

State of Delaware Ambient Surface Water Quality Monitoring Program - FY 2012

Department of Natural Resources and Environmental Control Watershed Assessment Branch

Executive Summary

Delaware's Surface Water Quality Monitoring Program for Fiscal Year 2012 is described in this report. Delaware maintains a General Assessment Monitoring Network (GAMN) of 134 stations. GAMN stations are considered long term stations whose data is used to do long term status and trend assessments of water quality conditions of the State's surface waters and support compilation of Watershed Assessment Reports as mandated by the Clean Water Act under section 305(b). This plan implements an updated monitoring strategy that monitors 23 stations monthly, and the remaining stations either 6 or 12 times a year on a rotating basin basis. Some stations in selected watersheds are monitored for the dissolved forms of key metals in the water column.

Ambient Surface Water Quality Monitoring Program - FY 2012

The purpose of the Ambient Surface Water Quality Monitoring Program is to collect data on the chemical, physical and biological characteristics of Delaware's surface waters. The information that is collected under this Program is used to:

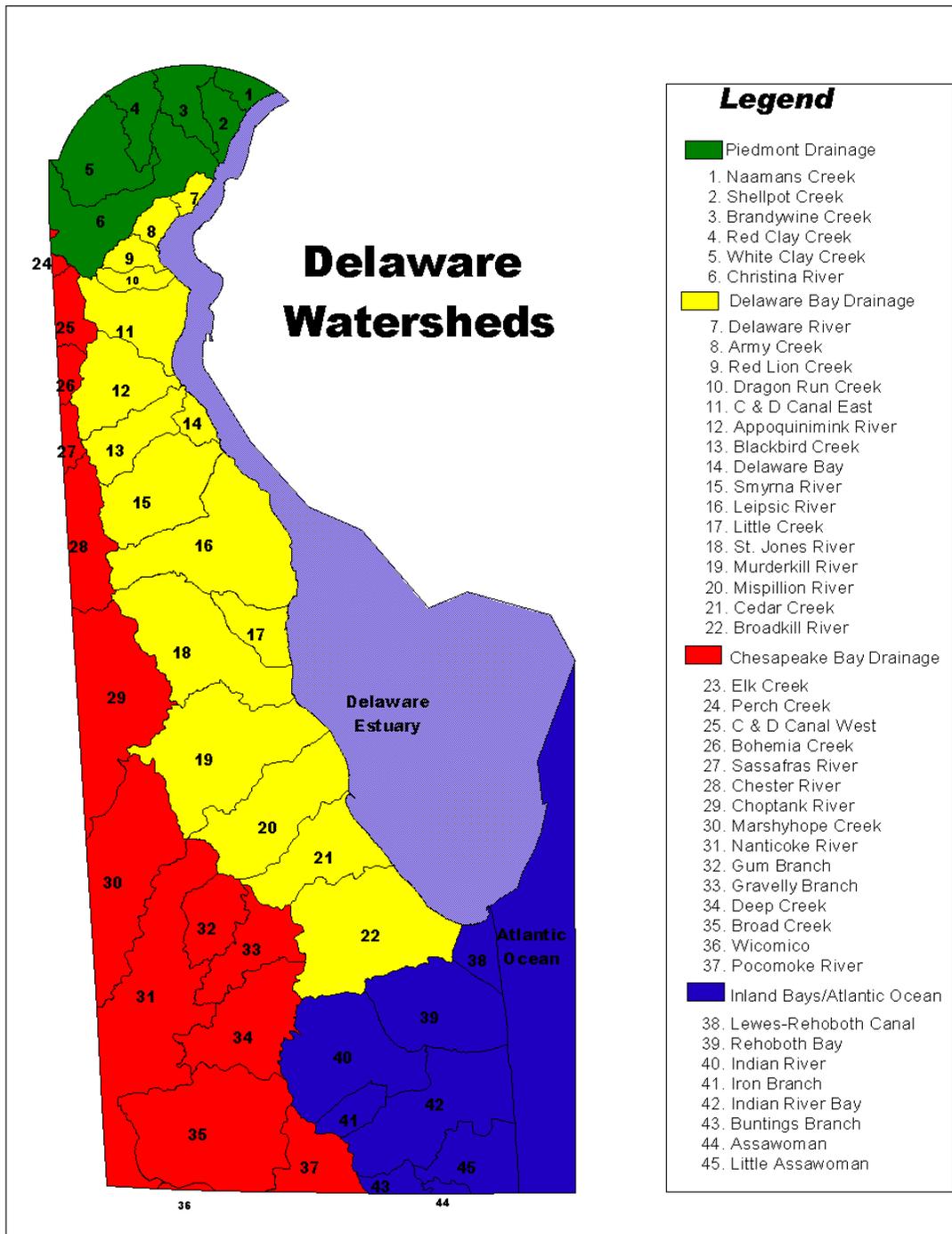
- Describe general surface water quality conditions in the State;
- Identify long term trends in surface water quality;
- Determine the suitability of Delaware surface waters for water supply, recreation, fish and aquatic life, and other uses;
- Monitor achievement of Surface Water Quality Standards;
- Identify and prioritize high quality and degraded surface waters;
- Calculate annual nutrient loads and track progress toward achieving Total Maximum Daily Loads (TMDLs) targets; and
- Evaluate the overall success of Delaware's water quality management efforts.

