BALTIMORE CITY

MS4 ANNUAL REPORT

Reporting Period: July 1, 2019 to June 30, 2020

DPW

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1 Introduction

This report includes the progress of compliance for the period of Fiscal Year (FY) 2020, in association with Baltimore City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit (Permit Number: 11-DP-3315, MD0068292). The current permit was issued on December 27, 2013. The City's current permit, which expired on December 27, 2018, is administratively continued until a new permit is issued. The City continues to be responsible for compliance of the current permit conditions. Annual report periods follow the City's fiscal calendar: July 1 to June 30. This Annual report has been formatted to match the reporting requirements as listed in Part V of the current permit.

1.1 Permit Administration

Designation of individual to act as a liaison between the City and the Maryland Department of Environment (MDE) for the implementation of this permit:

Kimberly L. Grove, P.E.
Chief, Office of Compliance and Laboratories
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Baltimore, MD 21215
410-396-0732
Kimberly.grove@baltimorecity.gov

Two organization charts (as of June 30, 2020) are provided in Appendix A of this report:

- City agency organization chart with designations of MS4 permit condition responsibilities.
- DPW organization chart.

Within the Department of Public Works, Matt Garbark assumed the role of the Director upon the departure of Rudy Chow in February 2020. Other noted organization changes occurring in FY 2020 within DPW include the following:

- Julie Day was hired as the Chief Administrative Officer.
- Linda Batts was hired as the Chief Diversity and Equity Coordinator.
- Azzam Ahmad assumed the acting role of the Chief Engineer.
- Harpreet Singh assumed the acting role of the Chief of Asset Management Division
- The Bureau of Solid Waste re-organized based on services and functions, instead of the geographic-based quadrant management system.

1.2 Legal Authority

The City maintained adequate legal authority in accordance with NPDES regulations 40 CFR 122.26(d) (2) (i) during FY 2019.

2 Implementation Status

Table 2-1 is a summary of the status for implementing the components of the stormwater management program that are established as permit conditions.

Table 2-1: Summary of Implementation Status

Permit Condition	Component	Due	Status as of June 30, 2020
Part IV.C. Source Identification	GIS Data	Annual report	Baltimore City transitioned the source identification to the MS4 Geodatabase as part of the FY 2018 Annual Report.
Part IV.D.1 Stormwater Management	Identification of problems and modifications of ESD to MEP	Annual report	No problems identified during this reporting period.
	Modification to ordinances to eliminate impediments to ESD to MEP	Annual report	No modifications were initiated during this reporting period.
Part IV.D.2 Erosion and Sediment Control	Responsible personnel certification 3 / year	Annual Report	The City's program was replaced by MDE's on-line program.
	Inventory of projects > 1 acre	Initial 4/1/14 then quarterly	Included in Appendix C.
Part IV.D.3 Illicit Discharge Detection and Elimination	Alternative program for MDE submittal	12/27/14	The City is using the same alternative analysis (Ammonia Screening) as reported since 1998. Results are discussed in Section 5.3. Results are provided in Appendices D and L.
	Annual visual surveys of commercial / industrial areas	Annual	See Section 5.3.
Part IV.D.4 Trash and Litter	Inventory and evaluation all solid waste operations	12/27/14	Part of *Public Outreach Strategy for Trash and Litter Programs for the City of Baltimore*, submitted February 20, 2015.
	Public education and outreach strategy	12/27/14	See Section 5.5.
	Evaluation of effectiveness of education program	Annual Report	See Section 5.5.
Part IV.D.5 Property Management and Maintenance	NOIs and SWPPPs submitted for NPDES stormwater general permit coverage for industrial permits	6/30/14	NOIs and SWPPPs were submitted for the City's solid waste facilities, fleet maintenance facilities, and wastewater treatment plants.
	Alternative maintenance program	12/27/14	No alternative maintenance program is being proposed.

Permit Condition	Component	Due	Status as of June 30, 2020
Part IV.D.6 Public Education	Maintain a compliance hotline for water quality complaints	Annual Report	2 customer service requests to 3-1-1 system were added in November 2014. See Sections 5.2 and 5.3.
Part IV.E.1 Watershed Assessment	Detailed watershed assessments of entire City	12/27/18	Updated assessments for Baltimore Harbor and North Lower Branch of Patapsco Watersheds were submitted to MDE on December 14, 2018; the public comment period started on November 20, 2018 but was extended to January 16, 2019.
Part IV.E.2 Restoration Plans	Impervious surface assessment consistent with MDE methods = baseline	12/27/14	MDE approved the baseline impervious area on July 28, 2015. On June 6, 2019, MDE deemed that this requirement was met based on FY 2018 Annual report data.
	Restoration of 20% of City's impervious surface area	12/27/18	
	Restoration Plan for each WLA approved by EPA prior to the effective date of the permit	12/27/14	Local and Bay TMDLs for nutrients and sediments were conditionally approved by MDE on May 9, 2018; see Section 6.5 and 6.6.1 for outstanding information and revised progress estimations. Bacteria TMDL implementation plan was approved by MDE on May 9, 2018. A modified implementation schedule, per the modified Consent Decree, was submitted to MDE on June 28, 2018. See Section 6.6.2 for progress. A modified PCB implementation schedule was submitted to MDE on September 14, 2018. See Section 6.6.4 for progress.

Permit Condition	Component	Due	Status as of June 30, 2020
	Restoration Plan for subsequent TMDL WLA	One year of approval	*Implementation Plan for the Middle Branch / Northwest Branch TrashTMDL in Baltimore City* was submitted on January 4, 2016. A clarification memo was submitted to MDE on September 14, 2018. See Section 6.6.2 for progress.
Part IV.E.4. TMDL Compliance	Annual assessment to evaluate the effectiveness of the City's restoration plans	Annual Report	See Section 3 and 6.
Part IV.F. Assessment of Controls	Continue assessments	Annual Report	See Section 3.2 and Appendices C, F and G.
Part IV.G. Program Funding	Fiscal analysis of the capital, operation, and maintenance expenditures necessary to comply with all conditions of this permit	Annual Report	See Section 4 and Appendix I.

The MS4 geodatabase included rules for completed records related to mandatory fields. As a short-term solution to complete the database, Baltimore City used designated values as a "null" value. These values are listed in Appendix B. In May 2019, the computer systems for the City of Baltimore were impacted by ransomware; computer systems were not available for 6 weeks. In March 2020, the City of Baltimore adjusted operations in response to the pandemic known as COVID-19. Specific impacts of these two events are described further in the appropriate sections of this Annual Report.

3 Narrative Summary of Data

3.1 Rainfall

The NOAA weather station at BWI Airport showed calendar year 2018 as the highest recorded annual rainfall, almost 25 inches above normal. Thus, the total rainfall for FY 2019 was significantly higher than previous years within this permit period, as shown in Table 3-1. In addition to the total rainfall, the NOAA station also reported the highest number of days with more than 0.1 inch rainfall. These two factors can impact sampling results by increasing the pollutant load as well as potentially diluting the measured concentration of the pollutant. DPW also noted a significant increase in reported groundwater seeps and basement flooding due to groundwater. The increased groundwater levels can also impact groundwater migration rates of pollutants to streams, in addition to increasing sanitary sewer overflows due to infiltration.

DPW operates and maintains a series of rain gauges throughout the City as part of the City's Flood ALERT system. DPW uses the four gauges shown Figure 3-1 for analysis of rainfall events exceeding one inch to evaluate reported flooding events. The rainfall records for the four rain gauges demonstrate variability of rainfall across the City and compared to NOAA's BWI Airport system, as shown in Table 3-2. This variability can affect evaluations of the influence on rain events on sampling results and trash / debris collection operations.

Table 3-1: Summary of Annual Rainfall (NOAA)

Fiscal Year	2015	2016	2017	2018	2019	2020
Rainfall, in.	55	42	38	44	68	39
Days > 0.1 in	85	76	73	74	96	75

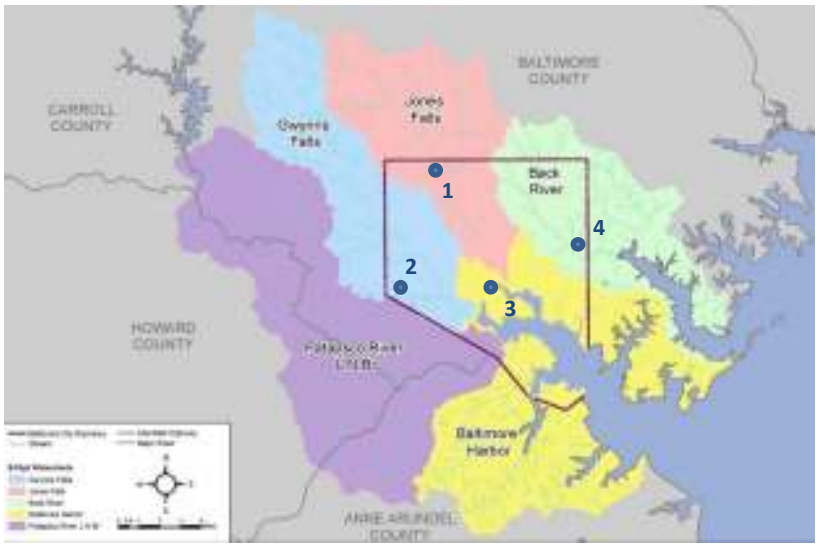


Figure 3-1: Daily Rainfall for FY 2020

Table 3-2: Summary of Variability in Rainfall Data for Baltimore in FY 2020

Location	NOAA	DPW, 1	DPW, 2	DPW, 3	DPW, 4
Total Rainfall, in	39.0	49.0	38.2	41.0	40.8
Days > 0.1 in	75	96	81	87	73
Days > 1.0 in	8	14	13	8	10
Max. Daily Rainfall	2.2	2.7	2.7	4.1	2.4

3.2 Stream Impact Sampling

DPW continued the Stream Impact Sampling (SIS) program, which now includes monthly sampling at 33 outfall or stream locations. The SIS program was initiated in 1997; the results are available on-line at the City's website and updated quarterly. The sampling program includes sampling results for nutrients, sediment, bacteria, metals and other health indicators. Sampling was suspended from March 23, 2020, through the end of April 2020 due to the work stoppage in response to COVID. The results of the sampling events for this reporting period are included in Appendix D.

3.2.1 Nutrient Monitoring

During FY 2020, 348 samples were analyzed for nutrients as part of the SIS program. Table 3-3 shows the evaluation of historic nutrient analysis (2009 through the reporting period), following a concept that the State used in its Maryland Water Quality Inventory, 1993-1995. A water quality level was assigned for each station's sample sets compared to a prescribed threshold for each parameter: "normal" if the percentage was less than 11%; "elevated" if it was between 11% and 25%; and "high" if it was greater than 25%. This assignment is color coded Tables 3-3 and 3-4.

In addition to the individual sampling results for total phosphorus (Appendix D), Table 3-3 summarizes the SIS results for total phosphorus, specifically the portion of sampling results above the total phosphorus threshold of 0.1 mg / L. Appendix E contains graphs of the annual results for total phosphorus (percent of samples in relation to threshold and geometric mean) for each station from FY 2010 to FY 2020.

Thirty (30) out of the thirty-three (33) SIS stations had a lower geometric mean for total phosphorus for the samples collected during FY 2020 compared to those collected during FY 2019: the exceptions were JF 11.5 in the Jones Falls watershed, WATERVIEW AVE. in the Harbor watershed and LIGHT ST. in the Harbor watershed. This trend is in contrast to the trend observed when comparing FY 2019 to FY 2018, for which twenty-two (22) stations had a higher geometric mean comparing FY 2019 to FY 2018. Those three (3) stations also exhibited a higher percentage of FY 2020 samples above the total phosphorus threshold of 0.1 mg/L than their percentages for FY 2019. All of the stations, except for JF 11.5 (which had a geometric mean for FY 2020 of 0.166 mg/L), had a geometric mean for FY 2020 that is below the total phosphorus threshold of 0.1 mg/L.

The graphs for the total phosphorus show a peak for geometric means occurred in FY 2011 and 2012; then a sharp decrease in FY 2013, reaching minimums for FY 2014; followed by an overall increase from FY 2015 to FY 2019; then the decrease for FY 2020. This pattern of a peak total phosphorus occurring in FY 2011 and 2012 was also shown in the graphs of the percentage of samples exceeding the threshold of 0.1 mg/L.

Table 3-3: Summary of Total Phosphorus for SIS Program

Station	Percent of Samples Total Phosphorus >=0.1 mg/L			Maximum Total Phosphorus Results	
	Pre-FY 2020[4]	FY 2020	All Samples	Pre-FY 2020[4]	FY 2020
Back River Watershed Herring Run Sub-watershed					
PERRING PKWY	15%	0%	14%	0.27	0.08
MT. PLEASANT GC	23%	0%	21%	0.42	0.09
CHINQUAPIN RUN	25%	10%	24%	0.46	0.14
TIFFANY RUN	12%	11%	12%	0.29	0.11
HARFORD RD.	16%	0%	15%	0.41	0.09
WRIGHT AVE.	24%	0%	22%	0.42	0.09
PULASKI HWY.	11%	0%	10%	0.51	0.05
Back River Watershed Moores Run Sub-watershed					
MARY AVE.	36%	30%	36%	0.87	0.17
HAMILTON AVE.	38%	30%	37%	0.50	0.16
RADECKE AVE.	21%	10%	20%	0.32	0.12
BIDDLE ST. & 62ND ST.	29%	11%	28%	0.39	0.40
Jones Falls Watershed					
SMITH AVE.	23%	9%	22%	0.36	0.13
WESTERN RUN	23%	18%	22%	0.52	0.12
STONY RUN	20%	9%	19%	0.33	0.14
JF 11.5 [1]	81%	80%	81%	3.10	0.54
LOMBARD ST.	30%	18%	29%	0.61	0.11
Gwynns Falls Watershed					
POWDER MILL	35%	27%	34%	0.94	0.17
PURNELL DR.	19%	9%	19%	16.40	0.11
DEAD RUN DNST.	26%	18%	25%	0.33	0.16
GWYNNS FALLS PKWY.	32%	27%	31%	0.42	0.17
GRUN HILTON ST.	32%	18%	30%	0.51	0.13
GF HILTON ST.	22%	0%	20%	0.34	0.10
MAIDENS CHOICE	25%	9%	23%	0.48	0.13

Station	Percent of Samples Total Phosphorus >=0.1 mg/L			Maximum Total Phosphorus Results	
	Pre-FY 2020[4]	FY 2020	All Samples	Pre-FY 2020[4]	FY 2020
GRUN CARROLL PARK	57%	36%	55%	0.51	0.17
WASHINGTON BLVD.	27%	18%	26%	0.34	0.11
Baltimore Harbor Watershed					
LINWOOD & ELLIOTT [2]	51%	45%	50%	0.36	0.20
LAKEWOOD & HUDSON [2]	37%	45%	38%	0.28	0.16
CENTRAL & LANCASTER [3]	48%	36%	47%	1.40	1.30
LIGHT ST.	35%	45%	36%	2.90	0.28
WARNER & ALLUVION	46%	36%	45%	0.77	0.12
WATERVIEW AVE.	24%	36%	25%	1.90	0.21
JANEY RUN	30%	27%	29%	0.68	0.11
Patapsco River Watershed					
REEDBIRD AVE.	32%	0%	29%	0.37	0.10
Notes:					
1 Sampling began at JF 11.5 in January 2016.					
2 Sampling began at LINWOOD & ELLIOTT and LAKEWOOD & HUDSON in March 2013.					
3 No samples were collected at the CENTRAL & LANCASTER station from January 2017 through March 2019 because access to the station was blocked by construction.					
4 Pre-FY 2020 includes samples from January 2009 to June 2019.					
Key					
	Normal: <= 11% of Samples				
	Elevated: Between 11-25% of Samples				
	High: >25% of Samples				

Table 3-4 summarizes the SIS results for total nitrogen, specifically the portion of sampling results above the total nitrogen threshold of 3 mg / L. Appendix F contains graphs of the annual results for total nitrogen (percent of samples in relation to threshold and geometric mean) for each station from FY 2010 to FY 2019.

Thirteen (13) stations exhibited a higher percentage of total nitrogen samples above the threshold for FY 2020 compared to their pool of samples prior to FY 2020. Five (5) stations stand out with an increase in percentage of at least sixteen (16) percentage points:

- WATERVIEW AVE. in the Harbor watershed had an increase of 53 percentage points;

- GWYNNS FALLS PKWY. in the Gwynns Falls watershed had an increase of 29 percentage points;
- LAKEWOOD & HUDSON in the Harbor watershed had an increase of 21 percentage points;
- POWDER MILL in the Gwynns Falls watershed had an increase of 20 percentage points; and
- WASHINGTON BLVD. in the Gwynns Falls watershed had an increase of 16 percentage points.

For twenty-six (26) out of the thirty-three (33) stations, the geometric mean of the FY 2020 total nitrogen samples decreased compared to the geometric mean for the FY 2019 samples. Seven (7) stations had a FY 2020 total nitrogen geometric mean above the threshold of 3 mg/L: HAMILTON AVE. in the Back River watershed; JF 11.5 in the Jones Falls watershed; GWYNNS FALLS PKWY. and GRUN CARROLL PARK in the Gwynns Falls watershed; and LINWOOD & ELLIOTT, LAKEWOOD & HUDSON and WATERVIEW AVE. in the Harbor watershed.

Table 3-4: Summary of Total Nitrogen for SIS Program

Station	Percent of Samples Total Nitrogen >=3 mg/L			Maximum Total Nitrogen Results	
	Pre-FY 2020[4]	FY 2020	All Samples	Pre-FY 2020[4]	FY 2020
Back River Watershed Herring Run Sub-watershed					
PERRING PKWY	4%	0%	3%	3.74	2.36
MT. PLEASANT GC	12%	10%	12%	8.07	3.19
CHINQUAPIN RUN	28%	10%	26%	5.78	3.42
TIFFANY RUN	8%	0%	7%	4.91	2.67
HARFORD RD.	8%	11%	8%	6.86	3.12
WRIGHT AVE.	4%	0%	3%	5.49	1.57
PULASKI HWY.	8%	0%	8%	4.00	2.78
Back River Watershed Moores Run Sub-watershed					
MARY AVE.	17%	10%	16%	7.20	4.80
HAMILTON AVE.	58%	50%	57%	7.38	7.94
RADECKE AVE.	12%	10%	12%	7.10	3.03
BIDDLE ST. & 62ND ST.	2%	10%	3%	5.68	10.02
Jones Falls Watershed					
SMITH AVE.	3%	0%	3%	4.18	2.49
WESTERN RUN	3%	0%	3%	6.04	2.20
STONY RUN	31%	27%	30%	5.66	5.54
JF 11.5 [1]	95%	80%	92%	16.56	6.36
LOMBARD ST.	7%	9%	7%	9.99	8.32
Gwynns Falls Watershed					
POWDER MILL	16%	36%	18%	14.89	3.43
PURNELL DR.	2%	10%	2%	5.26	3.25

Station	Percent of Samples Total Nitrogen >=3 mg/L			Maximum Total Nitrogen Results	
	Pre-FY 2020[4]	FY 2020	All Samples	Pre-FY 2020[4]	FY 2020
DEAD RUN DNST.	2%	0%	2%	5.69	2.79
GWYNNS FALLS PKWY.	11%	40%	13%	6.20	5.78
GRUN HILTON ST.	13%	0%	12%	4.30	2.94
GF HILTON ST.	2%	10%	2%	3.60	3.76
MAIDENS CHOICE	7%	10%	7%	201.07	9.76
GRUN CARROLL PARK	50%	55%	50%	4.91	5.21
WASHINGTON BLVD.	4%	20%	5%	13.00	3.25
Baltimore Harbor Watershed					
LINWOOD & ELLIOTT [2]	91%	82%	90%	7.66	4.95
LAKEWOOD & HUDSON [2]	79%	100%	82%	7.20	4.87
CENTRAL & LANCASTER [3]	17%	18%	18%	7.78	9.31
LIGHT ST.	12%	9%	12%	25.02	4.99
WARNER & ALLUVION	20%	18%	20%	8.55	6.53
WATERVIEW AVE.	20%	73%	25%	13.31	4.04
JANEY RUN	9%	0%	9%	3.80	2.88
Patapsco River Watershed					
REEDBIRD AVE.	15%	9%	14%	4.54	3.56
Notes:					
1 Sampling began at JF 11.5 in January 2016.					
2 Sampling began at LINWOOD & ELLIOTT and LAKEWOOD & HUDSON in March 2013.					
3 No samples were collected at the CENTRAL & LANCASTER station from January 2017 through March 2019 because access to the station was blocked by construction.					
4 Pre-FY 2020 includes samples from January 2009 to June 2019.					
Key					
	Normal: <= 11% of Samples				
	Elevated: Between 11-25% of Samples				
	High: >25% of Samples				

Further discussion of these results in relation to the local TMDL implementation plans are provided in Section 6.6.1 of this Annual Report.

3.2.2 Bacteria Monitoring

3.2.2.1 E. Coli Monitoring

DPW measures fecal bacteria with e. coli most probable number (MPN) counts at twenty-four (24) stations that are in non-tidal waters. In 2017, the water quality criteria for bacteria indicators were changed in COMAR 26.08.02.03-3 as follows:

- Geometric mean (GM) for e. coli for 90+ days must be less than 126 MPN / 100 ml
- Less than 10% of single sample results of e. coli may be greater than the standard threshold value (STV) of 410 MPN / 100 ml
- Dissolved oxygen must be greater than 5 mg /L
- pH must be between 6.5 and 8.5
- Water temperature may not exceed 90°F (32° C) for Class I and 75°F (23.9°C) for Class IV waters

The most notable changes were the simplification of the STV; full-body contact thresholds are no longer used. Previous MS4 annual report evaluations with respect to the former full-body contact thresholds are no longer applicable. Table 3-5 lists the results of SIS sampling for e. coli with respect to these water quality criteria. Appendix G contains graphs of the annual GM for e. coli for each station from FY 2010 to FY 2020.

None of the stations met all of the water quality criteria for FY 2020. Three stations are close to meeting the criteria: Smith Avenue, Tiffany Run, and Dead Run. Tiffany Run came close to meeting the criterion of less than 10% of e. coli below 410 MPN/100 ml. However, temperature and/or pH criteria were exceeded in all three stations. Since these three stations appear close to meeting the criteria, more frequent sampling will occur during the summer months to validate the statistical analysis for the e.coli measurements.

All of the stations, except for Wright Avenue and Radecke Avenue, met the dissolved oxygen criterion. The temperature criterion was met at all fourteen (14) of the class I stations. However, the temperature criterion was met at only one of the ten (10) class IV stations. The pH criterion was met at all but four (4) of the stations.

Table 3-5: Summary of E. Coli Sampling for SIS Program for FY 2020

Station	Class	E. Coli (MPN/100 ml)		Min. DO (mg/L)	Max. Temp (°C)	pH Range
		GM	% > STV			
Back River Watershed Herring Run Sub-watershed						
PERRING PKWY	IV	464	50%	7.89	25.4	7.3 to 8.2
MT. PLEASANT GC	IV	596	70%	7.59	24.9	7.5 to 8.4
CHINQUAPIN RUN	IV	657	50%	8.01	27.9	7.5 to 8.4
TIFFANY RUN	IV	150	11%	7.75	27.2	7.6 to 8.3
HARFORD RD.	IV	893	78%	7.33	26.5	7.5 to 8.2

Station	Class	E. Coli (MPN/100 ml)		Min. DO (mg/L)	Max. Temp (°C)	pH Range
		GM	% > STV			
WRIGHT AVE.	IV	619	70%	4.39	25.3	7.2 to 8.1
PULASKI HWY.	IV	385	40%	7.42	28.0	7.2 to 8.0
Back River Watershed Moores Run Sub-watershed						
MARY AVE.	I	1,721	80%	5.59	24.0	7.5 to 8.1
HAMILTON AVE.	I	1,269	90%	7.06	24.2	7.3 to 8.9
RADECKE AVE.	I	2,123	100%	3.35	24.4	7.4 to 7.9
BIDDLE ST. & 62ND ST.	I	557	50%	5.56	27.1	7.2 to 7.8
Jones Falls Watershed						
SMITH AVE.	I	147	18%	6.9	26.4	7.3 to 9.0
WESTERN RUN	I	297	27%	7.8	26.1	7.2 to 8.1
STONY RUN	IV	238	36%	7.3	25.1	6.7 to 8.0
JF 11.5	IV	1,902	90%	8.4	21.7	6.9 to 8.0
Gwynns Falls Watershed						
POWDER MILL	I	301	42%	7.25	23.0	7.2 to 8.3
PURNELL DR.	I	826	58%	7.58	24.7	7.3 to 7.8
DEAD RUN DNST.	IV	221	17%	7.99	25.3	7.4 to 8.4
GWYNNS FALLS PKWY.	I	654	50%	8.35	19.0	6.8 to 8.6
GRUN HILTON ST.	I	725	75%	7.51	25.5	7.4 to 8.3
GF HILTON ST.	I	302	25%	8.35	26.8	7.4 to 8.6
MAIDENS CHOICE	I	437	50%	7.95	25.9	7.4 to 8.5
GRUN CARROLL PARK	I	2,371	83%	7.16	24.4	7.2 to 8.2
WASHINGTON BLVD.	I	768	75%	7.98	26.9	7.2 to 8.5

3.2.2.2 Enterococci Monitoring

DPW currently measures fecal bacteria with enterococci most probable number (MPN) counts at ten (10) stations. In 2017, the water quality criteria for bacteria indicators were changed in COMAR 26.08.02.03-3 as follows:

- Geometric mean (GM) for enterococci for 90+ days must be less than 35 MPN / 100 ml
- Less than 10% of single sample results of e. coli may be greater than the standard threshold value (STV) of 130 MPN / 100 ml
- Dissolved oxygen must be greater than 5 mg /L
- pH must be between 6.5 and 8.5
- Water temperature may not exceed 90°F (32° C) for Class I and 75°F (23.9°C) for Class IV waters

The most notable changes were the simplification of the STV; full-body contact thresholds are no longer used. Previous MS4 annual report evaluations with respect to the former full-body contact thresholds are no longer applicable. Table 3-6 lists the results of SIS sampling for enterococci with respect to these

water quality criteria. Appendix G contains graphs of the annual GM for enterococci for each station from FY 2010 to FY 2020.

None of the stations met all of the water quality criteria for FY 2020. No stations had a GM for enterococci counts close to the criterion of 35 MPN/100 ml. Only three (3) of the stations met the dissolved oxygen criterion. The temperature criterion was met at all of the stations. The pH criterion was met at only one (1) station (Linwood & Elliott): all but one of the stations had a maximum for pH above 8.5.

