
4	06/16/14	1360	4	90	36	55			22.8
5	06/16/14	1335	4	23	7	40			24.1
6	06/16/14	1337	4	60	7	53			24.0
7	06/16/14	1339	4	37	10	43			24.2
8	06/16/14	1340	4	53	7	53			24.0
9	06/16/14	1343	4	10	< 3	27			22.7
10	06/16/14	1345	4	10	< 3	20			22.2
11	06/16/14	1347	4	23	< 3	7			22.1
12	06/16/14	1349	4	30	< 3	10			22.5
13	06/16/14	1351	4	60	3	13			22.4
14	06/16/14	1340	4	110	45	83			25.0

Money Island / Gandy's Beach, Delaware Bay

Station	Collection Date	Collection Time	Run	Fecal Coliform mTec (CFU's/100mL)	*Enterococcus* MEI (CFU's/100mL)	*Escherichia coli* Mod. mTec (CFU's/100mL)	Coliphage (PFU's/100mL)	Antibiotic Resistant Analysis	Optical Bright-ners

1	06/23/14	500	1	180	83	160	< 1	Wildlife	27.7
2	06/23/14	515	1	100	70	58			24.9
3	06/23/14	520	1	61	77	55			24.3
4	06/23/14	525	1	100	61	58			24.3
5	06/23/14	500	1	57	33	33			26.9
6	06/23/14	502	1	77	30	43			26.5
7	06/23/14	504	1	53	60	50			26.2
8	06/23/14	505	1	57	67	93			25.3
9	06/23/14	508	1	40	67	37			23.7
10	06/23/14	510	1	67	97	80			24.5
11	06/23/14	512	1	47	120	77			23.9
12	06/23/14	514	1	23	83	37			24.4
13	06/23/14	516	1	57	90	63			24.2
14	06/23/14	505	1	100	24	67			27.4
1	06/23/14	600	2	180	67	160			27.4
2	06/23/14	615	2	240	870	70	< 1	Human/Domestic	23.5
3	06/23/14	620	2	58	64	55			23.6
4	06/23/14	625	2	55	30	58			23.3
5	06/23/14	600	2	90	53	83			26.4
6	06/23/14	602	2	57	37	50			25.8
7	06/23/14	604	2	70	40	67			26.5
8	06/23/14	605	2	57	80	63			24.8
9	06/23/14	608	2	10	30	13			21.6
10	06/23/14	610	2	13	20	27			21.3
11	06/23/14	612	2	17	43	17			21.3
12	06/23/14	614	2	20	20	23			21.8
13	06/23/14	616	2	27	57	30			23.0
14	06/23/14	605	2	73	30	77			26.3
1	06/23/14	700	3	180	120	200			26.2
2	06/23/14	715	3	140	460	18			23.1
3	06/23/14	720	3	58	77	58			22.6
4	06/23/14	725	3	30	70	30			22.6
5	06/23/14	700	3	57	37	60			25.4
6	06/23/14	702	3	80	83	77	< 1	Wildlife	25.0
7	06/23/14	704	3	57	47	60			25.5
8	06/23/14	705	3	77	40	40			23.7
9	06/23/14	708	3	3	7	3			21.2
10	06/23/14	710	3	< 3	17	7			22.1
11	06/23/14	712	3	10	27	30			22.0
12	06/23/14	714	3	10	10	13			22.2
13	06/23/14	716	3	13	20	33			22.4
14	06/23/14	705	3	100	24	110			23.0

1	06/23/14	800	4	97	48	100			25.2
2	06/23/14	815	4	87	220	30			22.3
3	06/23/14	820	4	12	21	12			22.2
4	06/23/14	825	4	30	18	15			22.3
5	06/23/14	800	4	< 3	20	30			24.5
6	06/23/14	802	4	13	40	57			24.0
7	06/23/14	804	4	30	23	30			23.3
8	06/23/14	805	4	13	23	17			22.5
9	06/23/14	808	4	17	10	13			21.4
10	06/23/14	810	4	< 3	17	3			21.5
11	06/23/14	812	4	30	33	3			21.5
12	06/23/14	814	4	10	10	7			21.4
13	06/23/14	816	4	7	10	7			21.1
14	06/23/14	805	4	130	61	130	< 1	Human/Domestic	25.4

Money Island / Gandy's Beach, Delaware Bay

Station	Collection Date	Collection Time	Run	Fecal Coliform mTec (CFU's/100mL)	*Enterococcus* MEI (CFU's/100mL)	*Escherichia coli* Mod. mTec (CFU's/100mL)	Coliphage (PFU's/100mL)	Antibiotic Resistant Analysis	Optical Bright-ners
1	06/30/14	930	1	77	21	33			
2	06/30/14	945	1	73	120	61		Human/Wildlife	
3	06/30/14	950	1	42	18				
4	06/30/14	955	1	55	15	39			
5	06/30/14	930	1	30	17	40		Human/Domestic	
6	06/30/14	932	1	43	13				
7	06/30/14	934	1	40	7				
8	06/30/14	935	1	37	20				
9	06/30/14	938	1	47	10				
10	06/30/14	940	1	37	7				
11	06/30/14	942	1	37	20				
12	06/30/14	944	1	37	7				
13	06/30/14	946	1	50	3				
14	06/30/14	935	1	42	15	36			
1	06/30/14	1030	2	61	27	42			
2	06/30/14	1045	2	30	52	42			
3	06/30/14	1050	2	30	9				
4	06/30/14	1055	2	21	9	52		Wildlife	
5	06/30/14	1030	2	17	13	13			
6	06/30/14	1032	2	50	20				
7	06/30/14	1034	2	37	17				
8	06/30/14	1035	2	17	7				
9	06/30/14	1038	2	37	3				