There are four major components to Delaware's Surface Water Quality Monitoring Program:

- General Assessment Monitoring
- Biological Assessment Monitoring
- Toxics in Biota Monitoring
- Toxics in Sediment Monitoring

This report discusses the General Assessment Monitoring and Biological Assessment Monitoring. Current Toxics in Biota and Sediment Monitoring plans are available on request.

Figure 1. State of Delaware Basins



Part I The General Assessment Monitoring Network (GAMN)

The General Assessment Monitoring Network (GAMN) provides for routine water quality monitoring of surface waters throughout Delaware. Each station is monitored for conventional parameters such as nutrients, bacteria, dissolved oxygen, pH, alkalinity, and hardness. Some stations are monitored for dissolved metals. See tables 2 and 3 for parameters and methods. See Appendix A for a sampling schedule and estimated costs for the surface water component. The data from this monitoring is entered into the STORET database, is reviewed and then analyzed in assessing the water quality of each basin for the Watershed Assessment Report (CWA Section 305 (b) Report). The Department anticipates co-operating with EPA in migrating from the STORET platform to the new WQX platform.

The plan provides for monitoring at stations within each watershed in the state. The network was recently reviewed and updated. The review is discussed in section I.1. See also Table 1: FY 2012 Monitoring Plan and Schedule.

I.1 Changes for Surface Water Quality Monitoring Plan

Over the past several years, a main objective of the Watershed Assessment Section's Ambient Surface Water Quality Monitoring Program was to collect water quality data that could be used for developing and calibrating hydrodynamic and water quality models. These models were used to establish Total Maximum Daily Loads (TMDLs) for nutrients and bacteria in impaired waters of the State.

Now, with the establishment of nutrient and bacteria TMDLs for most impaired waters of the State, a major objective of the Ambient Surface Water Quality Monitoring Program is to collect appropriate data that can be used to track water quality changes and to determine if TMDL requirements are being met.

Considering this (and other emerging) needs, and since the Department's monitoring budget is limited, surface water quality monitoring plan has been prepared with the following changes: Monitoring stations in earlier monitoring plans were reviewed to determine which stations were critical to meet data needs and which could be dropped. The retained stations fall into 2 categories;

Stations were assigned to one of the following categories:

- a. C1 – Category 1 stations are high priority stations that will be used for calculating annual loads and/or long-term trends. These stations are generally co-located with a USGS stream gaging station, or are located at the mouth of a tidal river. Because of importance of these stations, monitoring at these stations will be conducted monthly, regardless of priority basin schedule (23 stations)
 - b. C2 – The remaining stations are part of Category 2 stations and monitoring frequency at these stations follow Priority Basin schedule.
2. A Rotating Basin Monitoring Plan is implemented. In this scheme of monitoring, the State is divided into 5 Monitoring Basins. Every year, two of the Basins are considered "Priority Basins" and all stations in a Priority Basin are monitored

monthly. Monitoring frequency for stations in other basins are conducted bimonthly. Priority Basin monthly monitoring will be conducted according to the following schedule:

- a. FY 2009 – Lower Delaware River/Bay, Piedmont
- b. FY 2010 – Piedmont, Chesapeake
- c. FY 2011 – Chesapeake, Inland Bays
- d. FY 2012 – Inland Bays, Upper Delaware River/Bay
- e. FY 2013 – Upper Delaware, Lower Delaware River/Bay

I.2 Objectives

The objective of this monitoring is to collect water quality data for status and trends assessment on all basins within Delaware. The data will also be compared to water quality standards to assess designated use support, as mandated by Section 305(b) of the Clean Water Act. In addition, the data will be used to calculate annual nutrient loads and to track progress toward achieving TMDL targets.