Table 3-6: Summary of Enterococci Sampling for SIS Program

Station	Class	Enterococci (MPN/100 ml)		Min. DO	Max. Temp	pH Range
		GM	% < STV			
Jones Falls Watershed						
LOMBARD ST.	I	311	71%	4.97	27.6	7.2 to 8.8
Baltimore Harbor Watershed						
WATERVIEW AVE.	I	196	61%	7.45	23.6	7.2 to 9.2
WARNER & ALLUVION	I	386	74%	2.75	29.3	7.3 to 9.3
LIGHT ST.	I	96	48%	1.98	30.6	6.7 to 8.6
CENTRAL & LANCASTER	I	170	65%	1.23	28.4	7.3 to 7.9
LAKEWOOD & HUDSON [1]	I	1,874	100%	7.46	26.2	7.3 to 8.8
LINWOOD & ELLIOTT [1]	I	2,789	91%	4.75	25.8	7.3 to 8.3
JANEY RUN	I	170	57%	2.54	31.8	6.8 to 9.0
Patapsco River Watershed						
REEDBIRD AVE.	I	124	48%	5.8	29.6	7.4 to 8.7

3.3 Biological and Habitat Monitoring

DPW did not collect macroinvertebrate samples in the spring of 2020: staff were told not to report to work in response to COVID from March 23, 2020 through April 27, 2020, which is the period during which samples are normally collected. Instead, DPW will present the results for the macroinvertebrate samples collected in the spring of 2019. DPW uses a combination of fixed and random sampling. There are 8 fixed stations, two of which are associated with the long-term discharge characterization of Moores Run. The results for those two stations are discussed in Section 3.2.2 of this report. For the random sampling, one of three watersheds is completed each year. During the spring of 2019, random sampling was completed in the Back River watershed.

Table 3-7 presents the benthic index of biotic integrity (BIBI) scores for 6 fixed stations from 2002 through 2019. All stations rated “very poor”. Three of the stations achieved the lowest score possible of 1.0. Four out of six of the stations showed a decline in the scores from 2018 to 2019; one station had a score that stayed the same; and one station had an improvement in its score.

Table 3-7: Macroinvertebrate BIBI Scores for Fixed Stations

	Gwynns Falls Watershed		Jones Falls Watershed			Back River Watershed
Year	Station 250 Dead Run	Station 430 Maidens Choice Run	Station 880 Stony Run	Station 949 Stony Run	Station 1053 Stony Run	Station 1235 Biddison Run
2002	1.7	NS	NS	NS	1.3	NS
2003	1.0	NS	NS	NS	1.0	3.3
2004	1.0	NS	NS	NS	1.0	1.3
2005	1.0	NS	NS	NS	1.3	1.9
2006	1.7	NS	NS	NS	NS	1.3
2007	NS	NS	NS	NS	1.0	1.3
2008	NS	NS	NS	NS	1.0	1.6
2009	1.3	NS	NS	NS	1.3	1.0
2010	1.3	1.0	1.3	1.7	2.3	1.9
2011	2.3	1.7	1.3	1.0	1.7	1.3
2012	1.0	1.0	1.0	1.0	1.0	1.6
2013	1.0	1.0	1.0	1.0	1.0	2.1
2014	1.7	1.3	1.7	1.3	2.0	1.9
2015	2.3	1.7	1.3	1.3	1.3	2.4
2016	1.0	1.3	1.0	1.0	1.0	1.9
2017	2.7	2.0	1.3	1.0	1.7	3.0
2018	1.3	1.3	1.3	1.0	1.7	2.4
2019	1.0	1.0	1.0	1.7	1.7	1.6

DPW sampled sixteen random stations in the Back River watershed in 2019. The BIBI scores for these sixteen samples ranged from 1.0 through 2.1: fourteen samples between 1.0 and 1.9, which are rated as "very poor"; and two samples as 2.0 and 2.1, which are rated as "poor". Random sampling was performed in the Back River watershed in 2004, 2007, 2010, 2013, 2016 and 2019. Figure 3-2 graphically shows the distribution of the BIBI scores for each of those six years. The best of the six years was 2010. Each of the three years that were sampled after 2010 have shown a decrease in quality.

The BIBI, embeddedness, epifaunal and habitat scores for all fixed station and random station samples from 2019 are listed in the *Biological Monitoring* table of the *MDE NPDES MS4 Geodatabase* (Appendix C of this report).

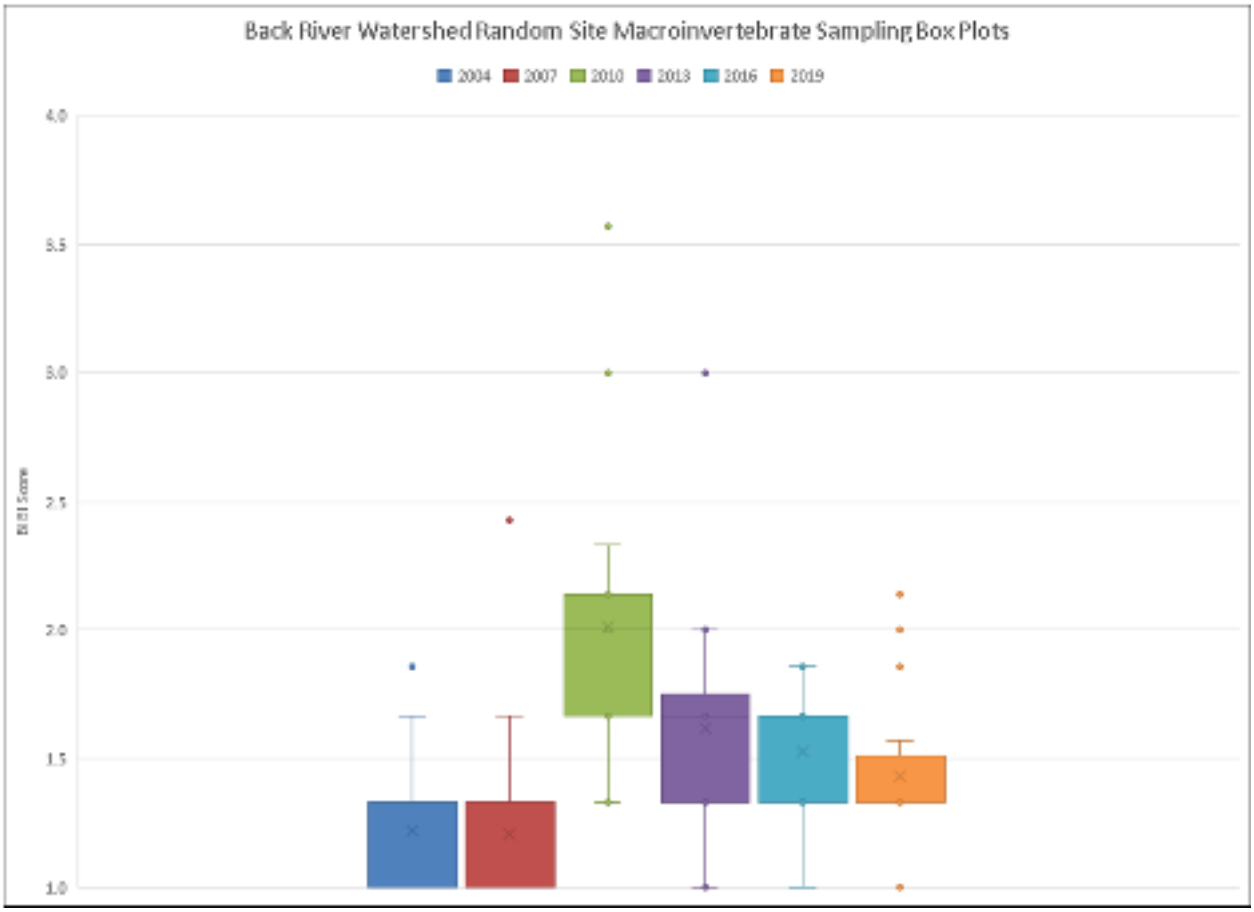


Figure 3-2: BIBI Scores for Macroinvertebrate Samples Random Sampling in the Back River Watershed

3.4 Watershed Assessment at Moores Run

3.4.1 Chemical Monitoring

During this reporting period, seven (7) storm events and ten (10) base flow events were monitored at Hamilton Avenue, the outfall station associated with the long-term discharge characterization for the Moores Run; and eight (8) storm events and ten (10) base flow events were monitored at Radecke Avenue, the in-stream station associated with the long-term discharge characterization for the Moores Run. DPW only monitored eight (8) storms in FY 2020; not twelve (12) as required by the permit. During the storm on 7/11/2019, there was a problem with the automated sampler at Hamilton Avenue such that samples were not collected during the ascending limb or peak of that storm. Due to the work stoppage in response to COVID, the base flow sampling scheduled for March and April were canceled.

The results of the monitoring events are provided in Appendix C of this report. In addition to these monitoring events, these two locations were monitored as part of the Ammonia Screening program. The results of that monitoring are included in Appendix D of this report.

3.4.2 Biological Monitoring

DPW collects macroinvertebrate samples at two fixed locations for the long-term discharge characterization of the Moores Run. As shown in Table 3-8, every sample from 2002 through 2019 at both stations has been rated as "very poor" since the BIBI scores were below 2. The BIBI, embeddedness, epifaunal and habitat scores for all fixed station and random station samples from 2019 are listed in the *Biological Monitoring* table of the *MDE NPDES MS4 Geodatabase* (Appendix C of this report).

Table 3-8: Macroinvertebrate BIBI Scores for Fixed Stations Moores Run Watershed

Year	Station 1367 Moores Run	Station 1659 Moores Run Tributary
2002	1.3	1.3
2003	1.3	1.7
2004	1.0	1.0
2005	1.3	1.3
2006	1.7	1.7
2007	1.3	1.3
2008	not sampled	1.7
2009	1.3	1.3
2010	1.3	1.7
2011	1.3	1.7
2012	1.7	1.0
2013	1.3	1.3
2014	1.7	1.3
2015	1.3	1.0
2016	1.7	1.0
2017	1.3	1.7
2018	1.7	1.3
2019	1.3	1.7

3.4.3 Habitat Assessment

DPW last performed a habitat assessment survey of the upper Moores Run watershed on July 10, 2019. That assessment was discussed in the FY 2019 Annual Report. DPW had expected to complete another assessment in the spring or summer of 2020, but the plan was complicated by the work shutdown in response to COVID; and staff were too busy on other sampling to complete the assessment before running out of time as the year reached October.

3.4.4 Geomorphic Monitoring

No additional activity was performed in FY 2020. During FY 2020 the process was begun to bring a consultant on board to train engineers and field scientist to perform geomorphic assessment training. The process was delayed due to limitations that resulted from COVID 19.

4 Expenditures and Proposed Budget

4.1 Expenditures and Budgets Related to MS4 Permit Compliance

DPW is predominantly responsible for compliance with the City's MS4 permit. Although the efforts of other City agency services are reported in this Annual Report for permit conditions, like property maintenance, inspections and enforcement, the expenditure information shown in Table 4-1 is strictly limited to DPW services. Annual expenditures and budgets for FY 2020 and 2021 are summarized in Table 4-2. This information is also included in the geodatabase in Appendix C.

The expenditures and budgets shown in Tables 4-1 and 4-2 do not include debt service payments, to avoid confusion with expenditures made using debt service mechanisms like bonds. This follows a similar format as the Financial Assurance Plan, included in Appendix I of this Annual Report. Debt service payments for the stormwater program in FY 2020 were on the order of $5,746,137.

Table 4-1: Fiscal Analysis of FY 2020 Expenditures

Description of Total Annual Cost	Actual
Source ID (Geodatabase Mgt.)	$332,769
Stormwater management	$575,340
Erosion and sediment	$767,121
Illicit detection/elimination (IDDE)	$1,551,263
Trash elimination	$370,315
Property management	$6,935
Inlet cleaning	$4,385,531
Street sweeping	$5,210,030
Public education	$175,469
Watershed assessment	$128,285
Watershed restoration (all projects)	$7,469,105
Chemical monitoring	$120,481
Biological monitoring	$17,277
TMDL assessment	$103,661
Total NPDES program	**$21,213,581**
Other activities related to stormwater*	$13,127,665
Total Stormwater	**$34,341,246**
Funded by Stormwater Utility	$24,047,217
Funded by W/WW Utility	$1,890,189
Funded by Other Sources	$9,903,055

Note: "Other activities" include the maintenance and remediation of stormwater infrastructure (collection system).

Table 4-2: NPDES Program Expenditures and Budgets

Fiscal Year	Operations	Capital	Total
FY 2020 (Expenditure)	$14,793,975	$6,419,606	$21,213,581
FY 2021 (Budget)	$13,405,740	$14,201,893	$27,607,633

4.2 Stormwater Fee and Stormwater Utility

The Stormwater Utility is an enterprise fund, established in 2013, to protect the use of revenue received from the stormwater restoration fee and other miscellaneous. The predominant source of revenue for the stormwater utility is the stormwater restoration fee. Other sources of revenue are as follows:

- Plans review fees for stormwater management and erosion and sediment control
- Penalty fines for stormwater management and erosion and sediment control
- Fees in lieu of on-site stormwater management (quantitative and qualitative control)

The stormwater restoration fee was established in the City Code in June 2013; the first bills were issued in September 2013. The fee structure and rate were established to remain constant for four years (FY 2014 through 2017) and remained the same through FY 2019. A 9% rate increase was approved by the Board of Estimates to begin in FY 2020 with additional 9% increase in FY 2021 and 2022. The ransomware suspended water bills being issued between May and August 2019. In March 2020, billing was again suspended for 6 weeks to allow adjustments to operations (teleworking customer service) due to COVID. Both suspensions of billing delayed the receipt of revenue to the stormwater fee.

The required Watershed Protection and Restoration Program report, as prescribed by MDE, is included in Appendix H of this report. Note that the stormwater fee expenditure for capital projects includes the payment of debt service mechanisms. The Financial Assurance Plan is included in Appendix I of this report.

4.3 Grant Support by DPW

DPW used the stormwater utility fund to provide $194,000 direct funding[1], matched by $109,065 from the Chesapeake Bay Trust and $15,798 of previous DPW funding[2], for the following projects which had grants issued in FY 2020 (Funding partners noted):

- **City Neighbors Green Campus ($74,741 DPW)** – funding to construct two bioretention facilities that treat 0.32 impervious acres, removal of 1,315 sf of impervious surface, and educational material to integrate the facilities into the school curriculum.
- **Church of the Redeemer Parking Lot Bioretention ($74,043 DPW)** – funding to construction bioretention facilities and pervious paving to treat 0.99 impervious acres, as well as stormwater education and outreach to parishioners and neighbors.

[1] DPW provided $200,000 for Chesapeake Bay Trust's Outreach & Restoration grant program. Three percent (3%) of the amount ($6,000) was an administration fee for CBT to manage the grant program.
[2] A previously funded project was not implemented and its funding was reallocated for this grant cycle.

- **Interfaith Partners for the Chesapeake ($9,298 DPW)** – Green Team Leadership Development Program to increase the impact of the faith community on Chesapeake Bay Watershed improvements. This project will train 5 to 7 congregations with the goal of developing 3 to 5 successful green teams.
- **Baltimore Tree Trust ($66,331: $28,216 DPW / 38,115 CBT)** – funding to plant 100 trees in two gateway corridors of the Fells Point neighborhood.
- **Civic Works Baltimore Center for Green Careers ($30,000: $19,000 DPW / $11,000 CBT)** – delivery of a 12-month, comprehensive, certification-based occupational and essential skills training in stormwater management to 10 underserved Baltimore City residents facing significant barriers to employment.
- **Waterfront Partnership ($29,995: $4,500 DPW / $25,450 CBT)** – revival of Harris Creek Connected, a group of 50 community leaders in East Baltimore, providing workshops and education on tree maintenance, rain garden maintenance, alley cleaning, and litter removal.
- **Patterson Park Audubon Center ($30,000 CBT)** – funding to support the Avian Ambassador program that works with the LatinX community in East Baltimore.
- **Baltimore Community ToolBank ($4,500 CBT)** – providing environmental education on stormwater management practices to property owners in the Carroll-Camden Industrial Park.

5 Enforcement Actions, Inspections and Public Education

5.1 Stormwater Management Program

Programmatic and implementation information for the period of this Annual Report (July 1, 2019 to June 30, 2020) is as follows:

- Number of Concept Plans received: 137
- Number of Site Development Plans received: 105
- Number of Final Plans received: 105
- Number of Redevelopment projects received: 53
- Numbers of Stormwater exemptions issued: 196

DPW received and approved as-built drawings for 13 stormwater management BMPs between July 1, 2019 and June 30, 2020. The required data for these BMPs are in Appendix C of this report. A summary of waivers and variances for this time period is provided in Table 5-1.

Table 5-1: **Summary of Waivers and Variances**

Description	**Requested**	**Granted**
Quantitative Control Waiver	4	4
Qualitative Control Waiver	26	26
Quantitative and Qualitative Waiver	0	0
Redevelopment Waiver	53	53
Phased Development Waiver	1	1
Administrative Waiver	0	0
Variance	1	1
Total	**85**	**85**

No changes to the City's ordinance or code related to the stormwater management program (Article 7, Division II) were pursued during this time.

During this reporting period, 17 inspections of ESD treatment practices and structural stormwater management facilities were conducted as part of preventive maintenance inspections. Of those inspections, no facilities required one or more follow-up inspections.

In the middle of the fiscal year, DPW encountered two key issues: high staff turnover in the inspection area and COVID-19 outbreak. The inspection staff turnover included retirement, dismissal, and promotions of seasoned employees. COVID-19 resulted in hiring freezes. With the reduced inspection staff, DPW procured an On-Call consultant to start inspecting the backlog of stormwater management facilities for the tri-annual maintenance inspections, to be completed in FY 2021.

5.2 Erosion and Sediment Control

The City added a new customer service request for erosion and sediment control in 2014. Complaints are reported via phone, internet or mobile phone application and tracked through the 3-1-1 system. During FY 2020, a total of 103 service requests were received.

During this reporting period, 2,428 inspections were conducted for compliance with approved erosion and sediment control plans. A total of 12 violation notices were issued by the City, resulting in a sum of $100 received as penalty fines (most fines are in appeal) and 5 stop work orders. The summary information regarding earth disturbances exceeding one acre is included in Appendix C of this report.

No changes to the City's ordinance or code related to the erosion and sediment control program (Article 7, Division III) were pursued during this time.

5.3 Illicit Discharge Detection and Elimination (IDDE)

5.3.1 Routine Field Screening Locations

DPW conducts an MDE-approved alternative to IDDE: ammonia screening (AS) and stream impact sampling (SIS) to initiate pollution source tracking (PST) investigations. The AS and SIS sampling locations are included in the geo-reference data provided in Appendix C. The monitoring results from the surveys for the AS and SIS programs for FY 2020 are included in Appendix D of this report. These monitoring results, plus historic data, are also available on-line at the City's DPW website.

5.3.2 Microbial Source Tracking

DPW initiated Microbial Source Tracking (MST) DNA analysis in an effort to supplement the existing chemical indicators used to track wastewater contamination in the streams and storm drain systems. The analyses were performed by Dr. Wolf Pecher through a contract between DPW and the University of Baltimore. MST analysis was primarily used during PST investigations where high levels of the primary wastewater indicators (ammonia nitrogen and bacteria) were found and various investigative techniques had been exhausted (dye testing, CCTV of pipelines, visual inspection, and historical mapping review) yielding no sanitary sewer sources. If the samples contained a high number of human markers and a sewage equivalent greater than 1%, the investigation would remain open for further monitoring and investigation. If the number of human markers was low and the sewage equivalent was less than 1%, the investigation was discontinued.

Between July 2019 and June 2020, thirty-two (32) samples from four (4) sampling events were submitted for analysis. The sampling sites chosen were based on seven (7) PST investigations, in addition to sites from three (3) watersheds with historically high ammonia values. The samples were analyzed for the number of human and canine DNA markers as well as a percent sewage equivalent. The percent sewage equivalent was a comparison of the number of human markers from a sample to the number of human markers found in wastewater samples taken from the influent at the Back River Wastewater Treatment Plant.

Of the seven (7) PST investigations with MST DNA samples submitted, three (3) were discontinued due to the sewage equivalent value being less than 1%. Three (3) PST investigations reached SDUO

designation. One (1) had a source identified and abated; one (1) had several sources identified and repairs are pending; and one (1) is still under investigation with delays involving Covid-19 primarily due to concerns with confined-space entry. One (1) PST investigation with a sampling site value of 1.28% sewage equivalent has been recently started and remains under investigation.

For the three (3) watersheds with historically high ammonia values, if any of the sites resulted in a sewage equivalent greater than 1% a new PST investigation would be open. Of these twenty (20) samples, three (3) had a sewage equivalent greater than 1%. All three (3) of these sites were in the same large storm drain system; so a Storm Drain Lateral survey was initiated, which samples every storm drain branch to the mainline for the entire system. To date, this Storm Drain Lateral survey has found and eliminated two (2) private illicit sewage discharges into the storm drain.

The four reports from Dr. Wolf Pecher for the sample sets analyzed during FY 2020, and a table summarizing the results of all seventy-nine (79) samples processed from FY 2017 through FY 2020 are included in Appendix J of this report.

5.3.3 3-1-1 Customer Service Request for Polluted Water

Complaints are reported via phone, internet or mobile phone application and tracked through the 3-1-1 system. Complaints that are designated with the type "WW Waterway Pollution Investigation" are initially assigned to the Water Quality Monitoring and Investigations (WQMI) Section of OCAL. During FY 2020, a total of ninety-one (91) service requests were received. Nine (9) of these requests were duplicates of other requests already received by WQMI. Seventeen (17) requests were determined to be mistakenly designated as "WW Waterway Pollution Investigation", then forwarded by WQMI staff to the appropriate agency. Consequently, there were sixty-five (65) complaints handled by WQMI during FY 2020. Sixty-two (62) complaints resulted in a pollution source tracking investigation. Thirteen (13) of these investigations led to the discovery of an illicit discharge or activity that was removed or corrected:

- Two (2) sanitary sewage overflows entering the storm drain system;
- Four (4) water distribution leaks causing discolored water or sediment to flow into a storm drain inlet;
- One (1) leaking dumpster from an industrial building entering a storm drain inlet;
- Two (2) petroleum containment (MDE emergency response) in the Inner Harbor;
- Two (2) sediment discharge into stream or storm drain inlets from improper sediment and erosion controls (joint efforts with SEC inspectors and MDE inspectors);
- One (1) construction debris runoff from residential construction; and
- One (1) damaged (but not leaking) sanitary sewer stack (repairs pending by OAM).

These illicit discharges are included among those further discussed in Section 5.3.4.

5.3.4 Pollution Source Tracking (PST)

DPW initiates PST investigations based on the results of field screening, 3-1-1 customer service requests or requests from other programs (such as Blue Water Baltimore, MDE or EPA). During FY 2020, a total of 221 PST investigations were conducted: 169 PST investigations were initiated during FY 2020 and the

other 52 were a continuation of PST investigations initiated prior to FY 2020. The PST investigations resulted in mobilizing to 1,104 locations in the open channel and storm drain system to conduct water quality chemical analyses, make observations, drop dye, etc. As a result of the PST investigations, the following ninety (90) illicit discharges were identified and abated, with further details provided in Appendix K of this report:

- Thirty-eight (38) dry weather sanitary sewer overflows (SSOs) from the public sewer; three (3) of these were designated as sanitary discharge of unknown origin (SDUOs) at some point during their investigations;
- Thirteen (13) sewage inputs from private properties to the storm drain system; seven (7) of these were designated as sanitary discharge of unknown origin (SDUOs) at some point during their investigations;
- Thirty-two (32) drinking water transmission losses; and
- Seven (7) with other types of illicit discharge:
    - Four (4) related to sediment in discharges from construction or repair activities;
    - Two (2) related to oil spills; and
    - One (1) related to improper disposal of drywall material and the cleaning of equipment used with that drywall material.

Additionally, twenty-five (25) illicit discharge sources were located and await further repairs:

- Nine (9) sanitary sewage discharges; three (3) are from private properties; and
- Sixteen (16) drinking water transmission losses.

5.3.5 FOG Program

Since November 2013, DPW has conducted an inspection program to reduce fats, oils and grease (FOG) within the sanitary sewer system. The FOG Program has a two-pronged approach that manages FOG from both the private and public sides of the property line by:

- Requiring all food services establishments (FSE) that have the potential to discharge FOG-laden wastewater to have an adequate grease control device (GCD), and
- Reducing build-up of fats, oils and grease in the sewer lines using a commercial grade degreaser.

FOG education efforts are focused on both residents and owners of FSEs. Flyers are included with water bills. Outreach at festivals and community meetings have included distribution of education materials. All education materials are available on the City's DPW website.

The DPW - Pollution Control Section performs the inspections and educates FSEs about FOG best management practices. There were 1,779 inspections of FSEs during FY 2020: this is a decrease of 57% compared to the 4,139 inspections during FY 2019. This decrease is in part due to the suspension of inspections as a result of COVID; there were no inspections during April or May 2020. During FY 2020, 565 FSEs (32%) were found not to be in compliance. There were 828 notices of violation (NOV) issued to the non-compliant FSEs. No FSEs were issued a consent agreement. A breakdown by type of NOV is included in Appendix K of this Annual Report.

5.3.6 Exterior Lead Paint Removal Waste Control Program

This program is administered by the DPW - Pollution Control Section. During FY 2020, there were 151 permitted sites. Inspectors made 129 site visits and issued 35 stop work notices requiring corrective action. There were no documented illegal discharges to the storm drain system.

5.3.7 NPDES Industrial Discharge Permits

The City has fourteen (14) municipal facilities covered under the NPDES Industrial Discharge Permit. During FY 2015, NOIs for these facilities and updated stormwater pollution prevention plans (SWPPPs) were submitted to MDE. Permit conditions related to staff training and routine inspections are managed by the responsible agency. DPW implemented an internal environmental compliance audit program in FY 2016, which consisted of site walkthrough inspections and SWPPP audits. In addition to the internal environmental compliance audit program, a geodatabase was created to monitor each facility's last quarterly inspection and SWPPP trainings.

5.4 Property Management and Maintenance

5.4.1 Street Sweeping and Trash Reduction

In FY 2020, the mechanical street sweepers operated by DPW- Bureau of Solid Waste removed 6,331 tons of debris while sweeping 62,034 miles of street surface. To encourage residents to remain home and practice social distancing related to COVID, street sweeping was suspended starting March 23, 2020. Street sweeping of gateways (main roadways) resumed in May 2020. Street sweeping tonnage and mileage for qualifying activities (minimum frequency of 2 passes / month) are listed in the MS4 geodatabase (Appendix C) and on Table N-2 (Appendix N) of this report. Street sweeping operations are anticipated to resume in FY 2022.

During FY 2019, DPW initiated the policy to suspend street sweeping operations during days where air temperatures were below freezing. The efficiency of the street sweeping operations, specifically in the expanded areas, is still hindered by the coordination of parked vehicles. New parking sign installation began in the summer of 2017 and were postponed due to COVID. Street sign installation is anticipated to resume in FY 2022 and include results from new route optimization software.

5.4.2 Inlet Cleaning

In May 2016, DPW completed the installation of screens and inserts for 414 inlets as a pilot program to improve the efficiency of inlet cleaning and street sweeping by preventing trash and debris from entering the storm pipe system. Modified inlets were installed in five neighborhoods: McElderry Park, Oliver, Baltimore-Linwood, Franklin Square, and Carrollton Ridge. The modifications were only made to a portion of the 1,092 inlets located within the selected neighborhoods, based on inlet type and the proximity to routine street cleaning routes. Each of the inlets were inspected by DPW staff at least quarterly to gauge the need for cleaning. In FY 2020, a total of 19 tons of debris was collected from the inlets in the 5 targeted neighborhoods.