10	06/30/14	1040	2	40	< 3				
11	06/30/14	1042	2	43	3				
12	06/30/14	1044	2	20	13				
13	06/30/14	1046	2	23	< 3				
14	06/30/14	1035	2	39	3	18			
1	06/30/14	1130	3	150	48	160		Human/Domestic	
2	06/30/14	1145	3	45	270	48			
3	06/30/14	1150	3	24	15				
4	06/30/14	1155	3	18	3	12			
5	06/30/14	1130	3	40	3	20			
6	06/30/14	1132	3	63	3				
7	06/30/14	1134	3	67	10				
8	06/30/14	1135	3	43	10				
9	06/30/14	1138	3	10	3				
10	06/30/14	1140	3	7	< 3				
11	06/30/14	1142	3	17	< 3				
12	06/30/14	1144	3	17	3				
13	06/30/14	1146	3	17	10				
14	06/30/14	1135	3	36	27	39		Human	
1	06/30/14	1230	4	83	67	100			
2	06/30/14	1245	4	30	58	21			
3	06/30/14	1250	4	30	3				
4	06/30/14	1255	4	24	15	21			
5	06/30/14	1230	4	13	< 3	33			
6	06/30/14	1232	4	33	7				
7	06/30/14	1234	4	50	17				
8	06/30/14	1235	4	27	7				
9	06/30/14	1238	4	7	< 3				
10	06/30/14	1240	4	3	7				
11	06/30/14	1242	4	3	< 3				
12	06/30/14	1244	4	< 3	3				
13	06/30/14	1246	4	17	< 3				
14	06/30/14	1235	4	42	18	15			

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Station	Collection Date	Collection Time	Run	Fecal Coliform mTec (CFU's/100mL)	*Enterococcus* MEI (CFU's/100mL)	*Escherichia coli* Mod. mTec (CFU's/100mL)	Coliphage (PFU's/100mL)	Antibiotic Resistant Analysis	Optical Bright-ners
1	07/10/14	930	1	200	140	210			
2	07/10/14	945	1	47	44	43			
3	07/10/14	950	1	55	32				
4	07/10/14	955	1	52	18	110			

5	07/10/14	930	1	69	35	53			
6	07/10/14	932	1	140	63				
7	07/10/14	934	1	< 3	70				
8	07/10/14	935	1	67	33				
9	07/10/14	938	1	30	17				
10	07/10/14	940	1	10	< 3				
11	07/10/14	942	1	17	7				
12	07/10/14	944	1	< 3	7				
13	07/10/14	946	1	13	7				
14	07/10/14	935	1	67	60	83			
1	07/10/14	1030	2	280	140	280			
2	07/10/14	1045	2	14	19	17			
3	07/10/14	1050	2	22	19				
4	07/10/14	1055	2	25	19	23			
5	07/10/14	1030	2	45	34	70			
6	07/10/14	1032	2	57	33				
7	07/10/14	1034	2	50	40				
8	07/10/14	1035	2	63	43				
9	07/10/14	1038	2	17	40				
10	07/10/14	1040	2	140	100				
11	07/10/14	1042	2	83	37				
12	07/10/14	1044	2	87	27				
13	07/10/14	1046	2	67	37				
14	07/10/14	1035	2	33	20	20			
1	07/10/14	1130	3	300	72	160			
2	07/10/14	1145	3	70	30	50			
3	07/10/14	1150	3	20	23				
4	07/10/14	1155	3	32	9	37			
5	07/10/14	1130	3	55	33	70			
6	07/10/14	1132	3	53	10				
7	07/10/14	1134	3	60	30				
8	07/10/14	1135	3	43	33				
9	07/10/14	1138	3	30	27				
10	07/10/14	1140	3	90	30				
11	07/10/14	1142	3	57	40				
12	07/10/14	1144	3	80	43				
13	07/10/14	1146	3	90	13				
14	07/10/14	1135	3	190	43	220			
1	07/10/14	1230	4	430	98	330			
2	07/10/14	1245	4	75	32	57			
3	07/10/14	1250	4	100	20				
4	07/10/14	1255	4	100	32	53			

5	07/10/14	1230	4	120	32	90			
6	07/10/14	1232	4	47	43				
7	07/10/14	1234	4	60	47				
8	07/10/14	1235	4	100	43				
9	07/10/14	1238	4	73	47				
10	07/10/14	1240	4	100	20				
11	07/10/14	1242	4	100	47				
12	07/10/14	1244	4	97	43				
13	07/10/14	1246	4	77	37				
14	07/10/14	1235	4	170	80	140			

***Data are available in an excel format from the Bureau of Marine Water Monitoring by calling (609) 748-2000.**