I.3 Scope of Monitoring

Table 1 provides a listing of all stations to be monitored during FY 2012, and predicted sampling needs for upcoming fiscal years.

Table 2 provides a listing of parameters that will be monitored at all stations in the network. Stations shown for metals testing in Table 1 shall be sampled according to the specifications in Table 3.

Part II Special Project Monitoring

Special project monitoring is needed from time to time in specific watersheds to address specific concerns. These projects are generally short term in nature. The Department is not conducting any special projects during the FY 2012 monitoring year.

II.1 Special Surveys

The purpose of special survey monitoring is to collect data that are not obtained using other monitoring activities and are needed for modeling purposes as described above. Special surveys include deployment of continuous monitors (YSI Data Sondes) and sediment sampling. No special survey sediment sampling is called for in this monitoring year.

II.2 Continuous Monitoring

The Department is implementing a network of continuous water quality monitoring stations to collect data for dissolved oxygen and other parameters several times each day using YSI (or similar) datasondes. The Department is cooperating with Delaware Geological Survey (DGS) and the United States Geological Survey (USGS) in operating a number of continuous monitors in the State. The information from these continuous monitoring sites are available on real-time basis via the USGS website and via the Delaware Environmental Observing System (DEOS) website. The Department had also

put into place a special highly sophisticated on-site monitoring station/automated lab device to collect and analyze samples for nutrients and other parameters at the outlet to Millsboro Pond. The data from this station were used to assess nutrient loads leaving the pond and entering the Delaware Inland Bays and thereby monitor TMDL implementation progress. It is planned to move this automatic data analyzer to the Nanticoke River Watershed during FY 2012 and deploy it at the Bridgeville stream flow gaging site.

Boat run surveys

Boat run surveys should be conducted within one day of tributary sampling in the watershed.

Part III Field and Laboratory Procedures

Field procedures for sample collection activities are detailed in the Quality Assurance Management Plan, Environmental Laboratory Section. Method references, STORET codes and reporting levels for parameters listed in Table 2 are from an Access database maintained by the Environmental Laboratory Section. Any deviation from standard field, laboratory procedures, or this sampling plan shall be documented with a complete description of the alteration.

Part IV Quality Assurance, Documentation, Data Usage and Reporting

The quality assurance objectives and quality control procedures for these surveys are documented in the Quality Assurance Management Plan, Environmental Laboratory Section. A duplicate water column sample will be collected and analyzed on 10% of the samples from this project. All analytical results from the duplicate analyses shall be reported with the other data.

All analytical results shall be reported to the Watershed Assessment Section digitally and on paper (using standard Environmental Laboratory Section data report forms).