DPW- Utility Maintenance Division also initiated a targeted pro-active inlet cleaning program in 2017 for approximately 424 inlets, selected based on sump condition and proximity to the Mayor's Violence Reduction Initiative. Each of the inlets are cleaned quarterly, yielding a total of 118 tons of debris

collection in FY 2019. Additionally, DPW- Utility Maintenance Division continued its daily reactive cleaning of the City's storm drain inlets, removing approximately 259 tons of debris from 4,426 inlets in the City's public storm drain system. Since Quarantine Road landfill prohibits the unloading of saturated debris, the weight measurement is based on the weight of the debris after it was spread and dried within a bermed area at the maintenance yard.

Both proactive inlet cleaning operations were suspended in March 2020, to encourage residents to remain home and practice social distancing related to COVID. This results in parked cars blocking access to inlets. Pro-active inlet cleaning is expected to resume in FY 2021.

5.4.3 Harbor Cleaning

The City employs a fleet of thirteen (13) skimmer boats to clear debris from the Harbor each year. The Marine Debris Operations Section utilizes the boats to collect floating debris and trash in the water. As shown in Table 5-2, FY 2020 debris collections were at a record low due to COVID. Marine debris collections were suspended mid-March and late April 2020, then crews were partially scheduled to ensure continued operations if quarantine was required due to staff exposure to COVID.

Table 5-2: Summary of Harbor Cleaning

Fiscal Year	Debris Collected (tons)
2015	311
2016	435
2017	322
2018	305
2019	449
2020	195

5.4.4 Middle Branch Shoreline Cleaning

In FY 2020, DPW continued to contract shoreline cleaning services in the Middle Branch. This service supplements the skimmer boat operations, since the shallow water conditions of the Middle Branch prevent access for the skimmer boats. Contracted shoreline cleaning services were conducted between July 23 to October 17, 2019. A total of 5,836 bags were collected, yielding approximately 35.0 tons of material collected. Shoreline cleaning services will continue in FY 2021.

5.4.5 Integrated Pest Management

During FY 2020, the Baltimore City Department of Recreation and Parks (BCRP) applied 18 gallons of concentrated glyphosate (Round Up equivalent), which contained 54 pounds of glyphosate acid. This is the same amount as FY 2019. Although the Horticulture Division put a hold on usage (which decreased) the report includes data from the Forestry Division for the first time. Forestry is expanding its capacity to manage undeveloped park land using IPM. While its use of chemical, cultural, and mechanical controls is expected to increase in coming years, due to managing more of its property, the amount per acre should remain consistent. BCRP currently has five (5) Public Agency Applicators who are certified by MDA (2 in Horticulture, 2 in Parks, and 1 in Forestry). All have attended MDA approved training to maintain their

certifications. All registered (not certified) applicators are re-registered annually with MDA as per the State process. BCRP is committed to reducing the use of glyphosate and is carefully reviewing its use. For more information https://bcrp.baltimorecity.gov/glyphosate.

During FY 2020, the Department of Transportation (DOT) did not apply any herbicide because there was no one on staff with a license to apply herbicide. The Baltimore City Public Schools System, as well as the Department of General Services (which manages most of the City buildings) report that no herbicides were applied on properties during FY 2020. In total for these four departments, there were 54 pounds of glyphosate acid applied during FY 2020, which was the same amount as FY 2019.

5.4.6 Deicing Materials

DOT applied 1,988 tons of road salt (sodium chloride) during FY 2020. This is a major decrease of 91% from the 21,505 tons that were applied during FY 2019. Additionally, DOT applied a brine solution on one day prior to a storm. DOT applied a total of 33,000 gallons of brine solution on that day. DOT used 36.3 tons of salt to make that amount of brine solution. Thus, DOT used a total of 2,024 tons of salt during FY 2020. The snowfall total recorded at BWI for FY 2020 was 1.8 inches- compared to 18.3 inches for FY 2019. During FY 2020, there were one (1) storm and two (2) days of icy conditions for which DOT applied road salt.

Figure 5-1 depicts the amount of road salt and the amount of snowfall recorded at the National Weather Service station at BWI Airport for each fiscal year, from FY 2011 through FY 2020. Note that 30 inches out of the 35.1 inches of snow fell in one event in FY 2016, specifically on January 21-22, 2016. That is why that pair of numbers (20,994 tons of road salt applied and 35.1 inches of snowfall) are not well related with the other pairs of numbers.

Note: For FY 2015 through FY 2020, S = number of snow events; I = number of Ice events

Figure 5-1: Road Salt Applied by City of Baltimore and Snowfall at BWI by Fiscal Year

5.5 Public Education and Outreach

5.5.1 Education and Outreach Activities

A summary of outreach events is provided in the following table. Note that due to COVID, community meetings and events were not held in April – June 2020, except for a few virtual meetings.

Table 5-3: Summary of Outreach Activities for FY 2019

Description	Details
Public Presentations on the MS4 WIP	• 9 presentations were given to communities where MS4 projects are to be located
School presentations providing information on trash reduction, recycling, rats, and storm drains, related to the health of the harbor	• 9 Presentations • 7 Schools • 492 Students
Community events where DPW provided educational materials on environmental topics	• Artscape – 7/19/19 – 7/21/19 • Health Wellness Fair – 7/20/19 • Senior Men's Conference – 7/25/19 • Chinese Language International Conference - 8/3 – 8/4 • Back to School Rally – 8/3/19 • National Night Out – 8/6/19 • AFRAM – 8/10/19 – 8/11/19 • Mayor Host Senior Town Hall – 8/21/20 • Dam Jam – 8/24/19 • Community Health Conversations – 9/6/19, 9/11/19, 9/18/19, 10/3/19, • Waxter Wisdom Resources (Seniors) – 7/10/19, 8/14/19, 9/11/19, 10/9/19, 11/13/19, 1/1/20, 2/12/20 • Annual Senior Persons with Disabilities Symposium – 9/18/19 • Book & Light Festival – 11/1/19 – 11/3/19 • Z-HAP Resource Services Expo (New Psalmist) – 12/4/19 • Annual Modified Consent Decree – 1/23/2 • Better Health Symposium – 1/13/20 • Mayor's Black History Month Ceremony – 2/18/20 • Southern District Community Relations Council – 2/20/20

Description	Details
	• Mayor's Community Forum – 3/5/20 • MOEM Houses of Worship Preparedness Workshop – 3/7/20 • Frederick Avenue Flood Mitigation Meeting – 3/4/20 and 6/15 • Monthly Crime and Grime meetings • 39 community events and meetings throughout the year
Incentives related to trash reduction	• Worked to finalize the "Less Waste, Better Baltimore" master plan which was released in August 2020 to provide a long-term strategy for reducing solid waste generation, offering more options for reusing or repurposing waste materials, and increasing recycling rates (see above for public meeting dates): https://publicworks.baltimorecity.gov/Less-Waste-Better-Baltimore • Participated in the Food Matters inter-agency project, funded by the Rockefeller Foundation, focused on food waste reduction, recovery, and composting • Secured a grant from the Recycling Partnership to implement a recycling anti-contamination campaign • Pursued funding to provide recycling carts citywide • Household Hazardous Waste Collection events (First Friday/Saturdays; July-October 2019, June 2020) • Free Paper Shredding/Plastic bag takebacks/Recycling bin sales (various dates) • Continued to provide disposal service for the Trash Wheel, a public-private project at the Jones Falls outfall to the Inner Harbor

Baltimore's stormwater restoration fee has a credit program which includes a fee reduction for participation in registered stormwater participation events. These include community clean-ups, stream

and harbor clean-ups, tree plantings, and installation of community BMPs. Outreach efforts and information promoting these types of trash reduction efforts and BMP installations are available on DPW's web site and provided at DPW attended events.

Due to the diminishing interest by groups applying for stormwater participation events, emphasis on the Mayor's Clean-up events, and the need for DPW Solid Waste to integrate community clean-ups with trash pick-up, the "Volunteer Clean-up" was created as a service request (SR) in August 2019. In FY20, 59 events were held with an estimated 1,358 volunteers (volunteer estimates are submitted as part of the service request – due to the nature of the SR, data is not collected on the actual number of volunteers or bags of trash). Volunteer Clean-ups were suspended in March 2020 due to COVID-19. Stormwater participation event certificates and application information was sent to organizers that provided email addresses.

DPW also provided outreach materials for stormwater participation credits to participants in the Mayor's Fall 2019 Clean-up.

5.5.2 GROW Center

In Fiscal Year 2018, DPW launched a feasibility study for resource hubs known as "GROW Center". GROW stands for Green Resources and Outreach for Watersheds and is envisioned to be places and events that link existing community greening networks to much needed sources of free/low-cost materials and technical expertise for stormwater management installation and vacant lot revitalization. The GROW Centers provide the following services:

- Materials for purchase. Mulch, bricks, crushed concrete, wood products, salvaged building materials and other quality-controlled materials that would be free and/or available for purchase by city residents and non-profits to use in micro-practice installation such as rain gardens, community gardens, and permeable paths and walkways. Trees, plants and quality-controlled materials like bio-soils will also be available in manageable volumes.
- Education and training. Experts will provide advice and guidance on green infrastructure projects, including hands-on training sessions, workshops, and educational classes on design, the proper use of the materials, securing funds and resources, and maintenance.

The feasibility study consists of two parts – 1) the testing of the concept through a series of "pop-up" events, and 2) the development of an Alternatives Analysis and Business Plan. Both efforts will be funded in part by a grant from the USDA Forest Service received in FY2017.

In FY 2020, GROW Center pop-ups continued. With the graduation of the GROW Center Peaceworker Fellow, only three pop-ups were scheduled and no workshops. Due to COVID-19, GROW Center pop-ups were cancelled for Spring 2020. In Fall 2019, the three pop-ups were held at a newly completed community-managed open space, a faith-based partner, and a previous location. Although there was smaller attendance, 69% of attendees had never attended a GROW center pop-up. Additionally, three new partners participated: Health Department, Office of Emergency Management, and DPW-HR. Summary results are as follows:

- 61 people attended from 30+ different neighborhoods
- 15 partner organizations participated
- 52 trees were given away along with 5+ cubic yards of mulch
- 21 recycling bins were sold

Figure 5-2: Photos of GROW Center Pop-up events from FY 2020.

5.5.3 Effectiveness of Education Program for Trash and Litter

Public education and outreach are an essential strategies to achieve the long-term, sustained prevention of trash entering our streams and waterways. Whereas DPW is the responsible party for implementing and providing solid waste services, public education and outreach requires partnerships to be effective. Partnerships involve voluntarily actions and/or cooperation by State, federal, private, non-profits, and community groups and residents, and can be both structural and non-structural practices.

5.5.3.1 B'More Beautiful

BMORE Beautiful is a City-led peer to peer beautification program that launched in April 2017. The goal of the program is to change behaviors and attitudes towards the beautification of the City as well as encourage residents, businesses, and organizations to become directly involved in activities and projects that will keep their neighborhoods clean. To meet this goal, the City works closely with neighborhoods

on beatification projects and cleanliness challenges, as well as provides educational literature, outreach materials and other resources that residents can use to Keep BMORE Beautiful.

After completing a 2-year pilot, BMORE Beautiful has expanded citywide. While the interest and decision to expand citywide is ambitious, staffing limitations remain a concern. In order to join BMORE Beautiful, interested groups must meet at least 3 of the following requirements

- Identified a primary coordinator (block captain)
- Neighborhood/interested party recommended by participating captain or partnering organization
- At least five dedicated volunteers
- Completed at least 1 successful cleanup/beautification project

BMORE Beautiful is currently active in 59 neighborhoods.

1. 4x4
2. Allendale
3. Belair Edison
4. Bocek
5. Boyd Booth
6. Broadway East
7. Brooklyn
8. Canton
9. CARE
10. Carrollton Ridge
11. Cedonia
12. Center City (Downtown)
13. Cherry Hill
14. CHM
15. Curtis Bay
16. Darley Park
17. Druid Heights
18. Edmondson Village
19. Evergreen Lawn
20. Forest Park
21. Franklintown Road
22. Franklin Square
23. Greektown
24. Greenmount West
25. Hampden
26. Harlem Park
27. Highlandtown
28. Hopkins Bayview
29. Howard Park
30. Irvington
31. Johnston Square
32. Langston Hughes
33. Matthew Henson
34. McElderry Park
35. Milton-Montford
36. Mondawmin
37. Morrell Park
38. Mosher
39. Mt. Clare
40. O'Donnell Heights
41. Oliver
42. Park Heights
43. Parklane
44. Patterson Park
45. Pen Lucy
46. Penn-North
47. Pigtown
48. Remington
49. Reservoir Hill
50. Rosemont
51. Sandtown Winchester
52. South Baltimore
53. Upton
54. Waverly
55. West Arlington
56. Westgate
57. Westport
58. Violetville
59. Yale Heights

In each neighborhood a volunteer resident block captain is responsible for:

- RECRUITING neighbors to sign the pledge and participate in BMORE Beautiful;
- ORGANIZING ongoing beautification and cleaning activities;
- LEADING others to change their negative behaviors regarding neighborhood cleanliness; and
- EDUCATING their neighbors on how to comply with specific City Code requirements and how they can keep their neighborhood beautiful through simple, easy-to-follow behaviors.

BMORE Beautiful continues to support neighborhood beautification efforts through four grant programs:

- **Love Your Block Grant:** The Love Your Block Grant was designed to support the City's goals of "revitalizing and renewing" neighborhoods. Eligible groups may receive funding ($500- 1,500) for the purpose of enhancing neighborhood appearance.
- **Say YES! (Youth Environmental Stewards) Grant:** Say YES! Program was designed as community engagement opportunity for youth to earn while they learn. Organizations may apply for a grant to engage within their community on a variety of beautification projects. Youth are selected and supervised by community leaders. The Say YES! Program has a 10-week Spring and Fall session; a 6-week summer session was introduced in the FY 2019. Youth are responsible for completely weekly perception surveys that are submitted at the end of the session.
- **Care-A-Lot Grant:** Care-A- Lot Grant is an opportunity for organizations to provide maintenance services for up to 25 vacant lots during the "Grow Season". Maintenance services include mowing and removing trash and litter. This program is targeted to support the maintenance of City-owned vacant lots. In FY 2019, BMORE Beautiful introduced an equipment funding opportunity to help support community maintaining and transforming Care-A-Lot locations.
- **Activate Your Space:** Activate Your Space Grant was designed in partnership with Mayor's Office of Criminal Justice (MOCJ). The grant is designed to support neighborhoods that want to transform vacant lots into safe communal spaces using CEPTED strategies.

BMORE Beautiful also sponsors the Cleanup Cup, an opportunity for neighborhoods, businesses, and organizations to engage in friendly competition and keep Baltimore Beautiful by picking up trash, litter, and debris in their communities. The Cleanup Cup is made possible through a partnership between BMORE Beautiful, Mayor's Office and DPW.

COVID-19 restrictions impacted BMORE Beautiful programs and activities. DPW staffing and service interruptions, a decrease in volunteer sizes, requests to extend project timelines, and cancellation of captain meetings reduced efforts, especially since a large portion of the work takes place during the Spring and Summer.

In FY 2020, BMORE Beautiful achieved the following:

- 1 Neighborhood Captain Meeting
- 2 Activate Your Space Meetings
- 3 Baseline Community Surveys
- 29 BMORE Beautiful Community Clean-ups
- 5 Love Your Block Projects
- 954 Care-A-Lot vacant lots
- 201 Say YES! Participants

5.5.3.2 Mayor's Fall and Spring Clean-ups / Community Pitch-ins

The Mayor's Spring and Fall Clean-ups are opportunities for residents to organize community clean-ups and beautification projects with support from DPW. The purpose of the clean-ups is to collect litter and trash. DPW provides bags to residents, coordinates dumpsters, and picks up the trash from each location. Due to COVID-19, only the Fall 2019 Clean-up was held:

- 280 communities participated
- 465 residents volunteered
- 138.6 tons

DPW also coordinates the Community Pitch-in program, which provides up to 4 dumpsters/year to community groups. As with the Mayor's Clean-ups, the Pitch-in program was suspended beginning in March 2020. In FY20, 680 requests were made for dumpsters, with 1,320 tons of debris collected. These events focus on larger debris collection, like old furniture and other material that is likely to be dumped.

6 Water Quality Improvements

6.1 MS4 Restoration and TMDL Watershed Implementation Plan (WIP)

The City submitted its WIP to MDE on December 22, 2014. A revised calculation of the baseline impervious area, with supporting GIS files and responses to the specific MDE comments, was submitted to MDE on June 30, 2015. MDE approved the baseline impervious area and 20% restoration goal of 4,291 acres on July 28, 2015. The WIP was revised based on public and MDE comments and submitted to MDE on August 24, 2015.

6.2 Milestone Schedule

The WIP included programmatic and project milestones as part of an accountability framework for restoring the Chesapeake Bay; however, the original proposed milestone schedule only extended to FY 2018, which was the last anticipated fiscal year to occur before the expiration of the current permit.

6.3 Implementation of Projects, Programs, and Partnerships

6.3.1 Project Implementation and Tracking

The progress status of the projects listed in the WIP is provided in Appendix N of this Annual Report, specifically Table N-1. The original plan scope, cost and schedule are shown in addition to the current projections. The Chinquapin Run stream restoration project continued through the construction phase, coinciding with sanitary system improvements. The Powder Mill Run stream restoration began construction in FY 2020. Two impervious area removal projects were completed. The current projections are based on the project progress as of June 30, 2020. Each of the current proposed projects, with specific locations, is included in the restoration BMPs tables of the georeference database in Appendix C.

Table N-1 listed afforestation efforts by Tree Baltimore for the proposed WIP. Although the Stormwater Utility funded some of Tree Baltimore's efforts, it was easier to list all of the Tree Baltimore efforts under Partnership (Table N-3).

6.3.2 Program Implementation and Tracking

The progress status of the programs listed in the WIP is provided in Appendix N of this Annual Report, specifically Table N-2. Current program implementation and corresponding georeference database records are reported, based on frequency and geographic distribution of the operation (tonnage by watershed) in the georeference database (Appendix C of this report).

IDDE efforts are also listed in Table N-2. Supporting calculations for each type of IDDE effort are included in Appendix L of this report.

6.3.3 Partnership Implementation and Tracking

The progress status of the partnerships listed in the WIP is provided in Appendix N of this Annual Report, specifically Table N-3. All restoration BMPs with approved plans and status of "completed" in the georeference database (Appendix C), implemented to meet development requirements, were simply

listed in the Table N-3 under development, using conservative pollutant removal efficiencies for pond and bioretention retrofits in type D soils. Specific projects completed by volunteer efforts are listed in Table N-3, in addition to the afforestation efforts by Tree Baltimore. The afforestation efforts are listed by watershed and assume that 80% of the trees were planted in pervious areas (i.e. on a grass field or in an existing tree pit).

6.4 Impervious Area Restoration

The progress status of implementation of proposed projects, programs, and partnerships of the WIP is provided in Appendix N. Since most of the projects are still in the design phase, the majority of the impervious area restoration is provided by programs, specifically street sweeping. A summary of the impervious area restoration efforts (Appendix N) is provided in Table 6-1 and shows that the City has exceeded the impervious area restoration goal (4,291 acres) as of June 30, 2020.

Table 6-1: Summary of Impervious Surface Restoration (ISR) Efforts

Description	ISR Completed by June 30, 2019 (ac)
Projects	102
Programs	3,914
Partnerships	733
Total	**4,749**

6.5 Bay TMDL Compliance

In FY 2018, MDE transitioned from the Maryland Assessment Scenario Tool (MAST) to the Chesapeake Bay Assessment Scenario Tool (CAST). As an alternative to CAST, an estimation of the pollutant removals (% reduction) using the MS4 Accounting Guidelines is provided in Appendix O, specifically Table O-2. The model was modified to calculate the baseline as the controlled impervious area (i.e. including controls in place by 2010). Street sweeping was not included in the current efforts, since the resulting mileage was less than 2009 values. The evaluation (Table O-2) showed that the City has met the Bay TMDL goal for sediment.

6.6 Local TMDL Compliance

6.6.1 Nutrients and Sediment

An analysis of the nutrient and sediment removals, based on the current implementation status, using the current MS4 Accounting Guidelines is provided in Appendix P. The analysis used a percent reduction methodology with both loads and load reductions calculated based on the 2014 MS4 Accounting Guidelines. The model was modified to calculate the baseline as the controlled impervious area (i.e. including controls in place by 2005).

The estimated baseline load for nitrogen and phosphorus were significantly higher using the loading factors from the MS4 Accounting Guidelines (Table O-1 of this report), as compared to the baseline load

listed in the approved TMDL documents. None of the local nutrient TMDLs have been met with the current efforts. However, significant decreases in total phosphorus have been observed in the stream impact sampling

Contrary to the local nutrient TMDLs, the estimated baseline load for sediment was significantly lower using the loading factors for from MS4 Accounting Guidelines (Table O-1) as compared to the baseline load listed in the approved TMDL documents, which were derived from biological assessments, not direct measurements of sediment. The sediment TMDL for Back River (issued in 2018) has been added. None of the local sediment TMDLs have been met with the current efforts.

The models for the local TMDLs will be adjusted with the approval of the updated MS4 Accounting Guidance.

6.6.2 Bacteria

The City is under a consent decree in Civil Action No. JFM-02-1524 for unpermitted discharges from the wastewater collection system. A modification to the consent decree was approved on October 6, 2017 in the United States District Court for the District of Maryland by the U.S. Department of Justice, the U.S. Environmental Protection Agency, and the Maryland Department of the Environment. The City submitted a modified implementation plan to reflect the schedule approved as part of the modified Consent Decree. Progress for the milestone implementation schedule (education and IDDE credit study) is included in Table M-1 of Appendix M of this report. The City's progress on a microbial source tracking study is discussed in Section 5.3.2.3 of this report.

The City has continued to make significant capital investments in rehabilitating the sanitary sewer system. Phase I of these capital investments will be completed in FY 2021 and includes the Headworks project, which is expected to reduce the number of wet weather SSOs by 80%. Two sanitary sewer re-alignment and rehabilitation projects were designed in concert with two of the City's stream restoration projects (Chinquapin Run and Powder Mill Run) to reduce land and community disturbance. Further information on these efforts is provided in quarterly Consent Decree reports, posted on the City's website.

The results of the City's routine stream sampling for bacteria are provided in Section 3.1.2 of this Annual Report. The following SIS stations remain a concern:

- All stations in the Back River, Moore Run Subwatershed. Phase I Consent Decree projects should significantly reduce SSOs and thus bacteria loading for this subwatershed.
- JF 11.5 is a structured overflow. Pending the completion of the Headworks project, the structured overflow will be removed.
- Gwynns Falls: all but stations at Dead Run and GF Hilton Street. Phase I Consent Decree projects should significantly reduce SSOs and thus bacteria loading for this subwatershed.
- Lakewood and Linwood stations in Baltimore Harbor. The drainage area for these two stations account for about 15% of the City land area. The storm drain systems inter-connect in and around Patterson Park. The Lakewood station is associated with the sub-watershed known as

Harris Creek; this system has endured 4 emergency repairs for sinkholes in and around Monument Street for the last 10 years due to failure of a 10-foot storm drain tunnel. A $22 million capital rehabilitation project for this system is scheduled to begin in FY 2020. This rehabilitation, in addition to the Phase I Consent Decree projects should significantly reduce bacteria loading.

6.6.3 Trash

On January 5, 2015, EPA approved the report entitled "*Total Maximum Daily Loads (TMDL) of Trash and Debris for the Middle Branch and Northwest Branch Portions of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment, Baltimore City and County, Maryland*". In compliance with the MS4 permit, the City developed the "Baltimore City Trash TMDL Implementation Plan", submitted to MDE on January 4, 2016, to present strategies to meet the TMDL waste load allocations. In addition to the trash reduction efforts noted in the previous sections of this report, progress on the milestone schedule for the trash TMDL is included in Appendix M of this report.

6.6.4 PCB

The City submitted a revised PCB TMDL implementation plan to MDE in September 2018. The plan included details of a collaborative study with USGS and UMBC in the Back River watershed, to be completed by FY 2020. The City is on schedule for this task. The City will share the results with MDE, Baltimore County and Anne Arundel County in FY 2021 to discuss appropriate future monitoring.

Appendix A: Organization Chart

Mayor of City of Baltimore

Department of Public Works

Chief of Staff

Office of Communications

MS4: D.6

Office of Information Technology

Office of Safety and Training

Office of Materials Management

Office of Engineering and Construction

MS4: E.1, E.2, F.2

Office of Asset Management

MS4: C, D.3

Office of Compliance and Laboratories

Water Quality Monitoring & Inspection Section

MS4: C, D.3, F.1, F.2

Watershed Planning and Partnerships Section

MS4: D.4, D.6, E.1, E.2, F.2

Research and Innovation Section

Plans Review & Inspection Section

MS4: C, D.1, D.2

Environmental Laboratories

Water Quality Laboratories

Chief Administrative Officer:
Boards and Commissions
Contract Administration
Fiscal Management
Grants Management
Human Resources
Legal and Regulatory Affairs
Legislative Affairs

MS4: D.5.a, D.6

Customer Svc Division

MS4: D.6

Bureau of Water and Wastewater

Utility Maint. Division

MS4: D.4, D.5.b.ii

Wastewater Facilities Div.

MS4: D.5.a

Environmental Services Div.