Table 1 Station Locations, Descriptions Parameters and Sampling Frequency

<i>STATION INFORMATION - FY 2012</i>	<i>STORET #</i>	<i>Cu, Pb & Zn</i>	<i>As</i>	<i>Fe</i>	<i>DIN & DIP</i>	<i>Storm Events</i>	<i>No. of Samples in 2011</i>
PIEDMONT DRAINAGE							
Brandywine Creek							
Brandywine Creek @ Foot Bridge in Brandywine Park	104011	✓					6
Brandywine Creek @ New Bridge Rd. (Rd. 279)(USGS gage 01481500)	104021	✓				3 storms	12
Brandywine Creek @ Smith Bridge Rd. (Rd. 221)	104051	✓					6
Christina River							
Christina River beneath Rt. 141 in Newport off Water St.	106021	✓					6
Little Mill Creek @ DuPont Rd.	106281	✓					6
Christina River @ Conrail Bridge (USGS tide gage 01481602)	106291	✓					12
Christina River @ Nottingham Rd. (Rt. 273) above Newark	106191	✓					6
Christina River @ Sunset Lake Rd. (Rt. 72) (USGS 01478000 at Cooches bridge)	106141	✓				3 storms	12
Smalleys Dam Spillway @ Smalleys Dam Rd.	106031	✓					6
Red Clay Creek							
Red Clay Creek @ W. Newport Pike (Rt. 4) Stanton (USGS gage 01480015)	103011	✓					6
Burrough's Run @ Creek Rd. (Rt 82)	103061	✓					6
Red Clay Creek @ Barley Mill Rd. (Rd. 258A) Ashland	103041	✓					6
Red Clay Creek @ Lancaster Pike (Rt. 48) Wooddale (USGS gage 01480000)	103031	✓				3 storms	12
White Clay Creek							
White Clay Creek @ Delaware Park Blvd. (Race Track) (USGS gage 014790000)	105151	✓				3 storms	12
White Clay Creek @ McKees Lane	105171	✓					6
White Clay Creek @ Chambers Rock Rd. (Rd. 329)	105031	✓					6
Naamans Creek							
Naaman Creek @ State Line near Hickman Rd.	101021						6
Naaman Creek @ RR crossing in Steel Plant	101041						6
Naamans Creek at Rt 3 (Marsh Road)	101061						6
Shellpot Creek							
Shellpot Creek @ Hay Rd. (Rd. 501)	102041			✓			6
Rt. 13 Bus (Market Street) Bridge, USGS station is located about 700 ft downstream.	102051					3 storms	12
Shellpot Crk at Carr Road Bridge	102081						6
CHESAPEAKE BAY DRAINAGE							
Chester River							
Sewell Branch @ Sewell Branch Rd. (Rd. 95)	112021						6
Choptank River							
Cow Marsh Creek @ Mahan Corner Rd. (Rd. 208)	207021						6
Tappahanna Ditch @ Sandy Bend Rd. (Rd. 222)	207081						6
Culbreth Marsh Ditch @ Shady Bridge Rd. (Rd. 210)	207091						6
White Marsh Branch @ Cedar Grove Church Rd. (Rd. 268)	207111						6

STATION INFORMATION - FY 2012	STORET #	Cu, Pb & Zn	As	Fe	DIN & DIP	Storm Events	No. of Samples in 2011
Marshyhope Creek							
Marshyhope Creek @ Fishers Bridge Rd. (Rd. 308)	302031					8 storms	12
Nanticoke River							
Nanticoke River @ buoy 45 (near state line)	304071	✓					6
Nanticoke River @ buoy 66 (confluence with DuPont Gut)	304151	✓					6
Nanticoke River Tributaries							
Raccoon Prong @ Pepperbox Rd. (Rd. 66)	304671	✓					6
Nanticoke River @ Rifle Range Rd. (Rd. 545)	304191	✓				8 storms	12
Concord Pond @ German Rd. (Rd. 516)	304311	✓					6
Williams Pond @ East Poplar St. (across from Hospital)	304321	✓					6
Bucks Branch @ Conrail Rd. (Rd. 546)	304381	✓					6
Nanticoke River @ Rt. 13	304471	✓					6
Records Pond @ Willow St.	307011	✓					6
Horseys Pond @ Sharptown Rd. (Rt. 24)	307171	✓					6
Gravelly Branch @ Coverdale Rd. (Rd. 525)	316011	✓					6
Trap Pond on Hitch Pond Branch @ Co. Rd. 449 or Trap Pond Rd	307081	✓					6
Deep Creek above Concord Pond, near Old Furnace at Rd. 46	304591	✓					6
Gravelly Branch at Deer Forest Road (Rd 565) on west edge of Redden State Forest Jester Tract	316031	✓					6
Broad Creek at Main Street in Bethel (Rd 493)	307031	✓					6
Nanticoke River at Beach HWY (Ellendale Greenwood HWY) on east edge of Greenwood	304681	✓					6
Pocomoke River							
Pocomoke River @ Bethel Rd. (Rd. 419)	313011						6
DELAWARE BAY DRAINAGE							
Appoquinimink River							
Drawyer Creek off DuPont Parkway. (Rt. 13) at parking area	109071	✓					12
Shallcross Lake @ Shallcross Lake Rd. (Rd. 428)	109191	✓					12
Noxontown Pond @ Noxontown Rd. (Rd. 38)	109131	✓					12
Appoquinimink River @ DuPont Prkwy. (Rt. 13)	109041	✓					12
Appoquinimink River @ MOT Gut (west bank)	109171	✓					12
Deep Creek Br of Appoquinimink River at Rt. 71 Bridge (Middletown Natural Area), duplicate with 109081	109251	✓				3 storms	12
Appoquinimink River @ Silver Run Rd. (Rt. 9) NE side	109121	✓					12
Appoquinimink River @ confluence with Delaware River	109091	✓					12
Army Creek							
Army Creek @ River Rd. (Rt. 9)	114011						12
Chesapeake & Delaware Canal							
C & D Canal @ DuPont Pky. (Rt. 13) St. Georges Bridge	108021						12
Lums Pond @ Boat ramp	108111						12
Dragon Run							

STATION INFORMATION - FY 2012	STORET #	Cu, Pb & Zn	As	Fe	DIN & DIP	Storm Events	No. of Samples in 2011
Dragon Creek @ Wrangle Hill Rd. (Rt. 9)	111011						12
Dragon Creek @ S. DuPont Hgwy. (Rt. 13)	111031						12
Red Lion Creek							
Red Lion Creek @ Bear Corbitt Rd. (Rt. 7)	107011						12
Red Lion Creek @ Rt. 9	107031						12
Blackbird Creek							
Blackbird Creek, Road 463 East of RR Tracks. USGS gage	110011					3 storms	12
Blackbird Landing Rd 455	110031						12
Blackbird Creek @ Taylors Bridge Rd. (Rt. 9)	110041						12
Leipsic River							
Garrisons Lake @ DuPont Highway (Rt. 13)	202021						12
Leipsic River @ Denny St. (Rt. 9)	202031						12
Upstream of Masseys Millpond at Rt. 15	202191						12
Little River							
Little River @ Bayside Dr. (Rt.9)	204031						12
Little River @ N. Little Creek Rd. (Rt. 8)	204041						12
Smyrna River							
Mill Creek @ Carter Rd. (Rd. 137)	201021						12
Smyrna River @ Rt. 9 (Flemings Landing)	201041						12
Duck Creek @ Smyrna Landing Rd. (Rd. 485)	201051						12
201011 Mill Creek at Rt. 13	201011						12
Providence Creek @ Duck Creek Rd. (Rt.15)	201161						12
Broadkill River							
Ingram Branch, Savanah Ditch @ Rd. 246	303011						6
Ingram Branch @ Rd. 248	303021						6
Rt. 5 Bridge	303031					3 storms	12
Rt. 1 Bridge (Mainstem)	303041						6
Broadkill River 0.10 Miles From Mouth of Broadkill	303061						12
Red Mill Pond at Rt. 1	303051						6
Beaverdam Creek at Rd. 88	303171						6
Beaverdam Creek above Rd. 259, Hunters Mill Pond	303181						6
Round Pole Branch at Rd. 88	303311						6
Waples Pond at Rt. 1	303331						6
Pemberton Branch at Rt. 30 above Wagamons Pond	303341						6
Cedar Creek							
Swiggetts Pond @ Cedar Creek Rd. (Rt. 30)	301021						6
Cedar Creek @ Coastal Hgwy. (Rt. 1)	301031						6
Cedar Creek @ Cedar Beach Rd. (Rt. 36)	301091						6
Mispillion River							
Mispillion River @ Rt. 1	208021						6
Mispillion River/Cedar Creek confluence @ Lighthouse	208061						12
Mispillion River @ mouth of Fishing Branch	208121						6
Abbotts Pond @ Abbotts Pond Rd. (Rd. 620)	208181						6
Silver Lake @ Maple Ave.	208211						6
Beaverdam Branch @ Deep Grass Ln. (Rd. 384)	208231						6
Delaware Bay							
Roosevelt Inlet, Mouth	401011						6