Pollution Control Section

MS4: D.3

Department of Planning

Office of Sustainability

MS4: C, D.6

Department of General Services

Fleet Management Division

MS4: D.5.a

Bureau of Solid Waste

Disposal Services

MS4: D.5.a

Special Services

MS4: D.4. D.5.b.i

Routine Services

MS4: D.4

Inner Harbor, DT Business

MS4: D.4

Support Services

Department of Recreation and Parks

MS4: C, D.5.b.iii, D.6

Department of Housing and Community Development

Office of Permits & Building Inspections

MS4: C, D.1, D.2, D.3

Department of Transportation

MS4: C, D.1, D.2, D.5.b.iii & iv

Office of Emergency Management

MS4: D.3

Department of Finance

MS4 Permit Condition Key:

C. Source ID (GIS)
D.1 Stormwater Management
D.2 Erosion and Sediment Control
D.3 Illicit Discharge Detection and Elimination (IDDE)
D.4 Trash Elimination
D.5.a – Property Management (NPDES regulated city facilities)
D.5.b.i – Street Sweeping
D.5.b.ii – Inlet cleaning
D.5.b.iii – Vegetation management
D.5.b.iv – De-icing materials
D.6 – Public education
E.1 Watershed assessment
E.2 – Watershed Restoration (projects)
F.1 – Chemical/ biological monitoring and physical assessment
F.2 TMDL Assessment

City of Baltimore Organization Chart in Reference to MS4 Permit Conditions as of June 30, 2020

Department of Public Works
Organization Chart
as of June 30, 2020

Matt Garbark,
Director (Acting)

Julie Day,
Chief Administrative Officer
Boards and Commissions, Deena Joyce
Contract Administration, Tonorah Houston-Burgee
Environmental Police, Luke Brackett
Fiscal Management, Troy Brogden
Grants Management, Anne Haskins-Brookover
Human Resources, LaToya Curtis
Legal and Regulatory Affairs, Paul DeSantis
Legislative Affairs, Marcia Collins

Johnnie Hemphill,
Chief of Staff
Asset Management, Harpreet Singh (Acting)
Communications and Strategic Alliance, Yolanda Winkler
Compliance and Laboratories, Kimberly Grove, P.E.
Engineering and Construction, Azzam Ahmad (Acting)
Information Technology, Yugandhar Narala
Materials Management, Ingrid Rivera
Quality Assurance, Terri Ayers
Safety and Training, Barbara Rodgers
Strategy and Performance, Krystina Bryant

Linda Batts,
Diversity and Equity Coordinator

John Chalmers,
Head of Bureau of Solid Waste
Chief of Bureau Operations, Yvonne Moore-Jackson
Disposal Services Division, James Rohrbach
Routine Services Division, Jerome Ragsdale
Special Services Division, Spencer Morgan
Inner Harbor, Downtown Business District, Muriel Rich
Support Services Division, Kristyn Oldendorff

Yosef Kebede,
Head (Acting) of Bureau of Water and Wastewater
Chief Administrative Officer, Bethel Henry
Environmental Services, Deborah Pitts
Wastewater Facilities, Mike Gallagher
Utility Maintenance, Anthony Galloway

Jennifer Ludwig,
Utility Manager
Customer Support and Services, Anita Taylor

Appendix B: Summary Table of Null Values in the MS4 Geodatabase

Summary of Null Values Used on MDE Geodatabase

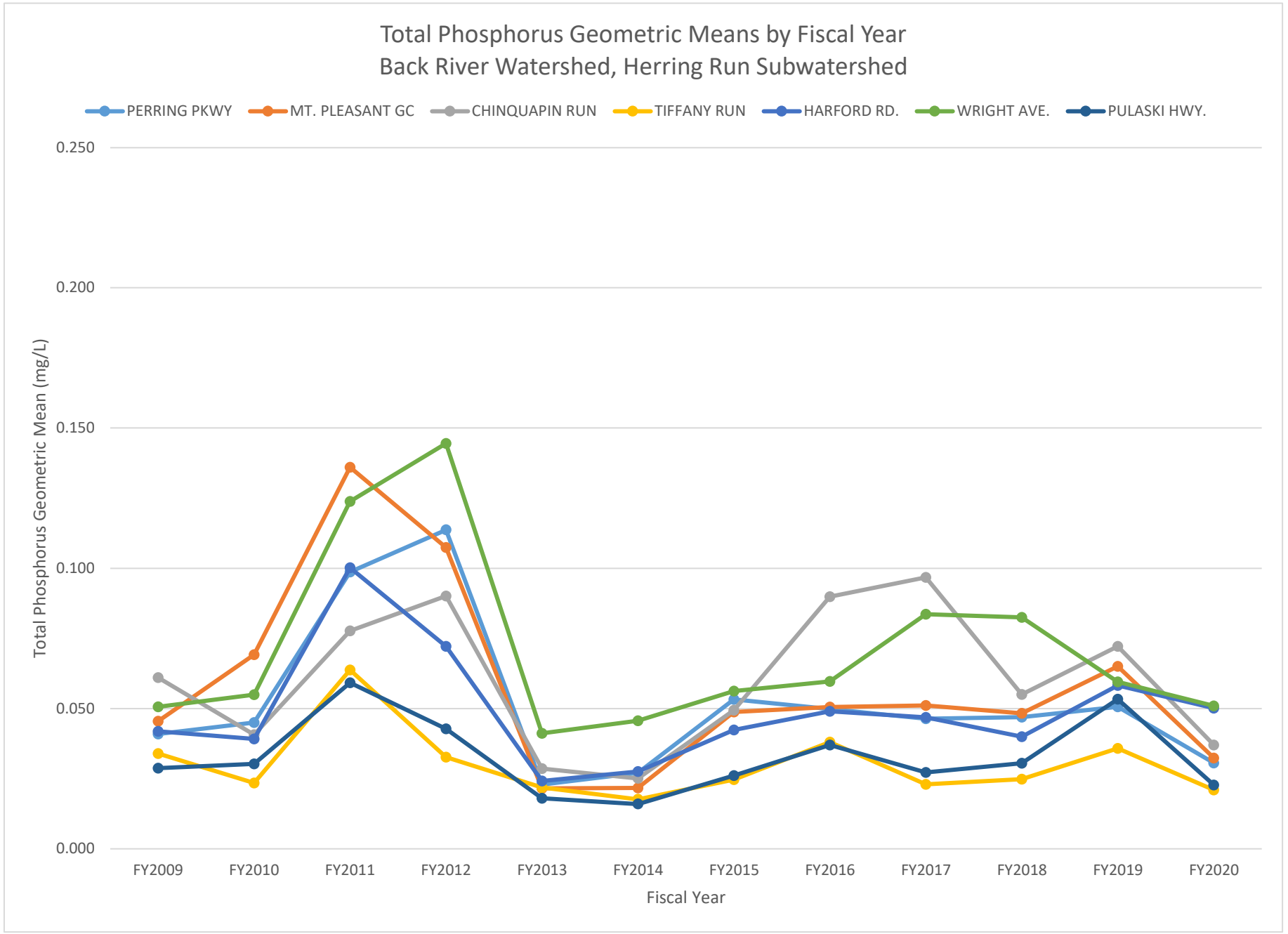
Table	Field	Value	Comments	Schema
Biological Monitoring	EVENT_TIME	12:00	Not recorded in field report.	
	FIBI	-999	FIBI is not done; it is not required for this permit.	X
	EMBEDDEDNESS	-999	Not recorded in field report.	
Chemical Monitoring	WATER_TEMP	-999	Not recorded in field report.	
	pH	-999	Not recorded in field report.	
	BOD_dt	-999	Not recorded in field report.	
	BOD_EMC0	-999	Not recorded in field report.	
	BOD_EMC_dt	-999	Not recorded in field report.	
	TSS_dt	-999	Not recorded in field report.	
	TSS_EMC0	-999	Not recorded in field report.	
	TSS_EMC_dt	-999	Not recorded in field report.	
BMPPOI	IMP_ACRES	-999	Data not shown on as-built plans	
	APPR_DATE	1/1/1900	Data not shown on as-built plans	
	BUILT_DATE	1/1/1900	Data not shown on as-built plans	X
RestBMP	IMP_ACRES	-999	For projects not constructed	
	BUILT_DATE	1/1/1900	For projects not constructed	
	PE_ADR	-999	For projects not constructed	
	PROJECTED_IMPL_YR	9999	For projects not constructed	
	IMPL_COST	-999	Missing data or data was not recorded	
BMP	BMP_DRAIN_AREA	-999	Data not shown on as-built plans	
	BUILT_DATE	1/1/1900	Data not shown on as-built plans	
AltBMPPoly	IMPL_COST	-999	Total program costs are shown Section 4, but not broken down by frequency / watersheds.	
Outfall	DIM_OUTFALL	-999	Missing data	
	HT_OUTFALL	-999	Missing data	
	WT_OUTFALL	-999	Missing data	
BMP_Inspections	REINSP_DATE	1/1/1900	For facilities which have been removed	X
IDDE	LAST_RAIN	1/1/1900	Data was not recorded at sampling time	
	SCREEN_TIME	1200	Data was not recorded at sampling time	
	WATER_TEMP	-999	Data was not recorded at sampling time	
	AIR_TEMP	-999	Data was not recorded at sampling time	
	ALGAEGROW	N	Data was not recorded at sampling time	
	ODOR	SE	Data was not recorded at sampling time	
	DEPOSITS	N	Data was not recorded at sampling time	
	VEG_COND	N	Data was not recorded at sampling time	
	STRUCT_COND	N	Data was not recorded at sampling time	
	EROSION	N	Data was not recorded at sampling time	
NarrativeFile	MDE_STATION_ID	-999	Document is not associated with a monitoring site.	X

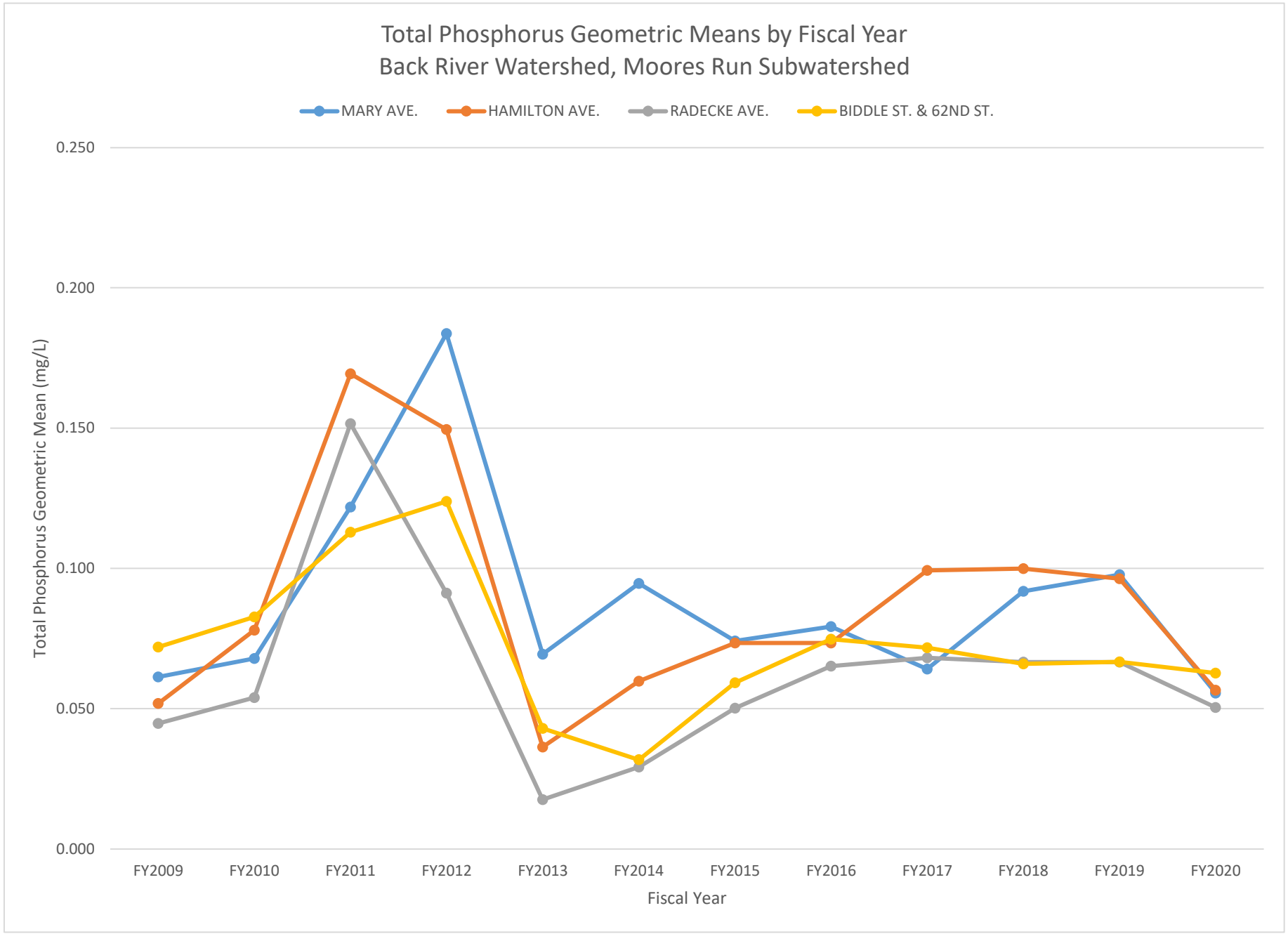
Note: Schema indicates MDE plans to change the field to optional in next generation of database.

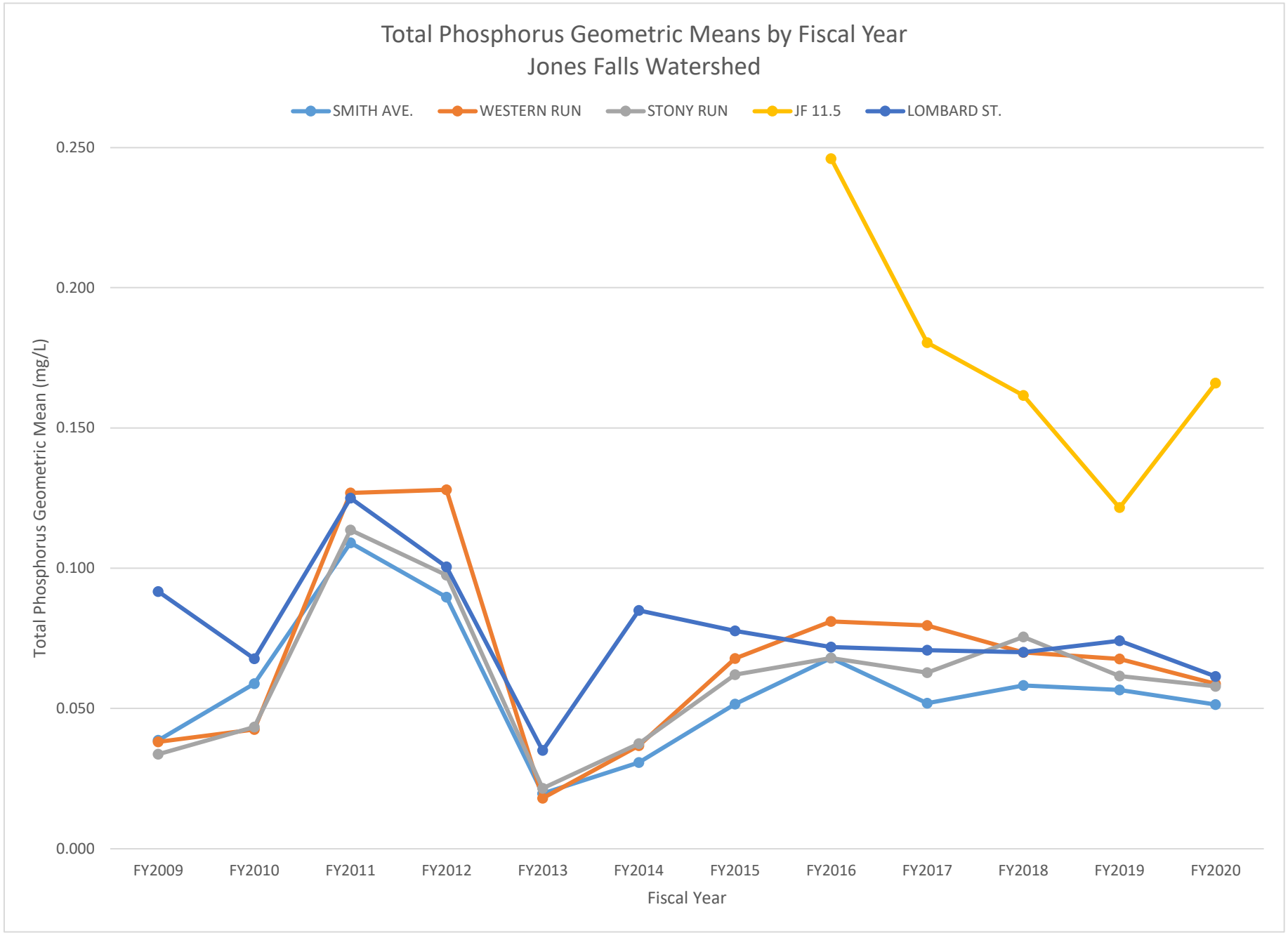
Appendix C: Source Information using MS4 Geodatabase (*electronic files only*)

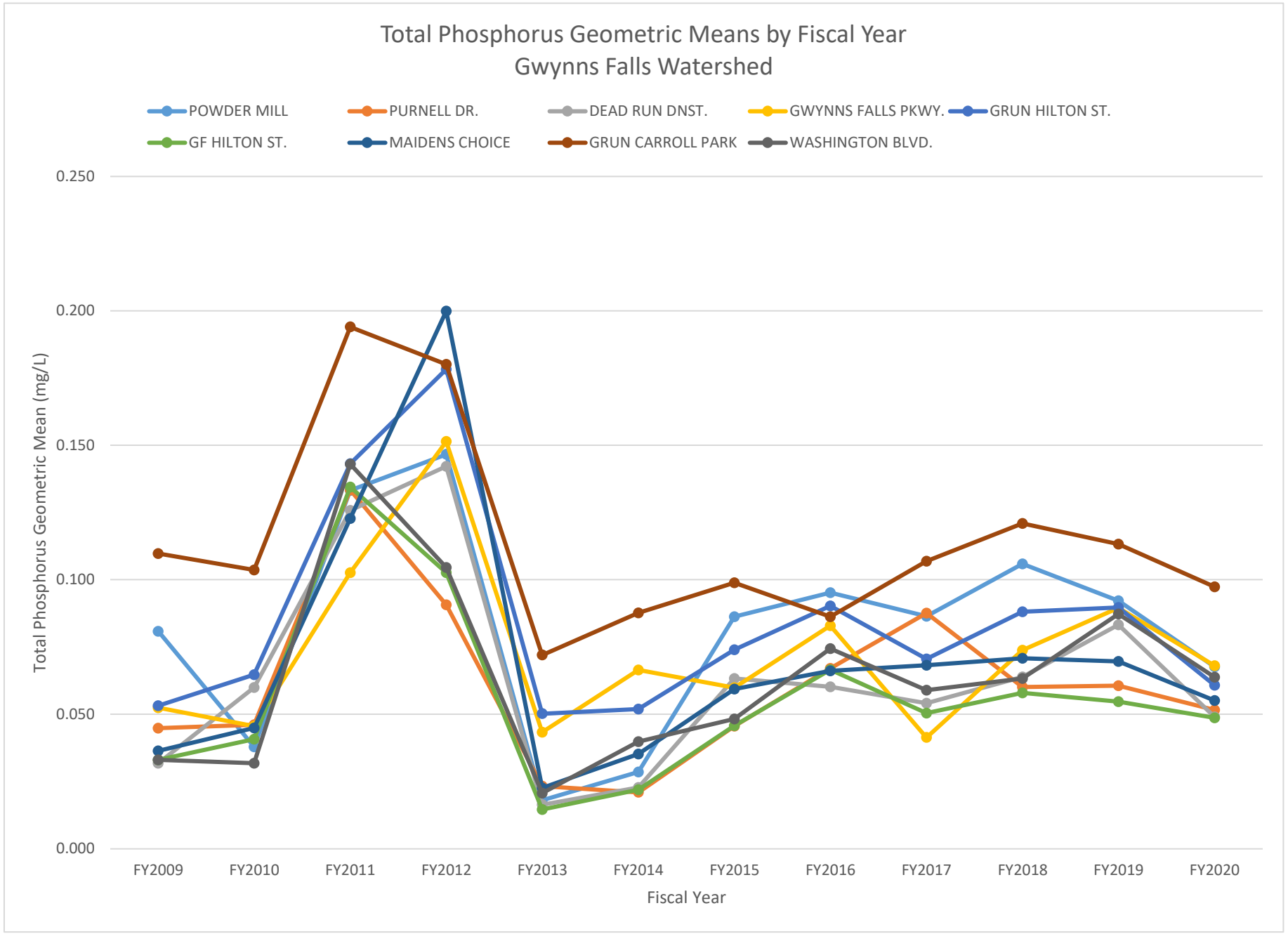
Appending D: Ammonia Screening and Stream Impact Sampling Results (*electronic files only*)

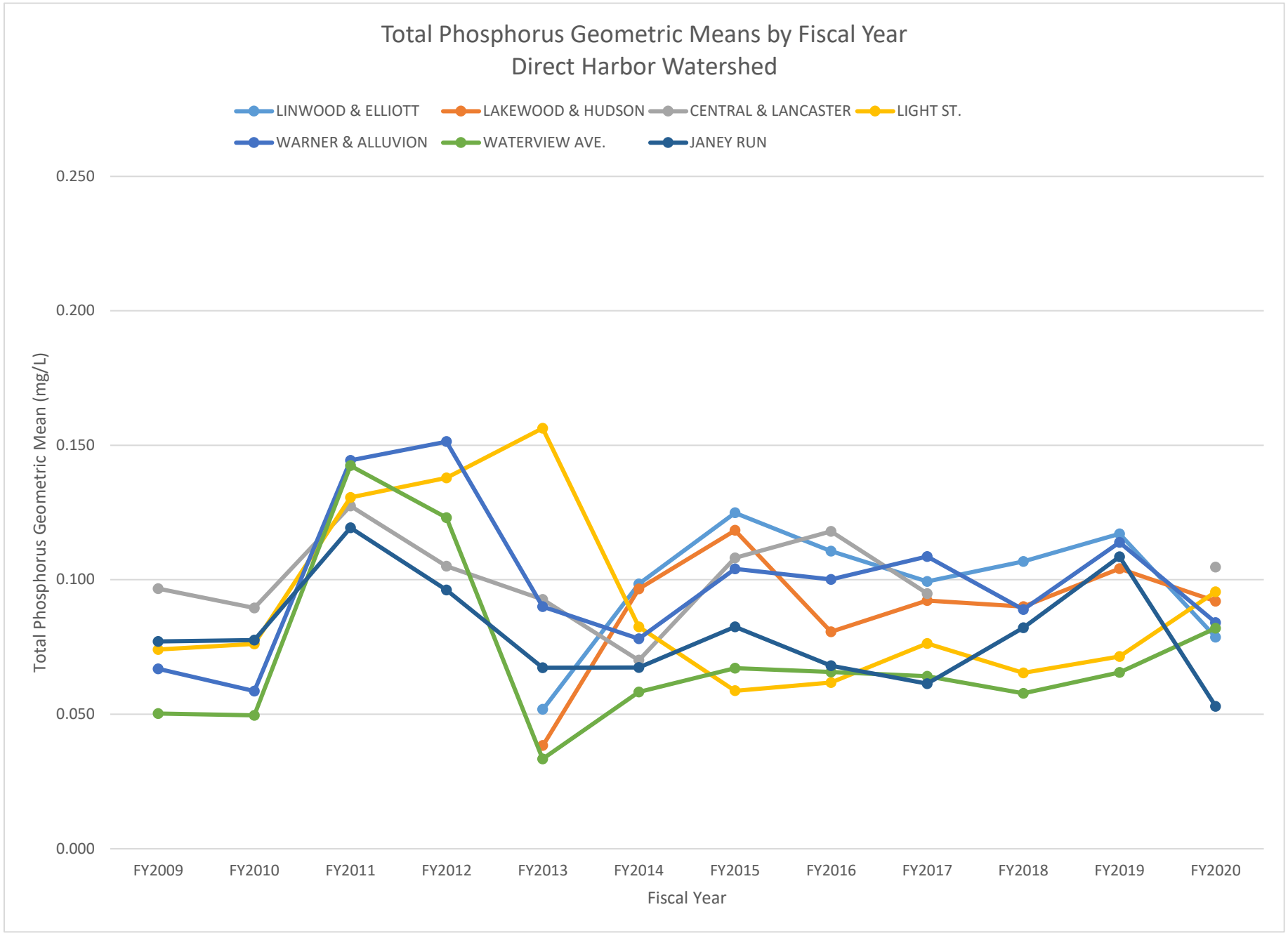
Appendix E: Total Phosphorus Monitoring Histographs

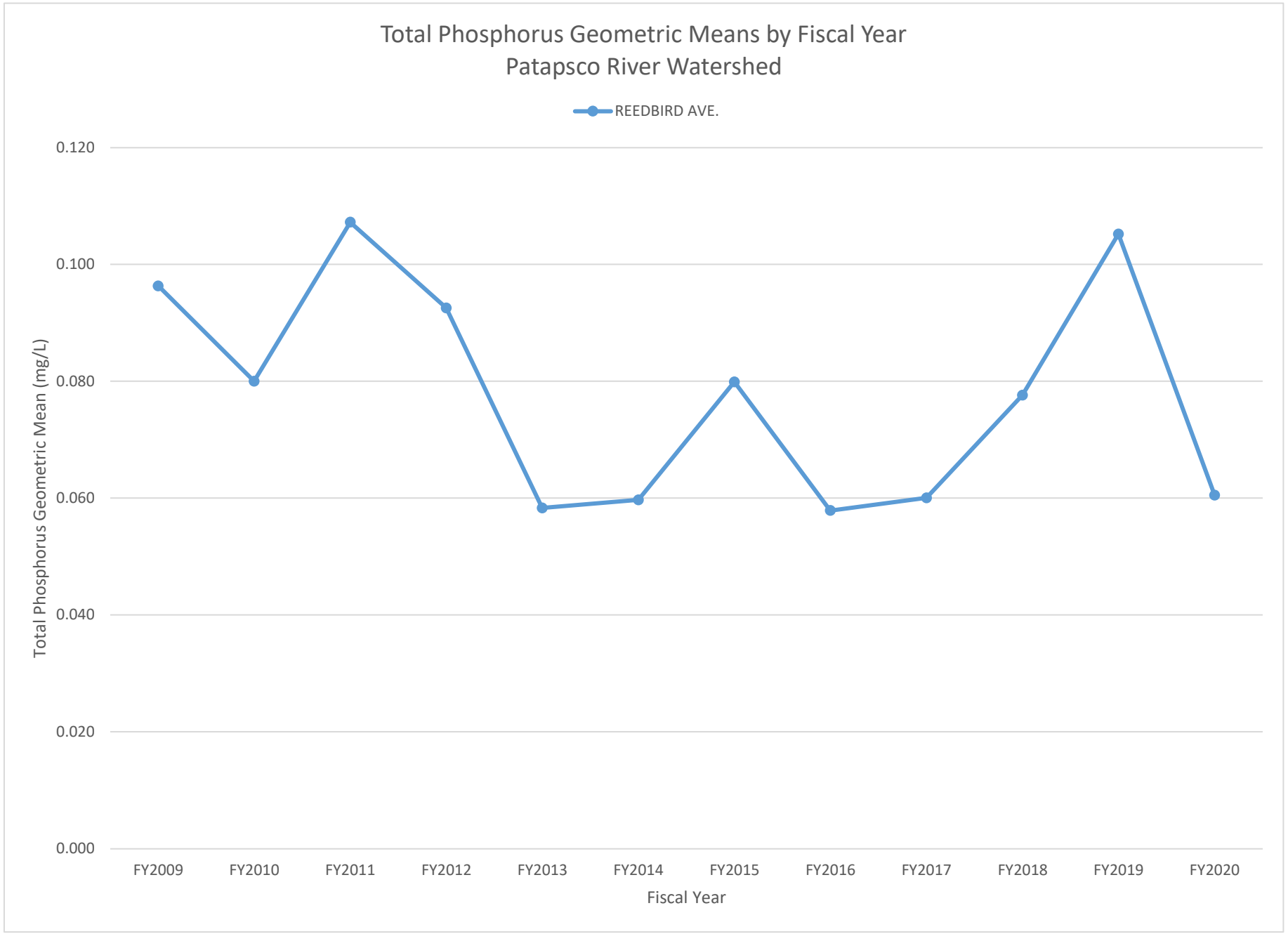

Total Phosphorus Geometric Means by Fiscal Year
Back River Watershed, Herring Run Subwatershed
PERRING PKWY
MT. PLEASANT GC
CHINQUAPIN RUN
TIFFANY RUN
HARFORD RD.
WRIGHT AVE.
PULASKI HWY.
0.250
0.200
0.150
0.100
0.050
0.000
Total Phosphorus Geometric Mean (mg/L)
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