STATION INFORMATION - FY 2012	STORET #	Cu, Pb & Zn	As	Fe	DIN & DIP	Storm Events	No. of Samples in 2011
<i>Murderkill River</i>							
Murderkill River @ confluence of Black Swamp Creek at Rt. 13	206011	✓				3 storms	12
Browns Branch @ Milford - Harrington Hwy. (Rt. 14)	206041	✓					6
Murderkill River @ Bay Rd. (Rt. 1/113)	206091	✓					6
Murderkill River @ Bowers Beach Wharf (mouth)	206101	✓					12
Murderkill River near levee @ Milford Neck Wildlife Area (3.25 miles from mouth)	206141	✓					6
Murderkill River @ confluence of Kent County WWTF discharge ditch	206231	✓					6
McColley Pond @ Canterbury Rd. (Rt. 15)	206361	✓					6
Coursey Pond @ Canterbury Rd. (Rt. 15)	206451	✓					6
Double Run @ Barretts Chapel Rd. (rd. 371)	206561	✓					6
<i>St. Jones River</i>							
St. Jones River @ Barkers Landing	205041						12
St. Jones River @ Rt. 10	205091						12
Fork Branch @ State College Rd. (Rd. 69)	205151						12
Moore's Lake @ S. State St.	205181						12
Silver Lake @ Spillway (Dover City Park)	205191					3 storms	12
St. Jones at Bowers Beach, mouth to Del.Bay.	205011						12
Derby Pond @ Rt. 13A	205211						12
<i>INLAND BAYS DRAINAGE</i>							
<i>Tributary Stations</i>							
Burton Pond @ Rt. 24	308031	✓	✓		✓		12
Millsboro Pond @ Rt. 24	308071	✓	✓		✓	3 storms	12
Pepper Creek @ Rt. 26 (Main St.)	308091	✓	✓		✓		12
Blackwater Creek @ Omar Rd. (Rd. 54)	308361	✓	✓		✓		12
Dirickson Creek @ Old Mill Bridge Rd. (Rd. 381)	310031	✓	✓		✓		12
<i>Bunting Branch</i>							
Buntings Branch @ Rt. 54 (Polly Branch Rd.)	311041	✓	✓		✓		12
<i>Guinea Creek</i>							
Guinea Creek @ Banks Rd. (Rd. 298)	308051	✓	✓		✓		12
<i>Iron Branch</i>							
Whartons Branch @ Rt. 20 (Dagsboro Rd.)	309041	✓	✓		✓		12
<i>Lewes & Rehoboth Canal</i>							
Lewes & Rehoboth Canal @ Rt. 9	305041	✓	✓		✓		12
<i>Little Assawoman Canal</i>							
Little Assawoman Bay @ Rt. 54 (The Ditch)	310011	✓	✓		✓		12
White Creek @ mouth of Assawoman Canal	312011	✓	✓		✓		12
<i>Love Creek</i>							
Bundicks Branch @ Rt. 23	308371	✓	✓		✓		12
<i>Miller Creek</i>							
Beaver Dam Ditch @ Beaver Dam Rd. (Rd. 368)	310121	✓	✓		✓		12
<i>Stockley Branch/Cow Bridge</i>							
Cow Bridge Branch @ Zoar Rd. (Rd. 48)	308281	✓	✓		✓		12
<i>Swan Creek</i>							
Swan Creek @ Mount Joy Rd. (Rd. 297)	308341	✓	✓		✓		12
<i>Vines Creek</i>							
<i>Ocean Boundary Stations</i>							

STATION INFORMATION - FY 2012	STORET #	Cu, Pb & Zn	As	Fe	DIN & DIP	Storm Events	No. of Samples in 2011
Lewes & Rehoboth Canal @ Rt. 1	305011	✓	✓		✓		12
Indian River Inlet @ Coast Guard Station	306321	✓	✓		✓		12
Boat Run Stations							
Rehoboth Bay @ Buoy 7	306091	✓	✓		✓		12
Masseys Ditch @ Buoy 17	306111	✓	✓		✓		12
Indian River Bay @ Buoy 20	306121	✓	✓		✓		12
Indian River @ Buoy 49 (Swan Creek)	306181	✓	✓		✓		12
Indian River @ Island Creek	306331	✓	✓		✓		12
Island Creek upper third	306341	✓	✓		✓		12
Little Assawoman Bay Mid-bay (Ocean Park Lane)	310071	✓	✓		✓		12

Table 2 Water Quality Parameters to be analyzed at all Stations in the Monitoring Network, FY 2012

<i>Parameter</i>	<i>Method Reference (EPA)</i>	<i>Reporting Level¹</i>
<i>Water Column Nutrients</i>		
Total Phosphorus	EPA365.1 M	0.005 mg/l P
Soluble Ortho-phosphorus	EPA365.1	0.005 mg/l P
Ammonia Nitrogen	EPA350.1	0.005 mg/l N
Nitrite+Nitrate N	EPA353.2	0.005 mg/l N
Total N	SM 4500 NC	0.08 mg/l N
<i>Carbon and Organics</i>		
Total Organic Carbon	EPA415.1	1 mg/l
Dissolved Organic Carbon	EPA415.1	1 mg/l
Chlorophyll-a (Corr)	EPA 445.0	1 µg/l
<i>Biochemical Oxygen Demand</i>		
BOD ₅ , N-Inhib (CBOD)	SM20 th ed-5210B	2.4 mg/l
BOD ₂₀ , N-Inhib (CBOD)	SM20 th ed-5210B	2.4 mg/l
<i>General</i>		
Dissolved oxygen – Winkler ²	EPA360.2	0.25 mg/l
Dissolved oxygen – Field	EPA360.1	0.1 mg/l
Total Suspended Solids	EPA160.2	2 mg/l
Alkalinity	EPA310.1	1 mg/l
Hardness	EPA130.2	5 mg/l
Field pH	EPA150.1	0.2 pH units
Conductivity – Field	EPA120.1	1 µS/cm
Salinity	SM20 th ed-2520B	1 ppt
Temperature	EPA170.1	°C
Secchi Depth ³	EPA/620/R-01/003	meters
Light Attenuation ⁴	EPA/620/R-01/003	%
Turbidity	EPA180.1	1 NTU
Chloride	EPA325.2	1 mg/l
<i>Bacteria</i>		
Enterococcus	SM20 th ed-9230C	1 cfu/100 ml

- ¹ As documented in the ELS Quality Assurance Management Plan, the ELS defines the Limit of Quantitation (LOQ) as the lowest standard in the calibration curve or, in instances where a standard curve is not specified by the procedure, LOQ represents the limitations of the method. For those tests where reference spiking material exists, the ELS measures Method Detection Limit (MDL), as defined in the Federal Register 40 CFR Part 136 Appendix B. MDL values are generated or verified once per year. Results less than the MDL are considered to be not detected and “< MDL” is reported. Results greater than the MDL but less than the LOQ are qualified with a J to indicate a result that is extrapolated or estimated. For tests where MDL is not applicable, results less than the LOQ are reported as “< LOQ”, ELS MDLs meet or exceed (i.e. are lower than) the reporting level requirements listed in Table 3.
- ² Secchi Depth to be measured at designated stations.
- ³ Light attenuation to be conducted as practical to obtain correlation with Secchi disk readings

Table 3 Metals Parameters

<i>Dissolved Metals (dissolved and total)</i>	<i>Method Reference (EPA)</i>	<i>Reporting Level</i>
Copper	EPA 200.7 M	5.0 ug/l
Lead	EPA 200.7 M	3.0 ug/l
Zinc	EPA 200.7 M	10 ug/l
Iron	EPA 200.7 M	100 ug/l

Appendix A: FY 2012 Surface Water Monitoring Schedule & Cost Estimate

Project	Basin/ Sub-basin/ Watershed	Number of Samples												Cost					
		Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	# Samples	Analytical Chemistry	Metals	WQX	Field Costs	Total
Northern Piedmont	Brandywine Creek	3		3		3		3		3		3		120	\$36,480	\$7,200	\$300	\$9,000	\$52,980
	Christina River	6		6		6		6		6		6							
	Red Clay Creek	4		4		4		4		4		4							
	White Clay Creek	3		3		3		3		3		3							
	Duplicates + Field Blanks	4		4		4		4		4		4							
UD Farm	University of Delaware Farm	6	6		6	6		6	6		6	6	56	\$8,176	\$0	\$0	\$0	\$8,176	
	Duplicates + Field Blanks	1	1		1	1		1	1		1	1							
Northeast Piedmont	Naaman's Creek	3		3		3		3		3		3	48	\$14,592	\$540	\$300	\$4,500	\$19,932	
	Shellpot Creek	3		3		3		3		3		3							
	Duplicates + Field Blanks	2		2		2		2		2		2							

Project	Basin/ Sub-basin/ Watershed	Number of Samples												Cost					
		Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	# Samples	Analytical Chemistry	Metals	WQX	Field Costs	Total
Piedmont Monthly	Piedmont Monthly		6		6		6		6		6		6	48	\$14,592	\$2,520	\$300	\$4,500	\$21,912
	Duplicates + Field Blanks		2		2		2		2		2		2						
North Delaware Bay Drainage	Army Creek	1	1	1	1	1	1	1	1	1	1	1	108	\$32,832	\$0	\$600	\$9,000	\$42,432	
	C & D Canal	2	2	2	2	2	2	2	2	2	2	2							
	Dragon Creek	2	2	2	2	2	2	2	2	2	2	2							
	Red Lion Creek	2	2	2	2	2	2	2	2	2	2	2							
	Duplicates + Field Blanks	2	2	2	2	2	2	2	2	2	2	2							
Appoquinimink River	Appoquinimink	8	8	8	8	8	8	7	7	8	8	8	118	\$35,872	\$7,080	\$600	\$12,375	\$55,927	
	Duplicates + Field Blanks	2	2	2	2	2	2	2	2	2	2	2							
Delaware Bay Drainage	Blackbird Creek	3	3	3	3	3	3	3	3	3	3	3	180	\$54,720	\$0	\$600	\$9,000	\$64,320	