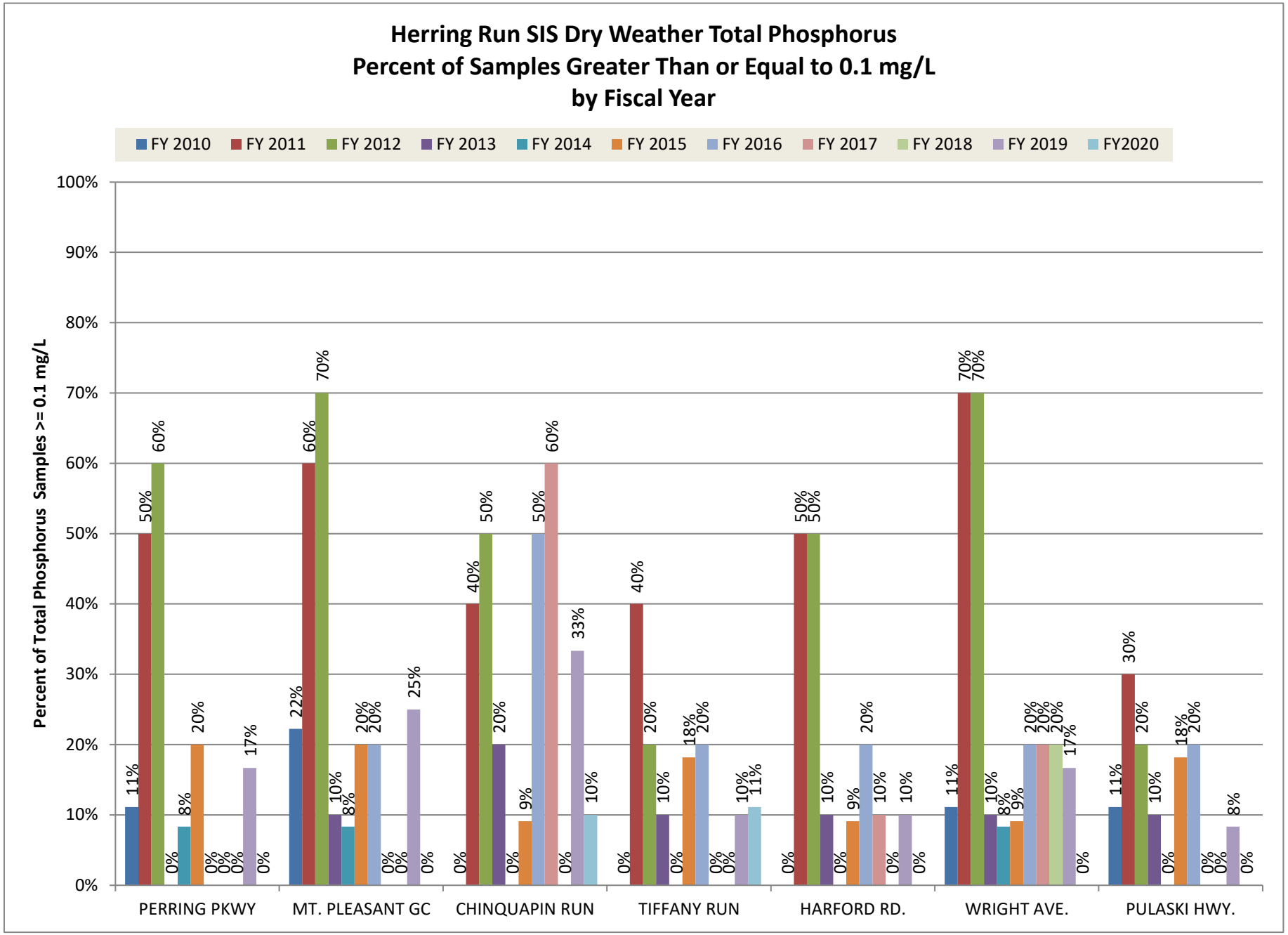

Total Phosphorus Geometric Means by Fiscal Year
Back River Watershed, Moores Run Subwatershed
MARY AVE.
HAMILTON AVE.
RADECKE AVE.
BIDDLE ST. & 62ND ST.
0.250
0.200
0.150
0.100
0.050
0.000
Total Phosphorus Geometric Mean (mg/L)
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

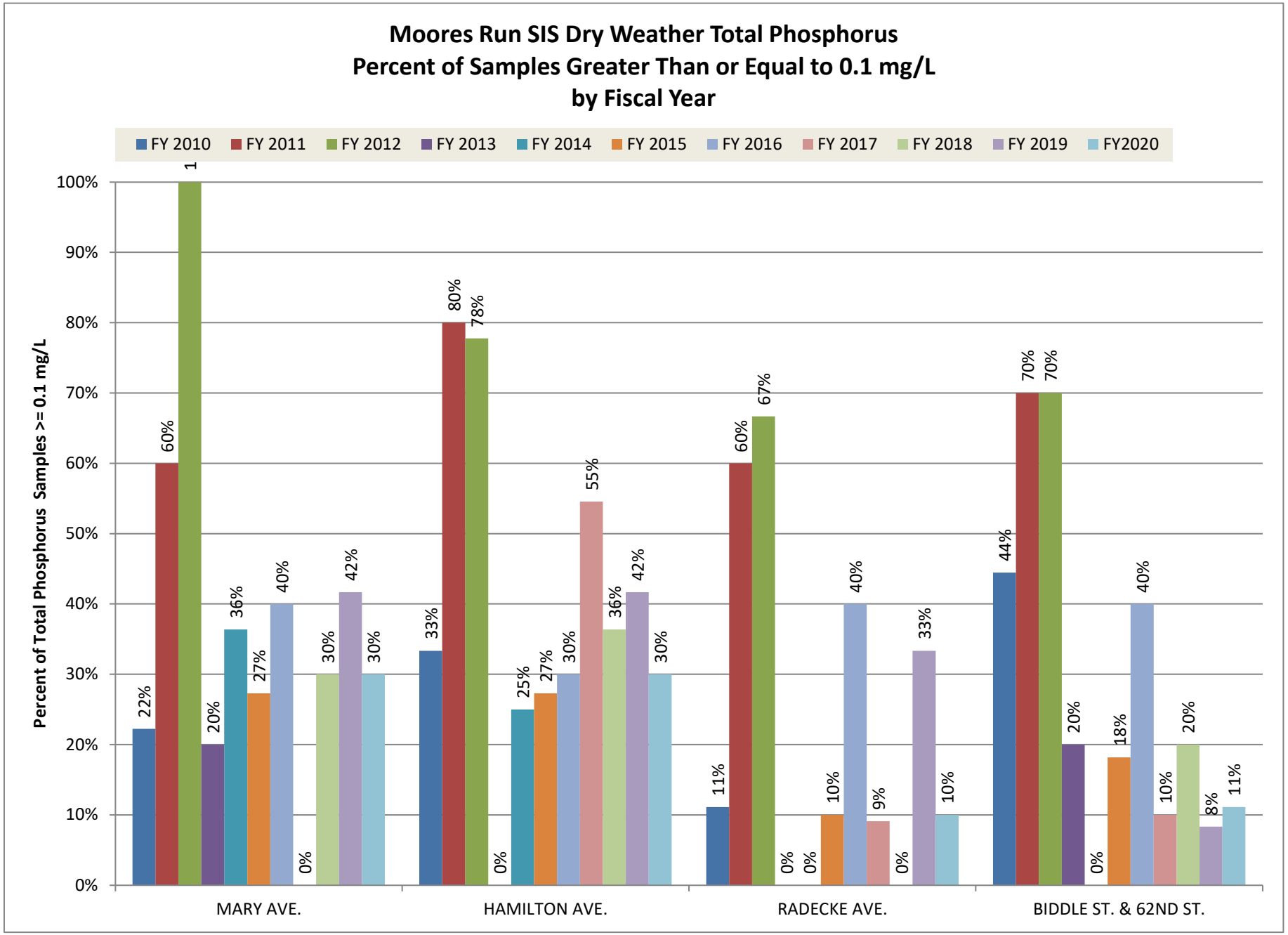

Total Phosphorus Geometric Means by Fiscal Year
Jones Falls Watershed
SMITH AVE.
WESTERN RUN
STONY RUN
JF 11.5
LOMBARD ST.
0.250
0.200
0.150
0.100
0.050
0.000
Total Phosphorus Geometric Mean (mg/L)
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

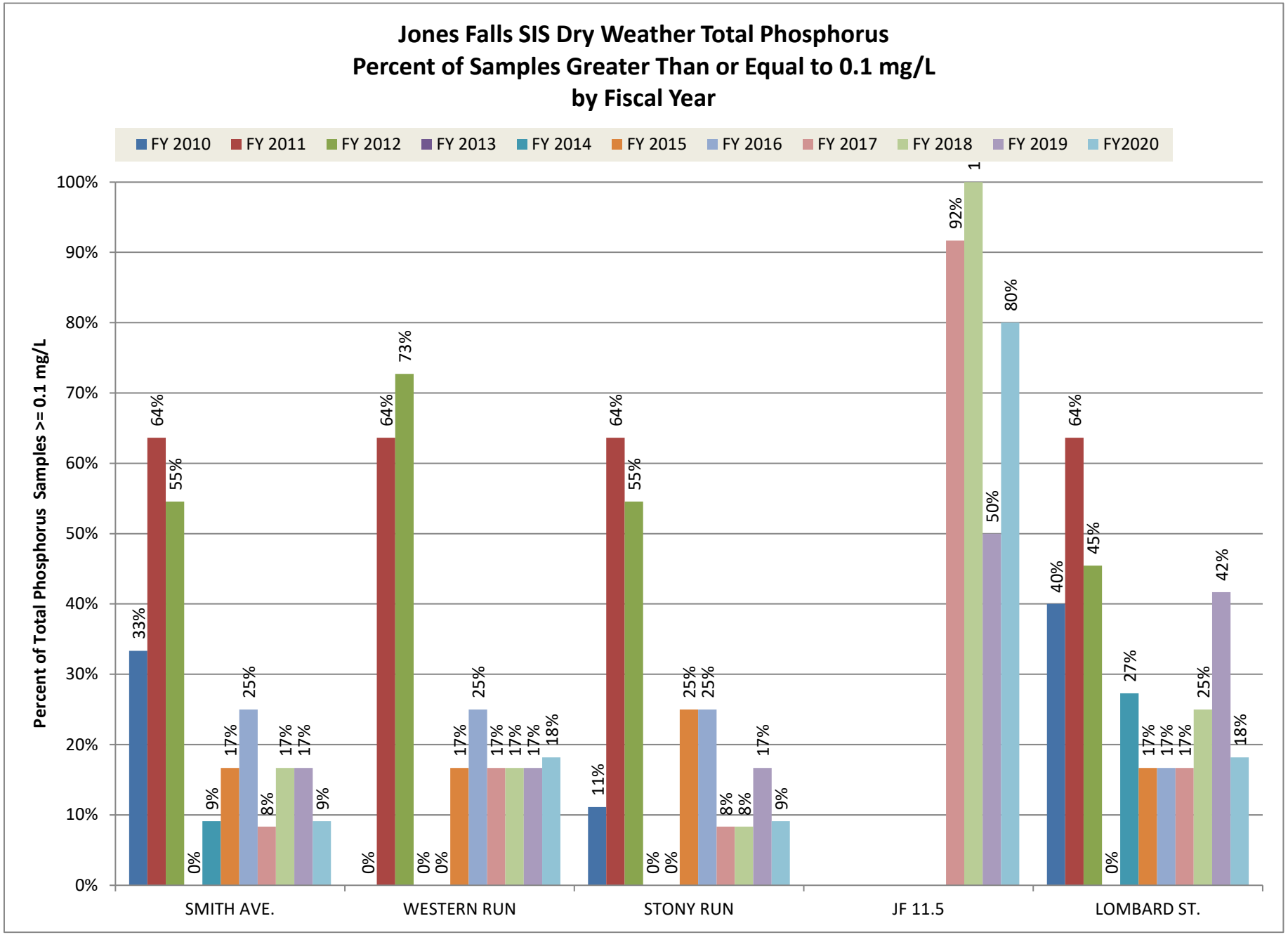

Total Phosphorus Geometric Means by Fiscal Year
Gwynns Falls Watershed
POWDER MILL
PURNELL DR.
DEAD RUN DNST.
GWYNNS FALLS PKWY.
GRUN HILTON ST.
GF HILTON ST.
MAIDENS CHOICE
GRUN CARROLL PARK
WASHINGTON BLVD.
0.250
0.200
0.150
0.100
0.050
0.000
Total Phosphorus Geometric Mean (mg/L)
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

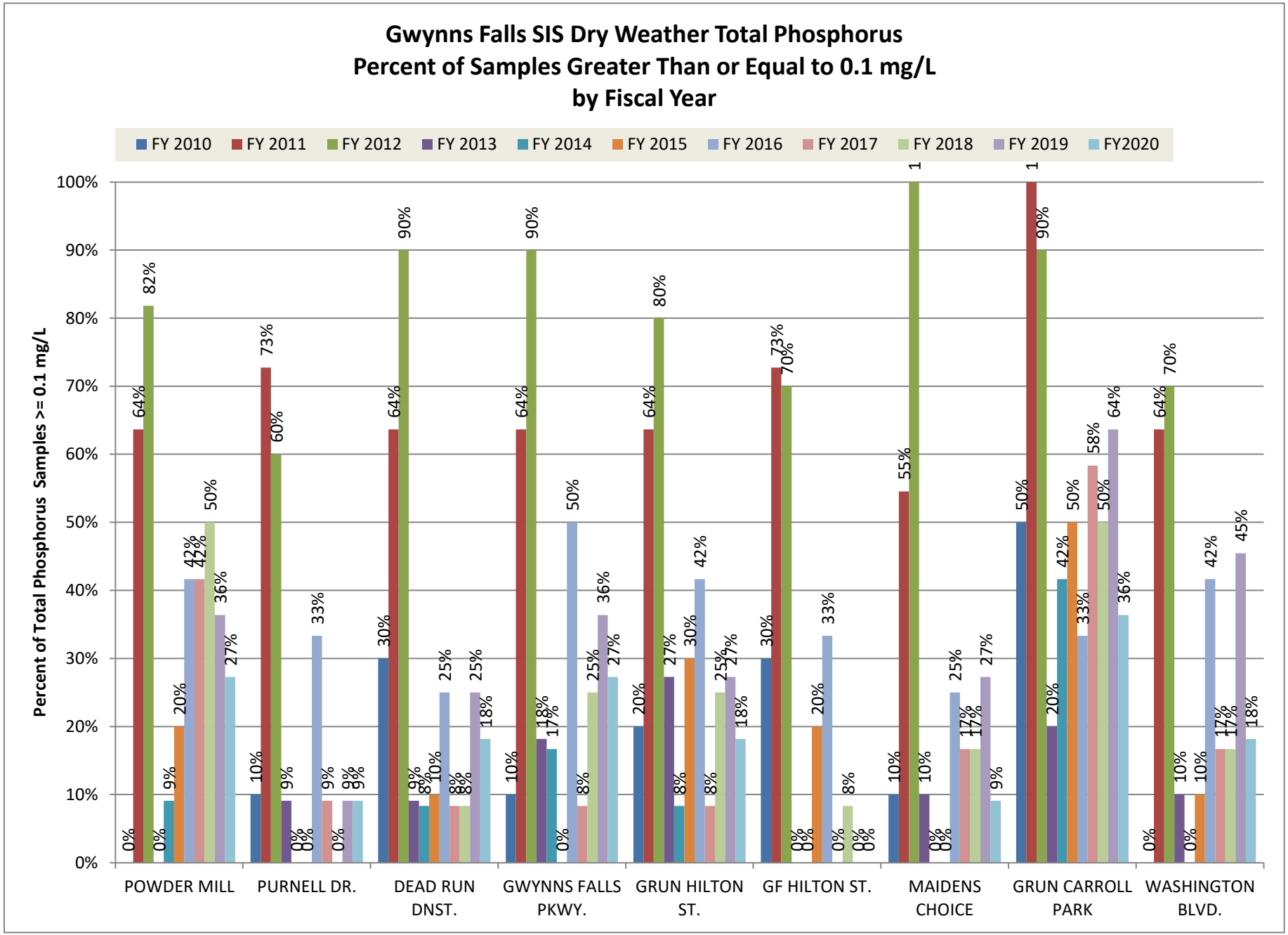

Total Phosphorus Geometric Means by Fiscal Year
Direct Harbor Watershed
LINWOOD & ELLIOTT
LAKEWOOD & HUDSON
CENTRAL & LANCASTER
LIGHT ST.
WARNER & ALLUVION
WATERVIEW AVE.
JANEY RUN
0.250
0.200
0.150
0.100
0.050
0.000
Total Phosphorus Geometric Mean (mg/L)
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

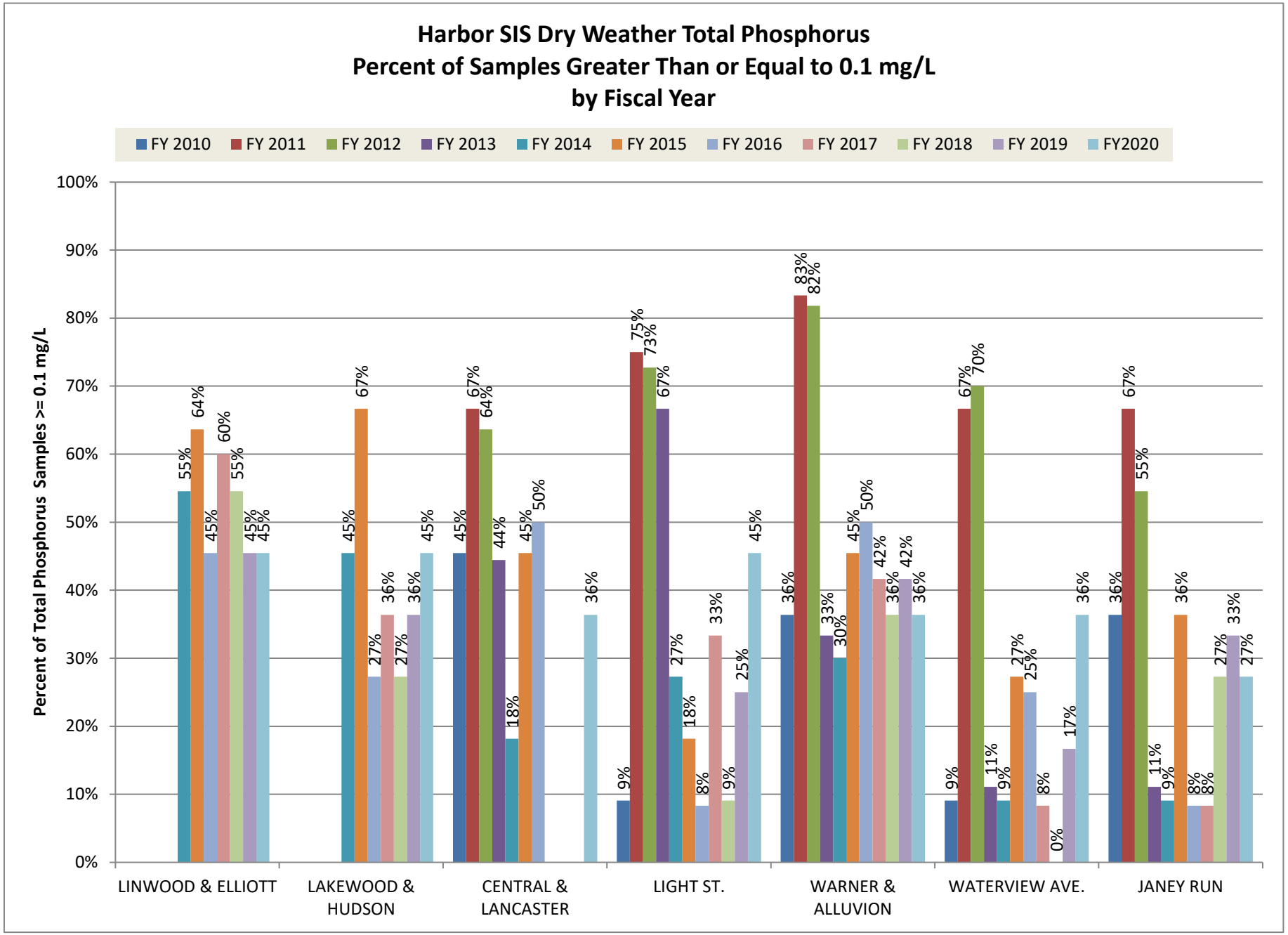

Total Phosphorus Geometric Means by Fiscal Year
Patapsco River Watershed
REEDBIRD AVE.
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Total Phosphorus Geometric Mean (mg/L)
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

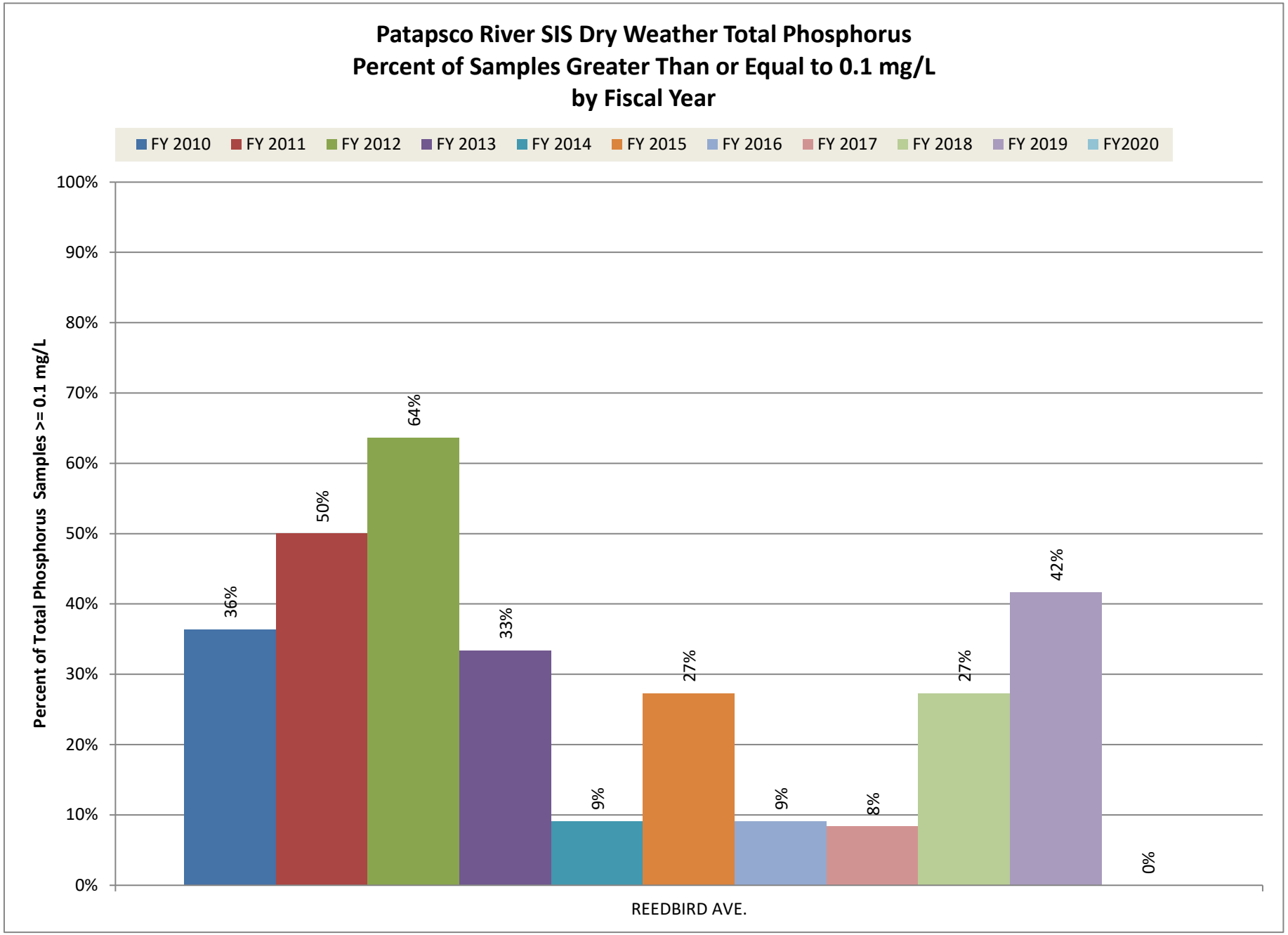

Herring Run SIS Dry Weather Total Phosphorus
Percent of Samples Greater Than or Equal to 0.1 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY2020
Percent of Total Phosphorus Samples >= 0.1 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PERRING PKWY
MT. PLEASANT GC
CHINQUAPIN RUN
TIFFANY RUN
HARFORD RD.
WRIGHT AVE.
PULASKI HWY.


Moores Run SIS Dry Weather Total Phosphorus
Percent of Samples Greater Than or Equal to 0.1 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY2020
Percent of Total Phosphorus Samples >= 0.1 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
22%
60%
1
20%
36%
27%
40%
0%
30%
42%
30%
33%
80%
78%
0%
25%
27%
30%
55%
36%
42%
30%
11%
60%
67%
0%
0%
10%
40%
9%
0%
33%
10%
44%
70%
70%
20%
0%
18%
40%
10%
20%
8%
11%
MARY AVE.
HAMILTON AVE.
RADECKE AVE.
BIDDLE ST. & 62ND ST.