Project	Basin/ Sub-basin/ Watershed	Number of Samples												Cost					
		Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	# Samples	Analytical Chemistry	Metals	WQX	Field Costs	Total
	Leipsic River	3	3	3	3	3	3	3	3	3	3	3							
	Little River	2	2	2	2	2	2	2	2	2	2	2							
	Smyrna River	5	5	5	5	5	5	5	5	5	5	5							
	Duplicates + Field Blanks	2	2	2	2	2	2	2	2	2	2	2							
St. Jones River	St. Jones River	7	7	7	7	7	7	7	7	7	7	7	108	\$32,832	\$0	\$600	\$9,000	\$42,432	
	Duplicates + Field Blanks	2	2	2	2	2	2	2	2	2	2	2							
Murderkill River	Murderkill								7		9		33	\$10,032	\$1,980	\$150	\$4,425	\$16,587	
	Duplicates + Field Blanks								2		3								3
Murderkill River Profiles	Murderkill		17		17		17						63	\$19,152	\$3,780	\$150	\$5,513	\$28,595	
	Duplicates + Field Blanks		4		4		4												

Project	Basin/ Sub-basin/ Watershed	Number of Samples												Cost					
		Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	# Samples	Analytical Chemistry	Metals	WQX	Field Costs	Total
Delaware Bay Monthly	Broadkill River Monthly	2		2		2		2		2		2		42	\$12,768	\$1,440	\$300	\$4,500	\$19,008
	Mispiration River Monthly	1		1		1		1		1		1							
	Murderkill Monthly	2		2		2		2		2		2							
	Duplicates + Field Blanks	2		2		2		2		2		2							
South Delaware Bay Drainage	Cedar Creek		3		3		3		3		3		66	\$20,064	\$0	\$300	\$4,500	\$24,864	
	Mispiration River		6		6		6		6		6								
	Duplicates + Field Blanks		2		2		2		2		2								
Broadkill River	Broadkill River		11		11		11		11		11		78	\$23,712	\$0	\$300	\$4,500	\$28,512	
	Duplicates + Field Blanks		2		2		2		2		2								
Inland Bays	Inland Bays	24	24	24	24	24	24	19	19	24	24	24	24	362	\$136,648	\$26,250	\$600	\$34,875	\$198,373

Project	Basin/ Sub-basin/ Watershed	Number of Samples												Cost					
		Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	# Samples	Analytical Chemistry	Metals	WQX	Field Costs	Total
	Delaware Bay	1		1		1		1		1		1							
	Pocomoke River	1		1		1		1		1		1							
	Duplicates + Field Blanks	6	6	6	6	6	6	6	6	6	6	6	6						
Nanticoke River	Nanticoke River		15		15		15		13		15		15	112	\$34,048	\$6,720	\$300	\$10,688	\$51,756
	Duplicates + Field Blanks		4		4		4		4		4		4						
Chesapeake Bay Nontidal	Chesapeake Bay Nontidal	2	2	2	2	2	2	2	2	2	2	2	2	48	\$14,592	\$0	\$600	\$9,000	\$24,192
	Duplicates + Field Blanks	2	2	2	2	2	2	2	2	2	2	2	2						
Chesapeake Bay Drainage	Chester River		1		1		1		1		1		1	30	\$9,120	\$0	\$300	\$4,500	\$13,920
	Choptank River		4		4		4		4		4		4						
Chesapeake Bay Nontidal Storm	Storm Sites	2		2		2		2		2		2		32	\$12,256	\$0	\$400	\$6,000	\$18,656

Project	Basin/ Sub-basin/ Watershed	Number of Samples												Cost					
		Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	# Samples	Analytical Chemistry	Metals	WQX	Field Costs	Total
		2		2	2		2	2		2	2		2						
Statewide Storm	Storm Sites	11		11						11		45	\$14,364	\$1,980	\$150	\$4,500	\$20,994		
	Duplicates + Field Blanks	4		4						4									
TOTALS												1697	\$536,852	\$59,490	\$6,850	\$150,375	\$753,567		
Shellfish & Recreational Waters																	\$21,000		
<i>Grand Total</i>																	\$774,567		