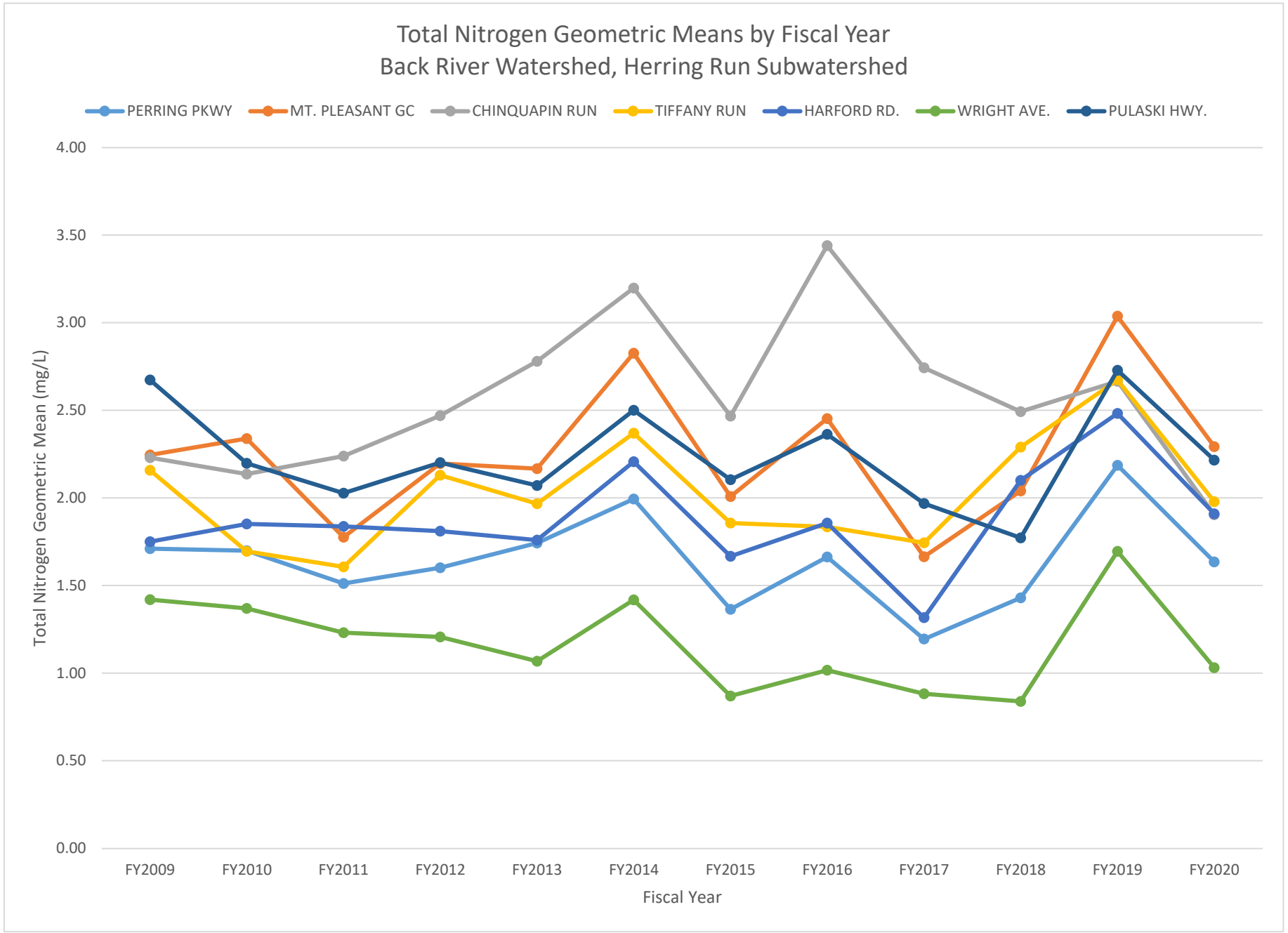

Jones Falls SIS Dry Weather Total Phosphorus
Percent of Samples Greater Than or Equal to 0.1 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY2020
Percent of Total Phosphorus Samples >= 0.1 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
SMITH AVE.
WESTERN RUN
STONY RUN
JF 11.5
LOMBARD ST.
33%
64%
55%
0%
9%
17%
25%
8%
17%
17%
9%
0%
64%
73%
0%
0%
17%
25%
17%
17%
17%
18%
11%
64%
55%
0%
0%
25%
25%
8%
8%
17%
9%
92%
1
50%
80%
40%
64%
45%
0%
27%
17%
17%
17%
25%
42%
18%

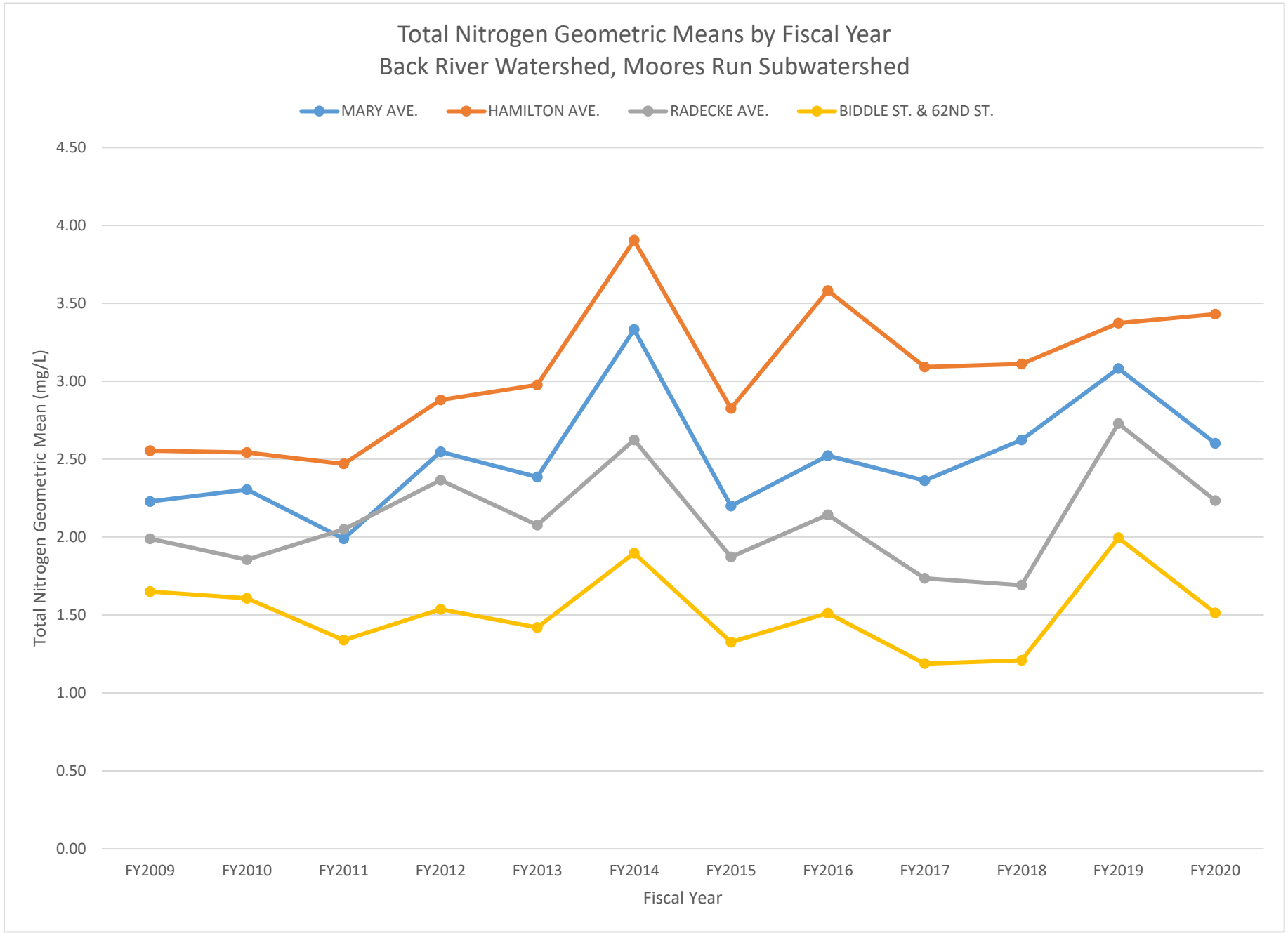

Gwynns Falls SIS Dry Weather Total Phosphorus
Percent of Samples Greater Than or Equal to 0.1 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY2020
Percent of Total Phosphorus Samples >= 0.1 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
POWDER MILL
PURNELL DR.
DEAD RUN DNST.
GWYNNS FALLS PKWY.
GRUN HILTON ST.
GF HILTON ST.
MAIDENS CHOICE
GRUN CARROLL PARK
WASHINGTON BLVD.

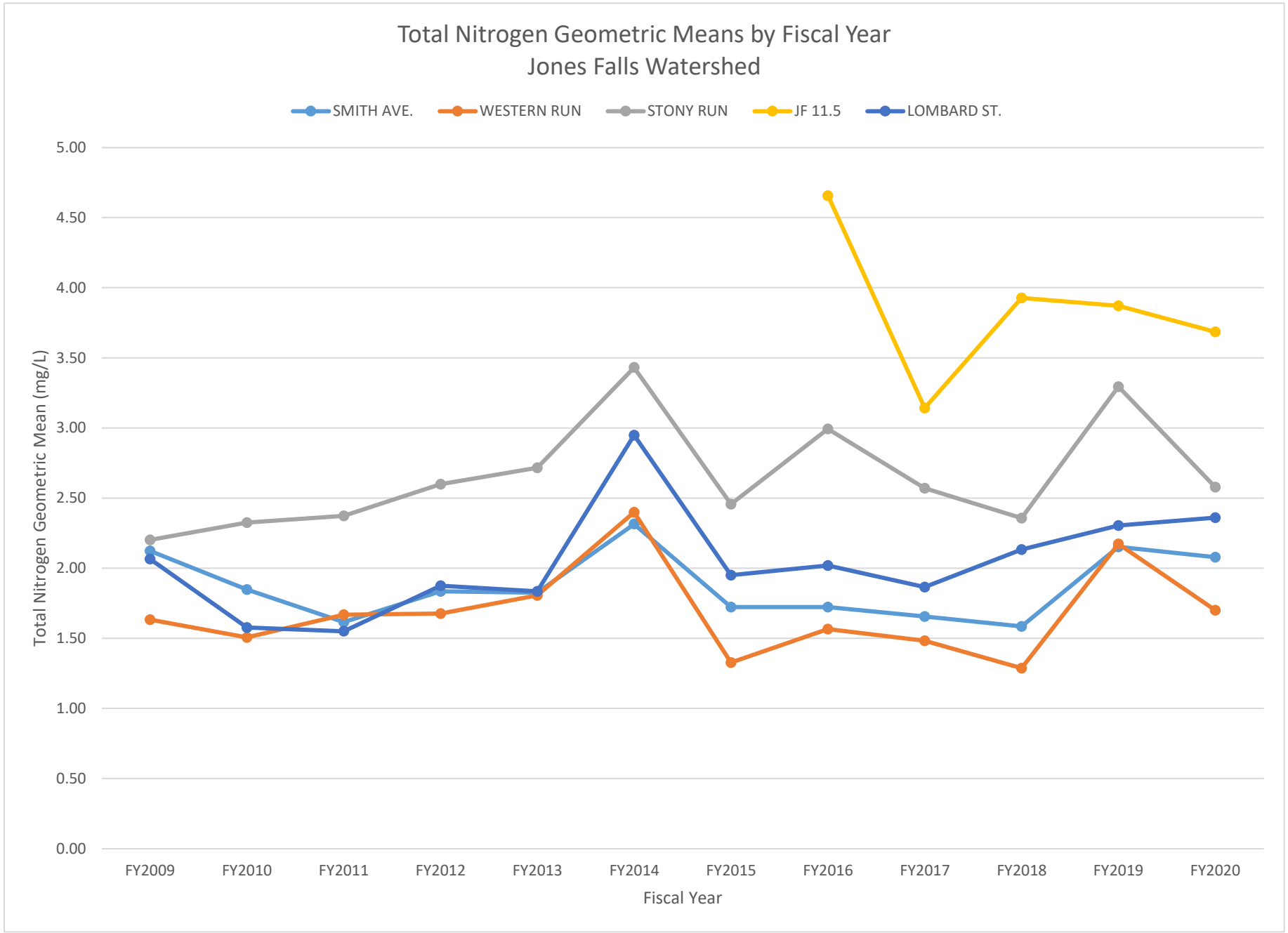

Harbor SIS Dry Weather Total Phosphorus
Percent of Samples Greater Than or Equal to 0.1 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY2020
Percent of Total Phosphorus Samples >= 0.1 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
LINWOOD & ELLIOTT
LAKEWOOD & HUDSON
CENTRAL & LANCASTER
LIGHT ST.
WARNER & ALLUVION
WATERVIEW AVE.
JANEY RUN

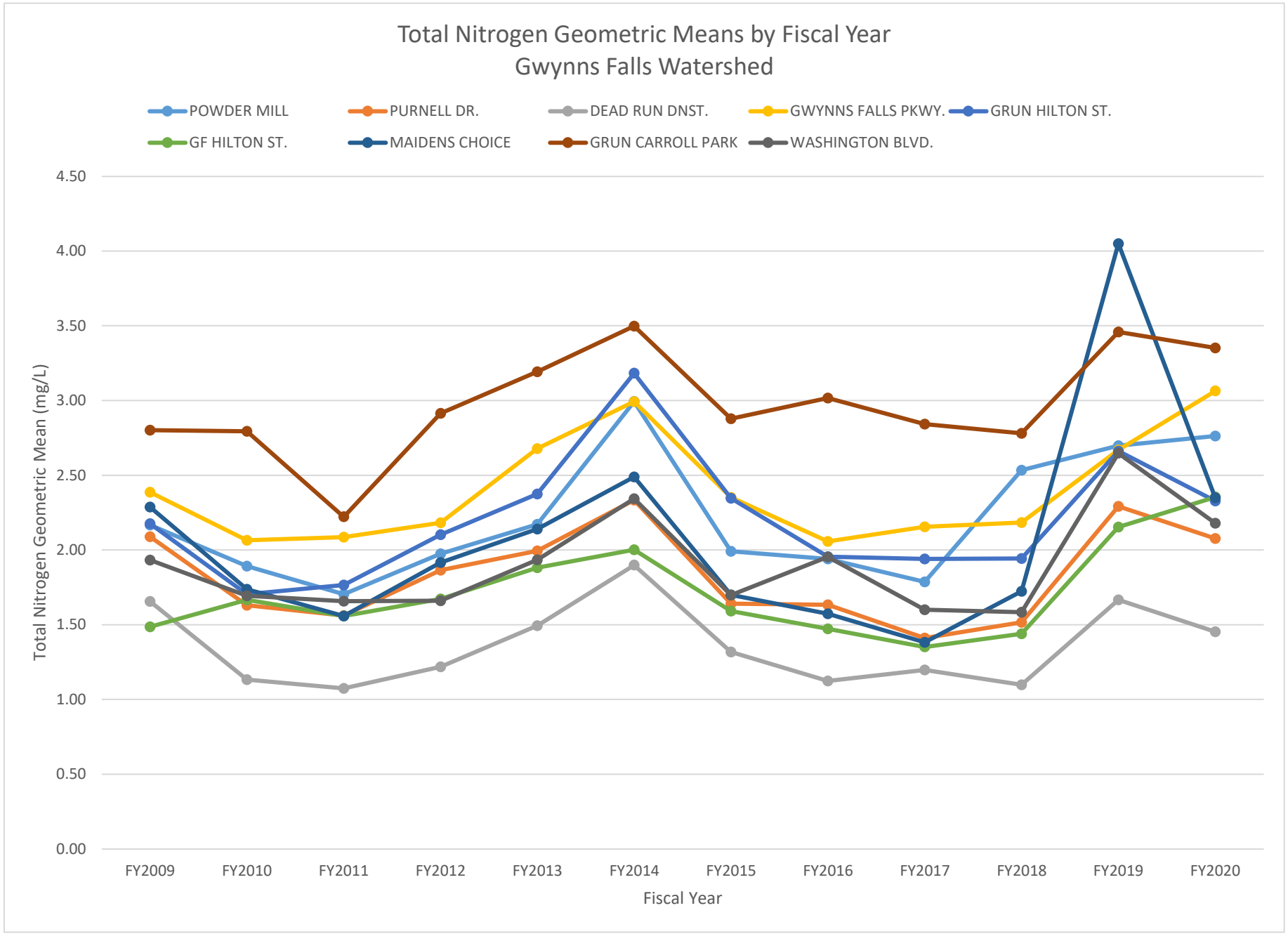

Patapsco River SIS Dry Weather Total Phosphorus
Percent of Samples Greater Than or Equal to 0.1 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY2020
Percent of Total Phosphorus Samples >= 0.1 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
36%
50%
64%
33%
9%
27%
9%
8%
27%
42%
0%
REEDBIRD AVE.

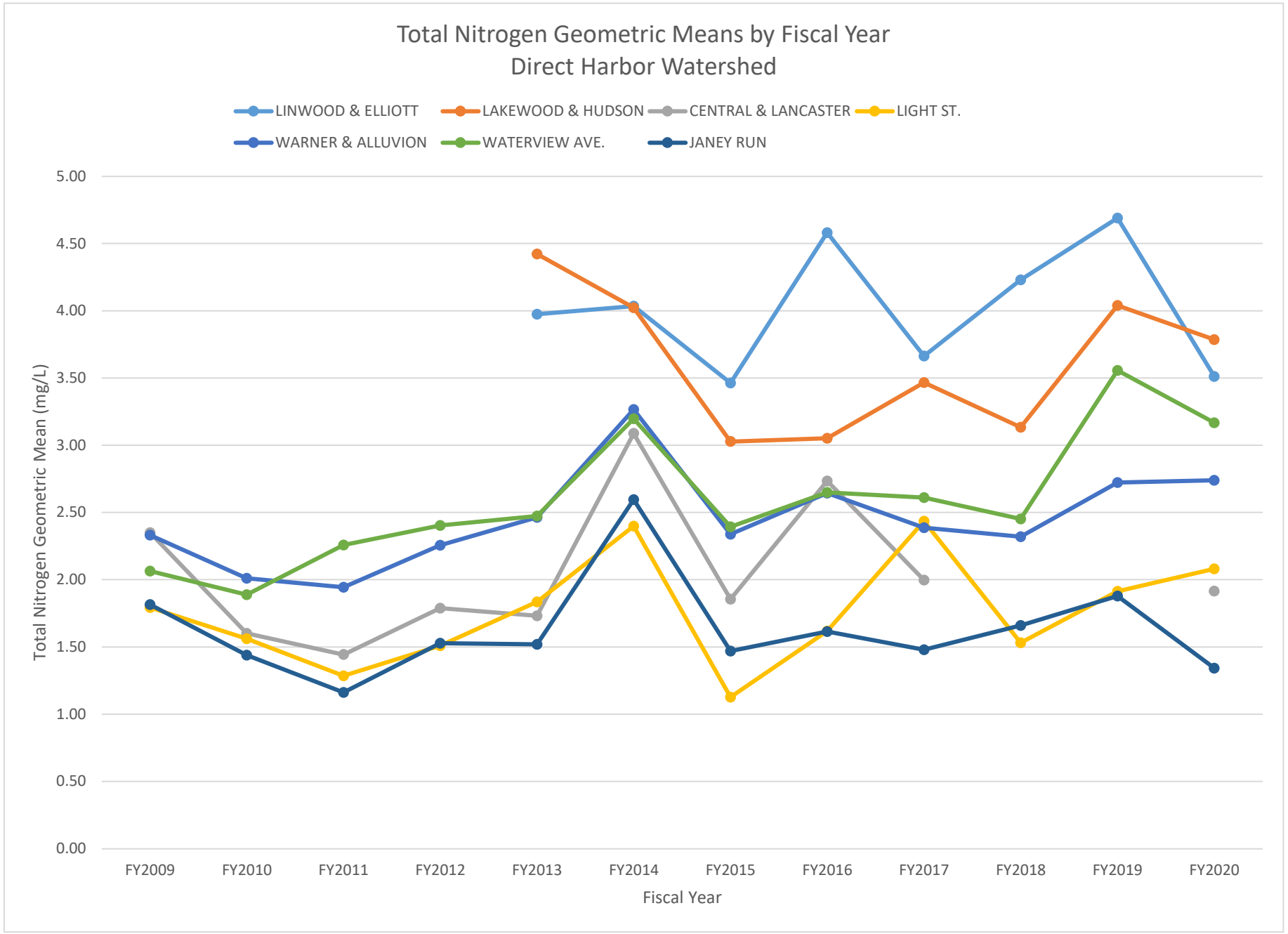
Appendix F: Total Nitrogen Monitoring Histographs

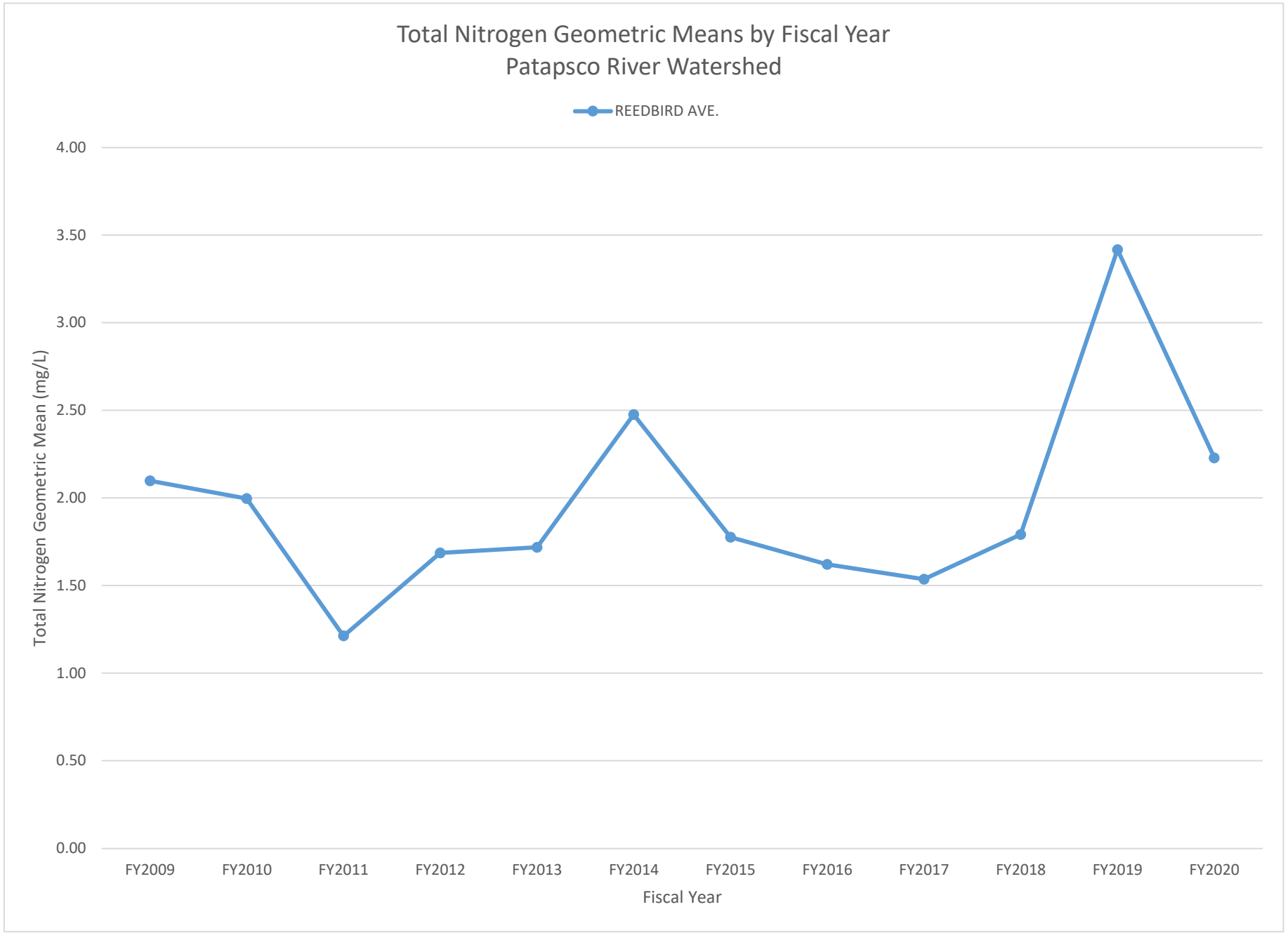

Total Nitrogen Geometric Means by Fiscal Year
Back River Watershed, Herring Run Subwatershed
PERRING PKWY
MT. PLEASANT GC
CHINQUAPIN RUN
TIFFANY RUN
HARFORD RD.
WRIGHT AVE.
PULASKI HWY.
Total Nitrogen Geometric Mean (mg/L)
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

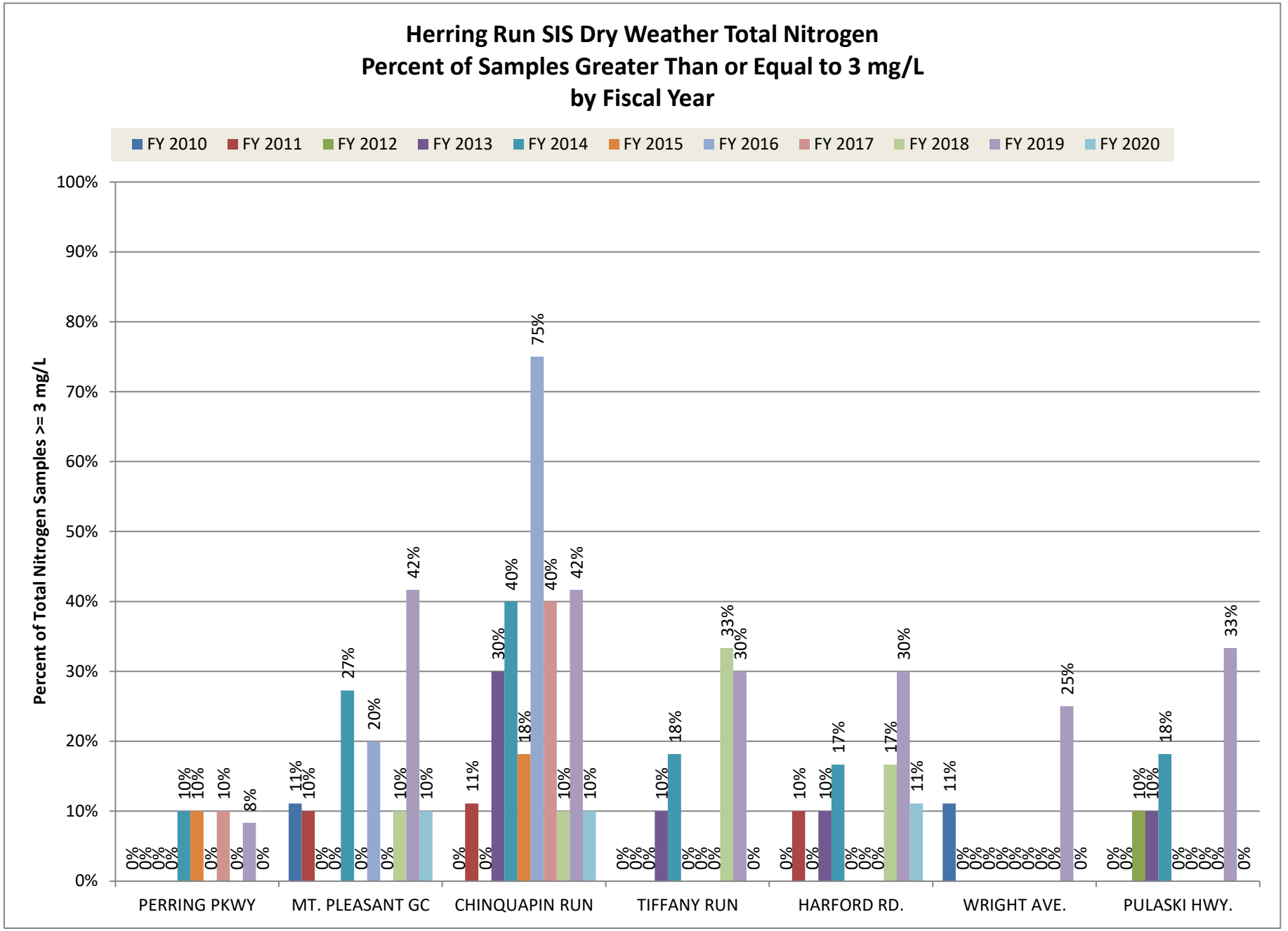

Total Nitrogen Geometric Means by Fiscal Year
Back River Watershed, Moores Run Subwatershed
MARY AVE.
HAMILTON AVE.
RADECKE AVE.
BIDDLE ST. & 62ND ST.
Total Nitrogen Geometric Mean (mg/L)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

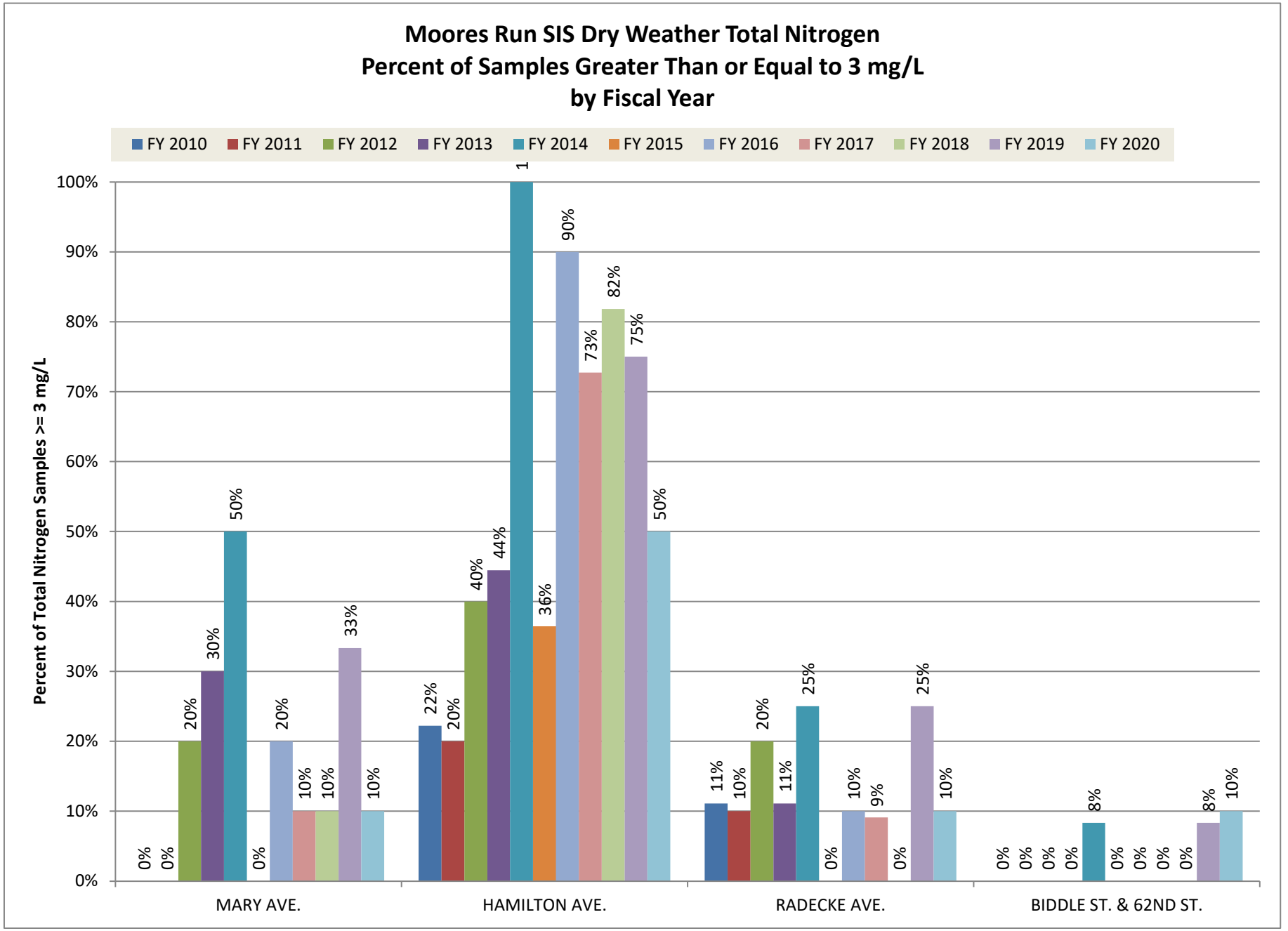

Total Nitrogen Geometric Means by Fiscal Year
Jones Falls Watershed
SMITH AVE.
WESTERN RUN
STONY RUN
JF 11.5
LOMBARD ST.
Total Nitrogen Geometric Mean (mg/L)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

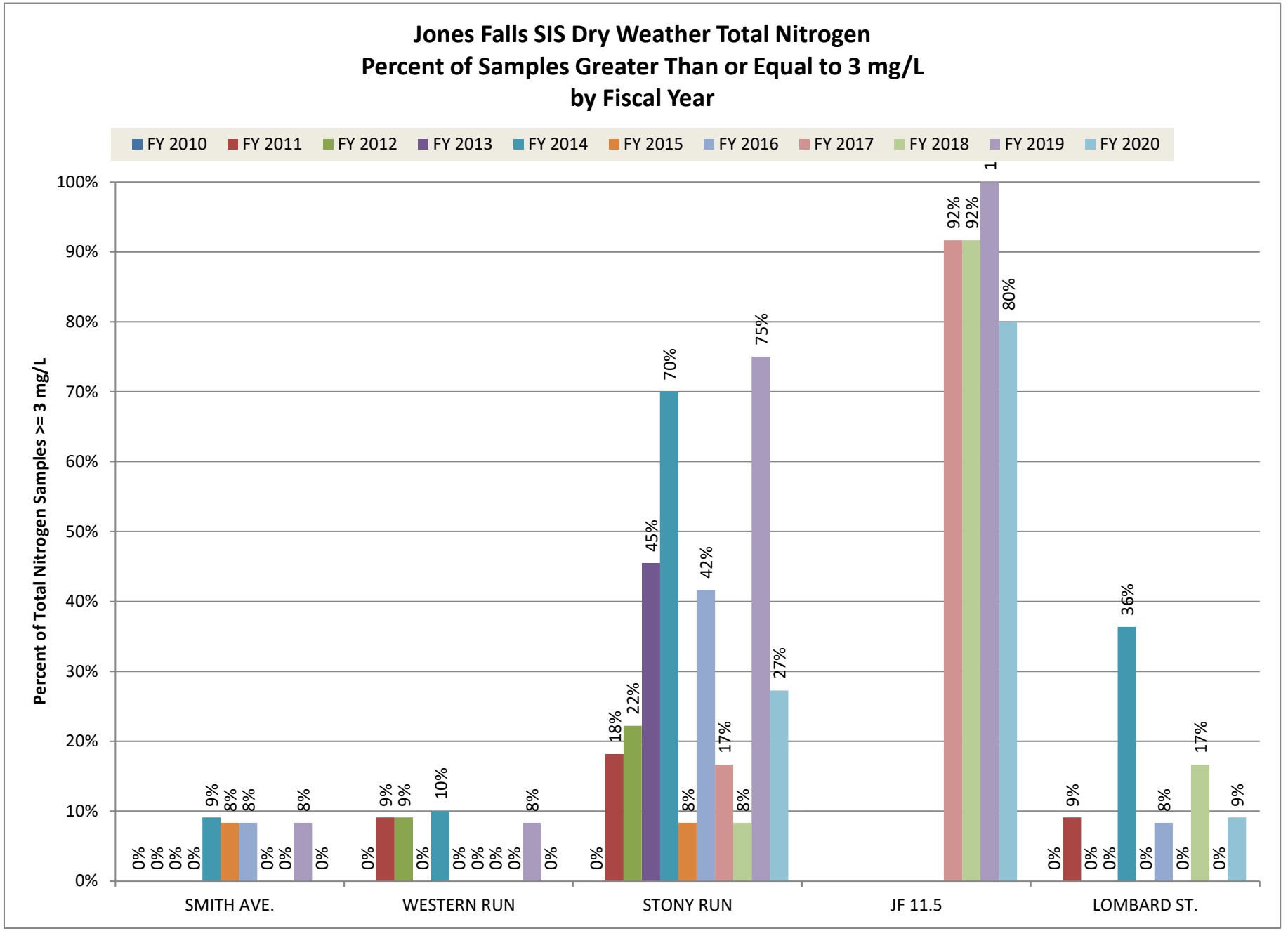

Total Nitrogen Geometric Means by Fiscal Year
Gwynns Falls Watershed
POWDER MILL
PURNELL DR.
DEAD RUN DNST.
GWYNNS FALLS PKWY.
GRUN HILTON ST.
GF HILTON ST.
MAIDENS CHOICE
GRUN CARROLL PARK
WASHINGTON BLVD.
Total Nitrogen Geometric Mean (mg/L)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

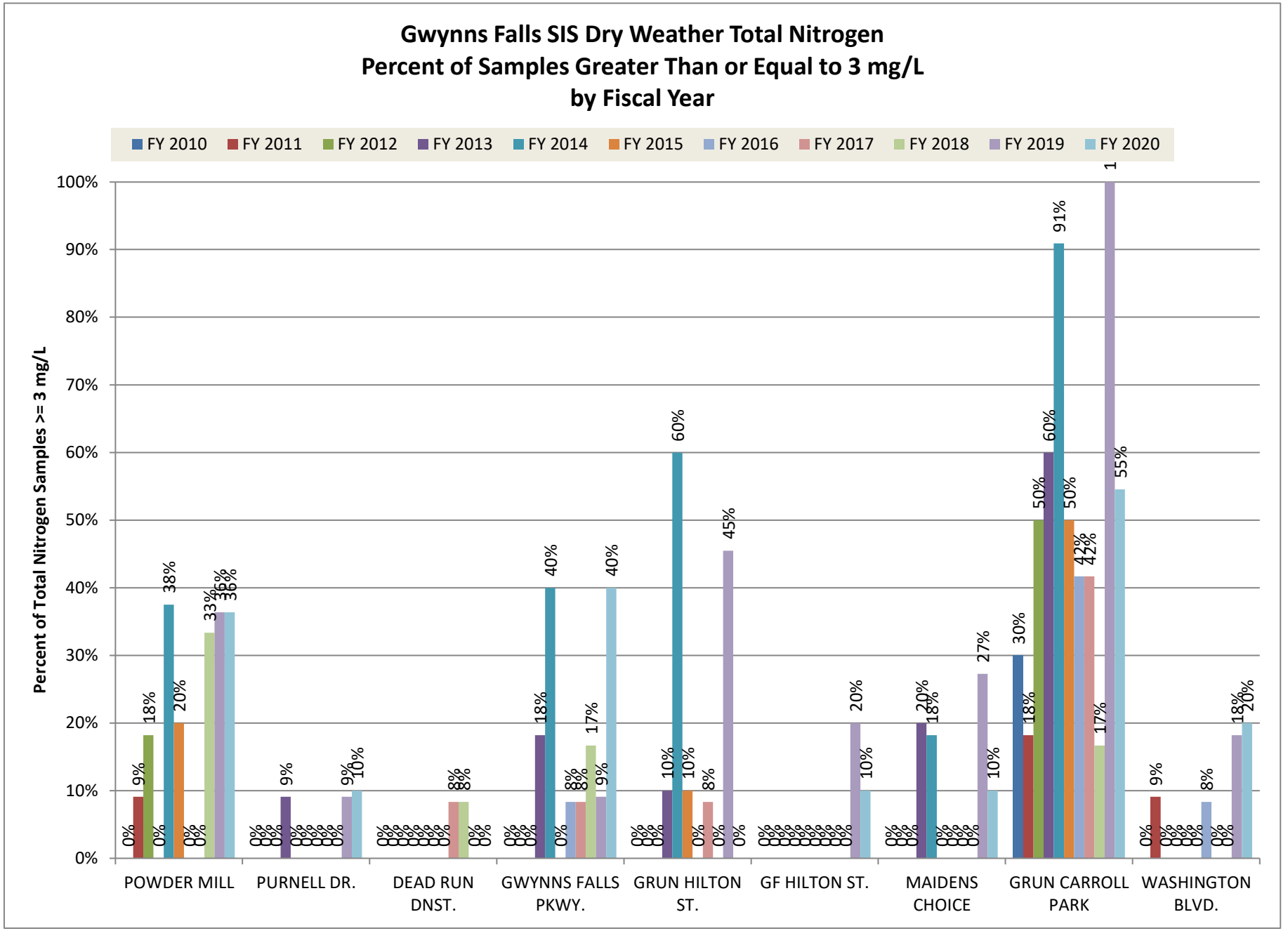

Total Nitrogen Geometric Means by Fiscal Year
Direct Harbor Watershed
LINWOOD & ELLIOTT
LAKEWOOD & HUDSON
CENTRAL & LANCASTER
LIGHT ST.
WARNER & ALLUVION
WATERVIEW AVE.
JANEY RUN
Total Nitrogen Geometric Mean (mg/L)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

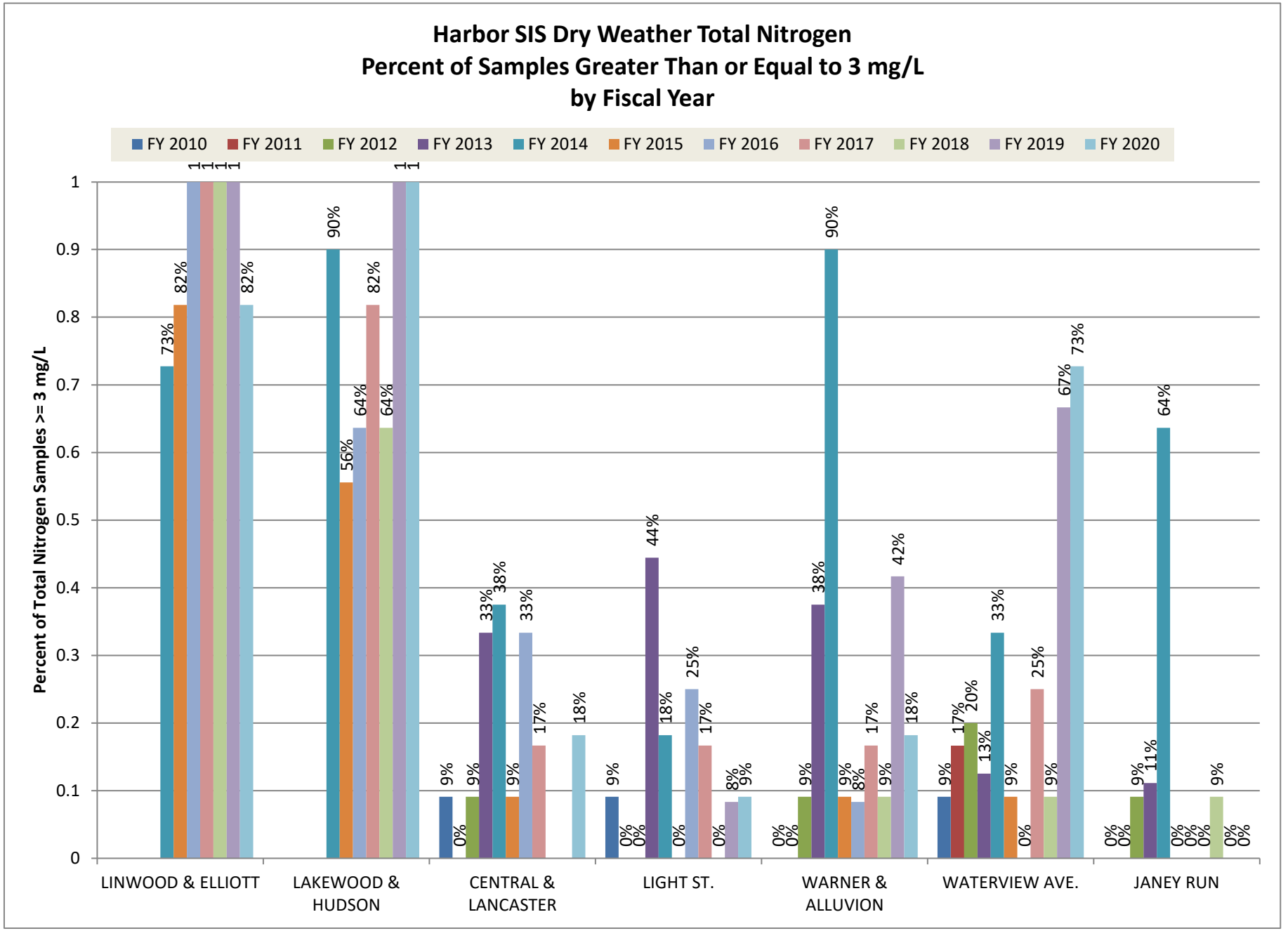

Total Nitrogen Geometric Means by Fiscal Year
Patapsco River Watershed
REEDBIRD AVE.
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Total Nitrogen Geometric Mean (mg/L)
FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
FY2015
FY2016
FY2017
FY2018
FY2019
FY2020
Fiscal Year

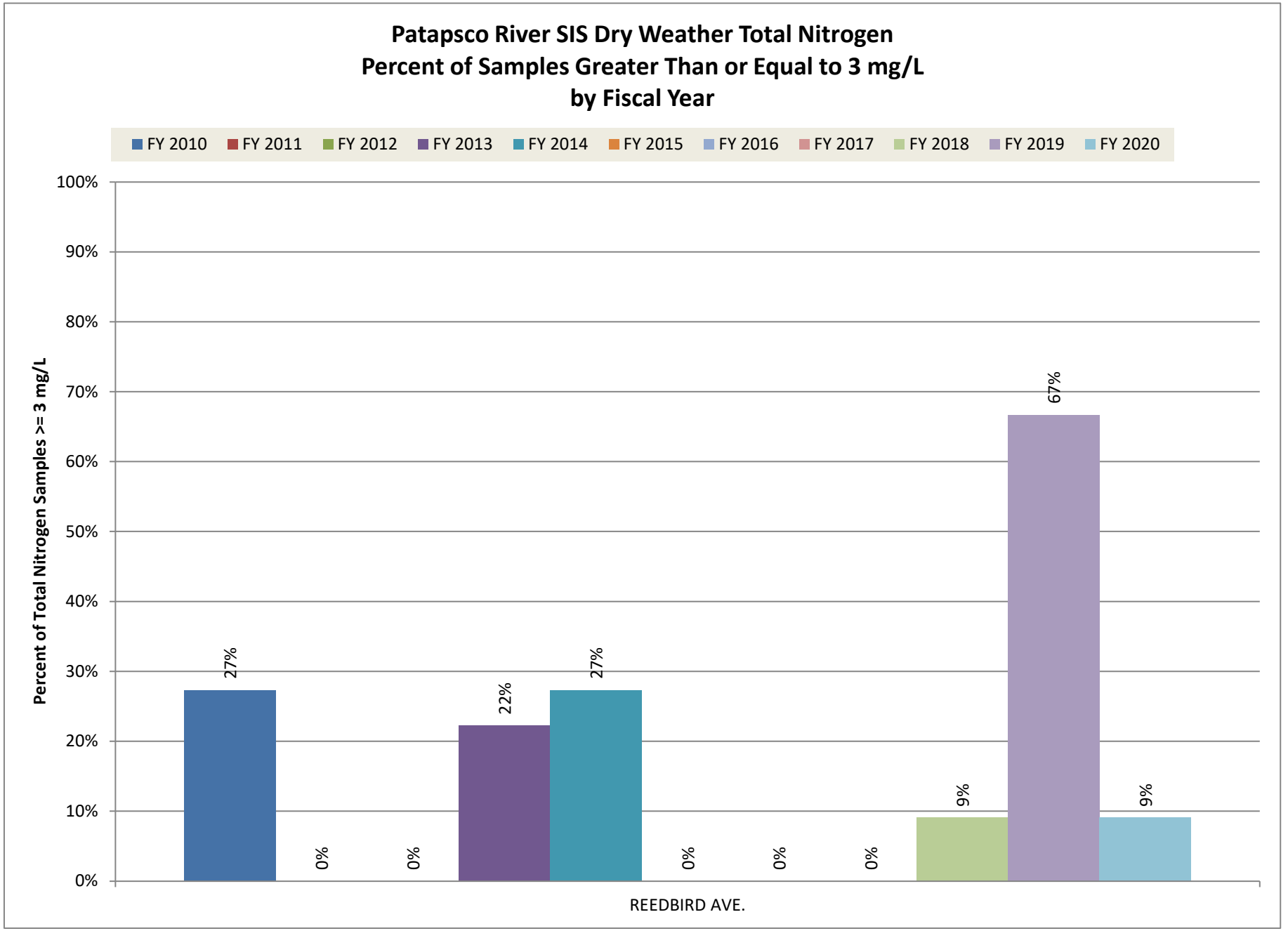

Herring Run SIS Dry Weather Total Nitrogen
Percent of Samples Greater Than or Equal to 3 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY 2020
Percent of Total Nitrogen Samples >= 3 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PERRING PKWY
MT. PLEASANT GC
CHINQUAPIN RUN
TIFFANY RUN
HARFORD RD.
WRIGHT AVE.
PULASKI HWY.


Moores Run SIS Dry Weather Total Nitrogen
Percent of Samples Greater Than or Equal to 3 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY 2020
Percent of Total Nitrogen Samples >= 3 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0% 0% 20% 30% 50% 0% 20% 10% 10% 33% 10%
22% 20% 40% 44% 1 36% 90% 73% 82% 75% 50%
11% 10% 20% 11% 25% 0% 10% 9% 0% 25% 10%
0% 0% 0% 0% 8% 0% 0% 0% 0% 8% 10%
MARY AVE.
HAMILTON AVE.
RADECKE AVE.
BIDDLE ST. & 62ND ST.


Jones Falls SIS Dry Weather Total Nitrogen
Percent of Samples Greater Than or Equal to 3 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY 2020
Percent of Total Nitrogen Samples >= 3 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
SMITH AVE.
WESTERN RUN
STONY RUN
JF 11.5
LOMBARD ST.
0% 0% 0% 0% 9% 8% 8% 0% 0% 8% 0%
0% 9% 9% 0% 10% 0% 0% 0% 0% 8% 0%
0% 18% 22% 45% 70% 8% 42% 17% 8% 75% 27%
92% 92% 1 80%
0% 9% 0% 0% 36% 0% 8% 0% 17% 0% 9%


Gwynns Falls SIS Dry Weather Total Nitrogen
Percent of Samples Greater Than or Equal to 3 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY 2020
Percent of Total Nitrogen Samples >= 3 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
POWDER MILL
PURNELL DR.
DEAD RUN DNST.
GWYNNS FALLS PKWY.
GRUN HILTON ST.
GF HILTON ST.
MAIDENS CHOICE
GRUN CARROLL PARK
WASHINGTON BLVD.

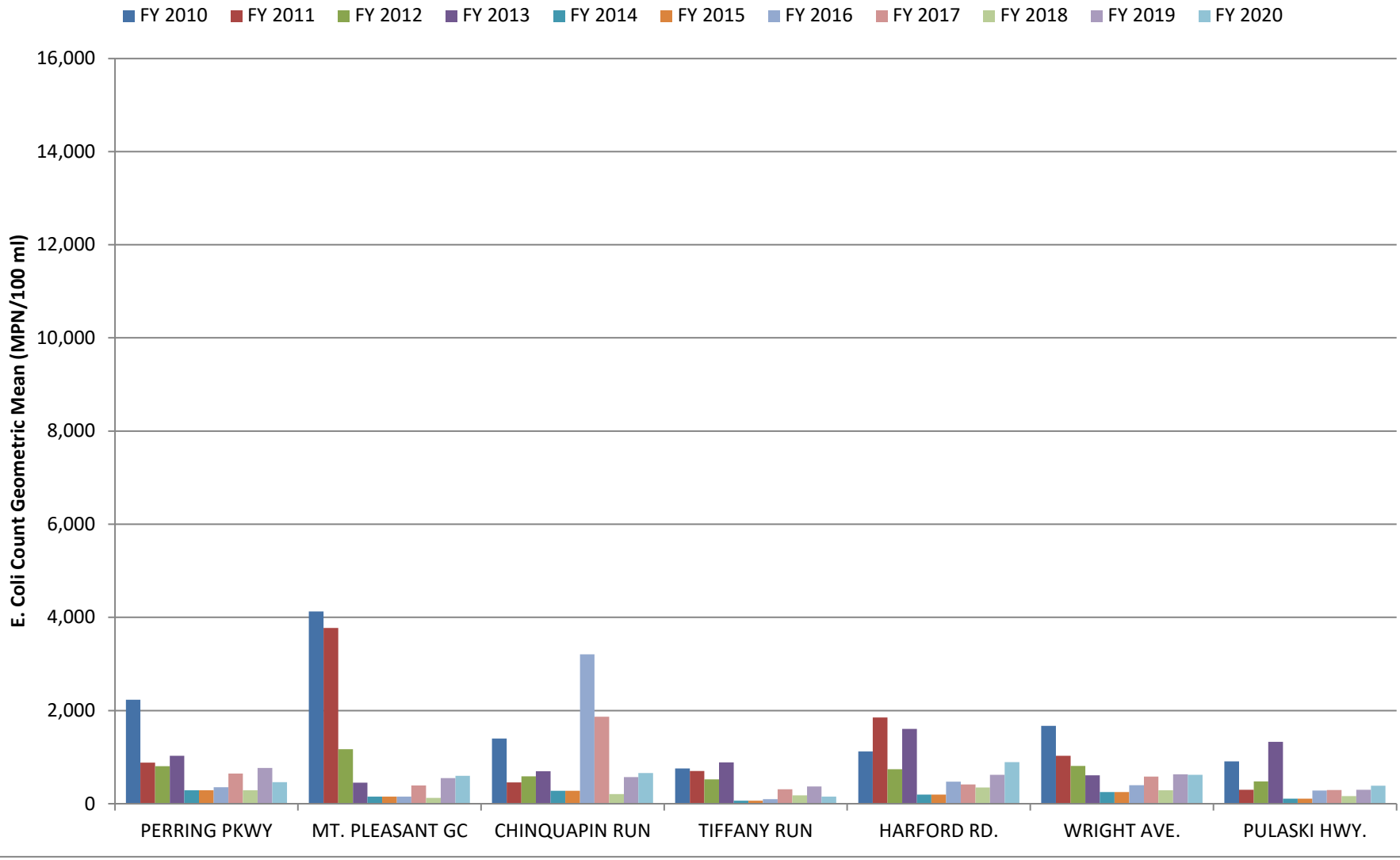

Harbor SIS Dry Weather Total Nitrogen
Percent of Samples Greater Than or Equal to 3 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY 2020
Percent of Total Nitrogen Samples >= 3 mg/L
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
LINWOOD & ELLIOTT
LAKEWOOD & HUDSON
CENTRAL & LANCASTER
LIGHT ST.
WARNER & ALLUVION
WATERVIEW AVE.
JANEY RUN


Patapsco River SIS Dry Weather Total Nitrogen
Percent of Samples Greater Than or Equal to 3 mg/L
by Fiscal Year
FY 2010
FY 2011
FY 2012
FY 2013
FY 2014
FY 2015
FY 2016
FY 2017
FY 2018
FY 2019
FY 2020
Percent of Total Nitrogen Samples >= 3 mg/L
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
27%
0%
0%
22%
27%
0%
0%
0%
9%
67%
9%
REEDBIRD AVE.

Appendix G: Bacteria Monitoring Histographs

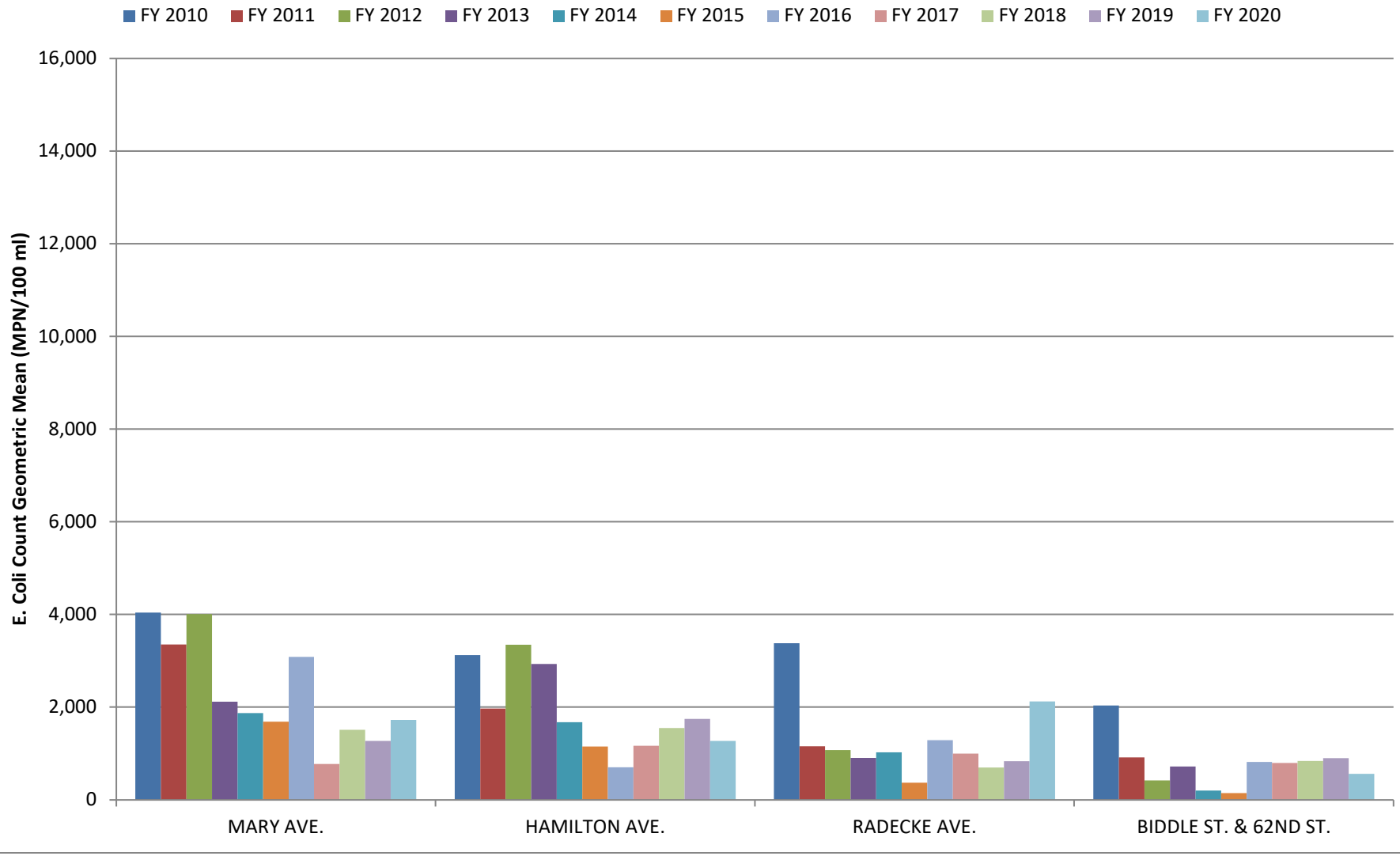
Back River- Herring Run SIS Dry Weather E. Coli MPN Count Geometric Means by Fiscal Year

Steady State Geometric Mean Indicator Density criteria is less than or equal to 126 MPN/100 ml for freshwaters (COMAR 26.08.02.03-3)



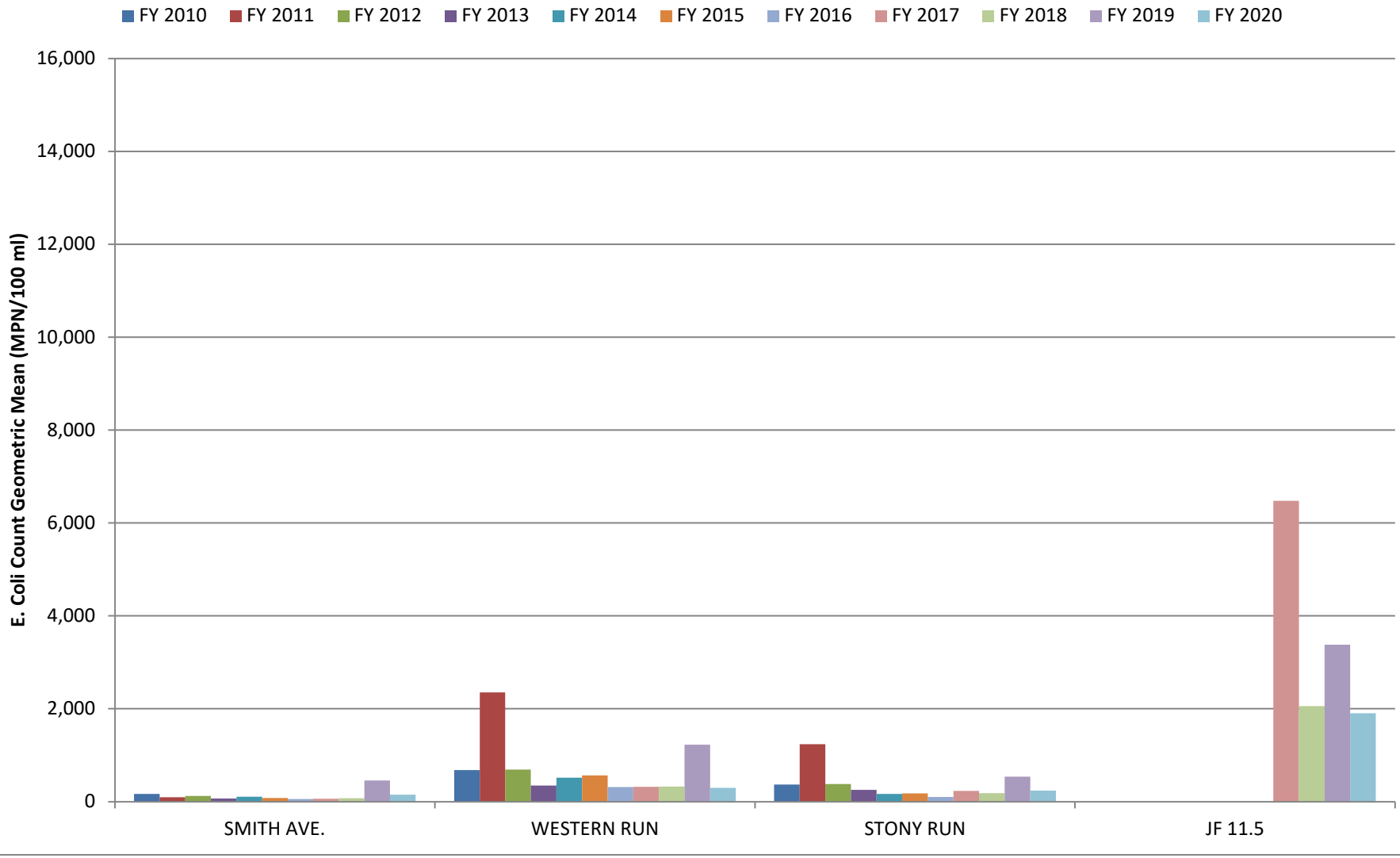
Back River - Moores Run SIS Dry Weather E. Coli MPN Count Geometric Means by Fiscal Year

Steady State Geometric Mean Indicator Density criteria is less than or equal to 126 MPN/100 ml for freshwaters (COMAR 26.08.02.03-3)



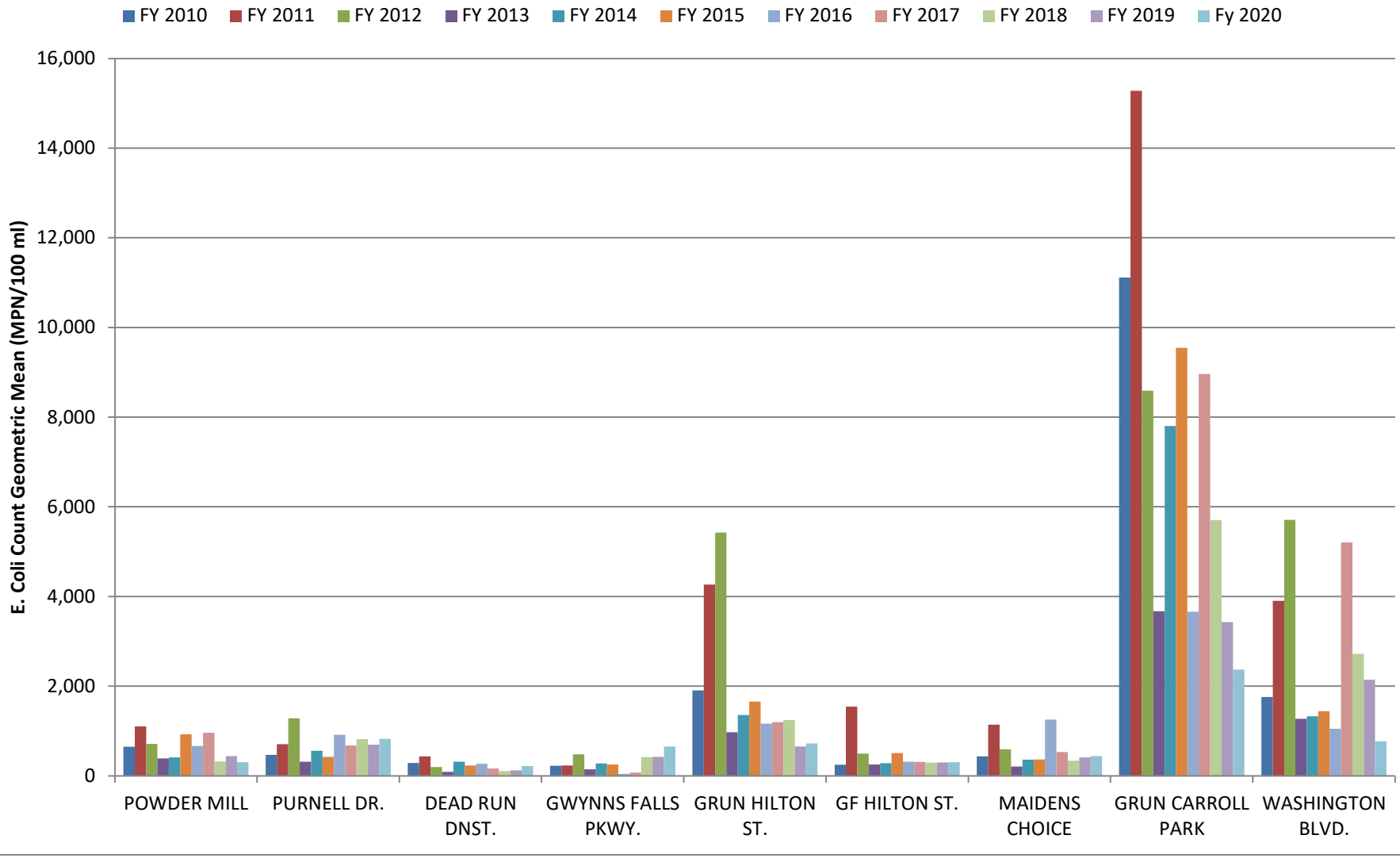
Jones Falls SIS Dry Weather E. Coli MPN Count
Geometric Means by Fiscal Year

Steady State Geometric Mean Indicator Density criteria is less than or equal to 126 MPN/100 ml for freshwaters (COMAR 26.08.02.03-3)



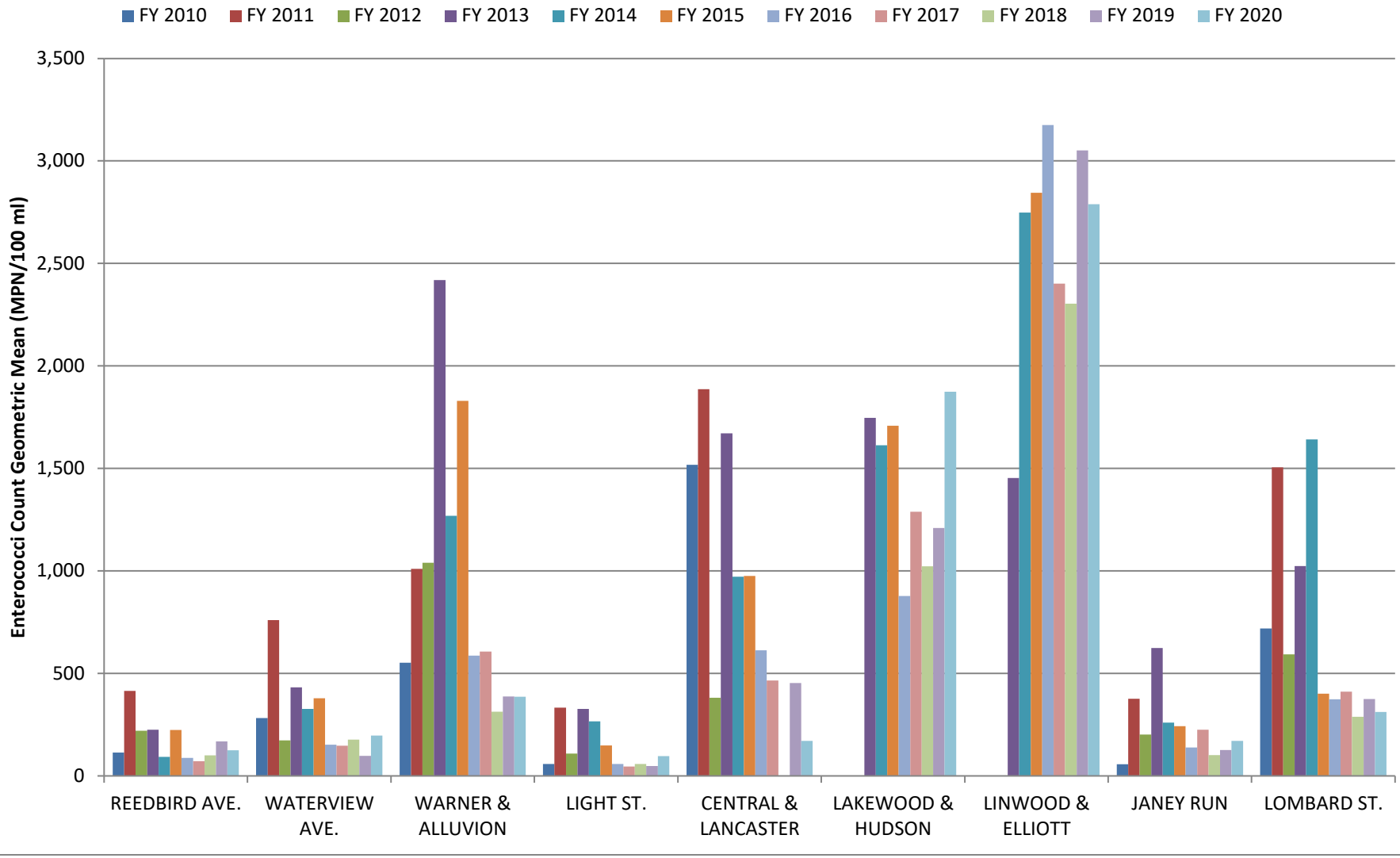
Gwynns Falls SIS Dry Weather E. Coli MPN Count Geometric Means by Fiscal Year

Steady State Geometric Mean Indicator Density criteria is less than or equal to 126 MPN/100 ml for freshwaters (COMAR 26.08.02.03-3)



Harbor SIS Dry Weather Enterococci MPN Count Geometric Means by Fiscal Year

Steady State Geometric Mean Indicator Density criteria is less than or equal to 35 MPN/100 ml for freshwaters (COMAR 26.08.02.03-3)



Appendix H: Watershed Protection and Restoration Program (WPRP) Annual Report

Watershed Protection and Restoration Program Annual Report Table

Article 4-202.1(i)(4): "The percentage and amount of funds in the local watershed protection and restoration fund spent on each of the purposes provided in subsection (h)(4) of this section;"

Program Element		Cost	Percent of WPRF
Capital Improvements for Stormwater Management	$	7,932,898	32.99%
O & M of SWM Systems and Facilities	$	11,843,589	49.25%
Public Education and Outreach	$	420,951	1.75%
Stormwater Management Planning (see Md. Environment Code Ann. § 4-202.1(h)(4)(iv))	$	722,975	3.01%
Review of Stormwater Management Plans and Permit Applications for New Development	$	1,349,648	5.61%
Grants to Nonprofit Organizations	$	205,179	0.85%
Adminstration of WPRF	$	1,571,977	6.54%
	TOTAL	$24,047,217.00	100.00%

Number of Properties Subject to Fee	237,391
Reporting Year	2020
Permit Number	11-DP-3315
Comments:	Capital improvements of stormwater management includes payment of debt

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Jurisdiction	Agency	Local Ordinance Submitted to MDE	MDE Approval of Fee Reduction Policy	Fee Reduction Amount	Rate Structures								Additional Sources of Funds			Estimated Annual Revenue	Notes
					Annual Single Family Residential Rate	Annual Commercial Rate	Equivalent Residential Unit (ERU) impervious	Commercial Capped Rates	Non-profits, Religious Organizations	Exemptions	Federal Facilities Status	Federal Facility Fee(s)/Rate(s)	Additional Source 1	Additional Source 2	Additional Source 3		
Baltimore City	Department of Public Works	Yes	NA	NA	$44 - 131[2]	$65 / ERU	1,050 sf	Capped at 20% of all State and local property taxes	$12 / ERU on religious and K-12 education structures	IA permitted to public ww system; streets privately maintained and open to public in SFR communities; IA requires as a superfund cap; solar panel bases; driveways for cemetaries	Charged	$65 / yr / ERU	SWM/ESC Misc. Fees for permitting and penalties as part of development			$34,290,734.00	
Directions:		**Use: Yes or No**	**Use the approval date or N/A**	**Reduction amount(s), if any, with reason for reduction(s)**		**Use: N/A, amount of flate rate, rate amount per ERU, etc.**				**General description of exemption(s), if any**	**Use: No Facilities, Exempt, or Charged**	**Use: N/A or the fee and rate structures for federal facilities**					

Notes:
ERU = Equivalent residential unit

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Article 4-202.1(i)(3): "The amount of money deposited into the watershed protection and restoration fund in the previous fiscal year by source;"

Source		Amount
Annual Single Family Residential Fees Collected	$	11,330,378.00
Annual Commercial Fees Collected	$	19,838,184.00
Non-profits, Religious Orgs Fees Collected	$	2,909,796.00
Miscellaneous fees related to development	$	212,376.00
	$	34,290,734.00

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Note: Revenue by source is estimated based on the total revenue for the stormwater fee, proportional to the customer base (billing) and may not reflect actual proportion of revenue received for the fiscal year.

All SWM Projects Implemented in Previous FY for the 20% Restoration Requirement

REST BMP ID	REST BMP TYPE	BMP CLASS	NUM BMP	IMP ACRES	BUILT DATE	IMPL COST	IMPL STATUS	IMPL COMP YR
	VSS	A	1	3568	6/30/2020	$5,210,030	Complete	2020
	SDV	A	1	158	6/30/2020	$4,385,531	Complete	2020
	IMPAA	A	2	1.5	9/1/2019	$751,402	Complete	2020

VERSION 2-28-18

Appendix I: Financial Assurance Plan

CERTIFICATION

WHEREAS, the provisions of § 4-202.1 of the Environment Article of the Annotated Code of Maryland require _Baltimore City__ (County/City) to file a financial assurance plan to the Maryland Department of the Environment that demonstrates that it has sufficient funding to meet the impervious surface restoration plan requirements of the (County's/City's) National Pollutant Discharge Elimination System Phase I Municipal Separate Storm Sewer System Permit; and

WHEREAS, the provisions of this law require that "a county or municipality may not file a financial assurance plan under this subsection until the local governing body of the county or municipality: (i) Holds a public hearing on the financial assurance plan; and (ii) Approves the financial assurance plan."

NOW, THEREFORE, I certify that:

1. A public hearing was held on the financial assurance plan on December 17, 2020 (Date);
2. The local governing body approves the aforementioned financial assurance plan; and
3. Under penalty of law, the information in this financial assurance plan is, to the best of my knowledge and belief, true, accurate, and complete.

Signature of County Executive/Municipal Mayor or Chief Financial Officer

12/24/2020
Date

_Brandon M. Scott_____
Printed Name of County Executive/Municipal Mayor or Chief Financial Officer

_Mayor_____
Title

Baltimore City– Fiscal Year 2020
Financial Assurance Plan
as required under the
Watershed Protection and Restoration Program
December, 2020

Executive Summary

The submission of Baltimore City's Financial Assurance Plan (FAP) to the Maryland Department of the Environment (MDE) fulfills requirements specified in the Maryland Article – Environment, Section 4-202.1. This plan is being filed with MDE in order to document all actions implemented by Baltimore City to comply with its National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer system (MS4) permit and demonstrate the City's ability to pay for these activities through the Watershed Protection and Restoration Fund.

An MS4 permit was issued to Baltimore City on December 27, 2013. Annual reports for Fiscal Years (FY) 2014 through 2019 have been submitted to MDE by the City and are available on the City's website. The FY 2020 Annual Report will be submitted to MDE by December 27, 2020, and will include the Watershed Protection and Restoration Program (WPRP) report for FY 2020. These annual reports are based on the City's fiscal year (FY) and include updates on the City's MS4 programs and impervious surface area restoration. Baltimore City has continued implementing its MS4 program. This Executive Summary documents achievements met since the FY 2018 FAP, submitted to MDE in December, 2018.

In compliance with the Maryland Article Section 4-202.1, the following FAP includes all activities that have been completed in compliance with Baltimore City's MS4 permit, and five-year projections for the implementation of its stormwater program and best management practices (BMPs) necessary for meeting specific permit requirements. The following FAP documents implementation and financial data since the beginning of the current permit, in FY 2014. Additionally, the following FAP includes proposed measures to meet the next MS4 permit, which is in tentative determination and should be issued in FY 2021 (i.e. before June 30, 2021).

A major tenet of the FAP is to demonstrate the financial wherewithal for meeting the current and proposed MS4 permit impervious surface area restoration requirements for FY 2021 through 2025. The sections in this Executive Summary follow the order of Baltimore City's MS4 permit found in Part IV, Standard Permit Conditions, and highlight the major achievements for each program element.

- **Part IV.C. Source Identification** – Existing BMP data was converted to the MDE-specified georeference database. Additional data for development and updates from field verification have also been incorporated. The new database was included in the FY 2016 MS4 Annual Report. The MS4 Annual Reports for FY 2016 through 2020 included all approved and constructed BMPs. This effort was primarily completed by in-house resources.

- **Part IV.D.1 and 2. Stormwater Management and Erosion and Sediment Control**– Since FY 2018, the workforce totaled 21 full-time employees (FTE) to fulfill both the plan review and inspection obligations of these permit conditions. This workforce included 2 FTE hired from the City's YH2O program (workforce development). The increased workforces has allowed the average response time for plans review has reduced from 90+ days to 18 days. In FY 2021, the City will initiate an on-line submittal and tracking system for plans review, compatible with the City's e-plans system. This system should improve transparency and efficiency in the plans review process. This was originally planned for FY 2019, but was delayed due to procurement issues, not funding. In March 2020, a portion of the plans review staff transitioned to teleworking due to COVID. All other staff continued operations on-site.

- **Part IV.D.3. Illicit Discharge Detection and Elimination (IDDE)**– As of FY 2020, the workforce for this permit condition (and assessment of controls) totaled 11 FTEs. Currently, the City tests surface waters for nitrogen-ammonia, chloride, and other field parameters at 88 locations on a weekly basis as part of the Ammonia Screening program. The number of locations was expanded from 44 in FY 2016. Additionally, the City tests surface waters for bacteria, metals, and nutrients at 33 locations on a monthly basis. All test data is posted quarterly on-line. From January 2014 to June 2019, the City has found over 483 illicit discharges to the storm sewer system, due to investments in technology (camera, IPad applications, new probes, etc.) for field operations and reporting. The City initiated a microbial source tracking (MST) study in FY 2017, contracted to local universities: UMBC and University of Baltimore. Although the City has included the IDDE abatement activities in the nutrient reduction listed in the MS4 Annual Reports, the cumulative amount (FY 2014 to 21) is only shown as IDDE in the "All Actions" table of the FAP, pending MDE's approval of the equivalent impervious area methodology has not been approved by the MDE. Funding to comply with the permit condition (detection and abatement of bacteria sources), included in the "Fund Sources" table of the FAP, only relates to the detection efforts, not the elimination efforts which are usually the responsibility of a private property owner or the water and wastewater utilities.

- **Part IV.D.4. Trash and Litter** – Following on the success of the municipal trash can distribution to all City residents in FY 2016, the City initiated the installation solar-powered corner cans in the downtown area in FY 2018 to improve operation efficiency. In April 2017, the City created the B'More Beautiful pilot program: a City-led, peer to peer beautification program, which has expanded into 59 neighborhoods. The City continued the Small Haulers program, initiated in April 2017. The City developed the "Less Waste, Better Baltimore" (LWBB) Master Plan in FY 2020, which outlined a clear and realistic future vision for improving the City's solid waste recycling program and operations, over both the near- and long-term, with the goal of maximizing waste reduction, reuse/repair, recycling, and sustainable management of materials.. These efforts are not included in the FAP or WPRP, since the programs extend beyond NPDES compliance. These efforts are funded by the General Fund and public-private partnerships.

- **Part IV.D.5. Property Management and Maintenance** – Street sweeping operations expanded city-wide in FY 2014. Parking signage was installed in the Central District in FY 2018 to improve operation efficiency and will be continued through FY 2022. Pro-active inlet cleaning was initiated in FY 2016 in 5 neighborhoods where inlet screens had been installed as a pilot program and in sump areas (high frequency of choked inlets and flooding). Street sweeping and inlet cleaning operational programs are part of the impervious surface restoration plan (ISRP); the impervious acreage and associated costs for these operations are listed in the "All Actions" table of the FAP. In addition to nutrient and sediment reduction; these two routine operations are significant in the addressing the City's trash TMDL, in addition to reducing potential roadway flooding. Both of these operations were impacted (suspended or minimalized) due to COVID in Spring 2020, to allow residents to quarantine at home. Once operations fully resume, parking signs are installed and subsequent parking enforcement occurs, operational efficiencies are anticipated to reflect an increase in mileage without an increase in operational costs for street sweeping. Additionally, under the proposed MS4 Accounting Guidance, the monthly street sweeping occurring in the outer portions of the City will included in the ISRP. Additional staff for inlet cleaning are proposed by FY 2023 and will increase the production of this effort (i.e. allow more inlets to be cleaned), targeting areas prone to litter and choked inlet service requests.

- **Part IV.D.6. Public Education** - In addition to website modifications and participations in public outreach events, like Dam Jam, the City initiated GROW Center pop-up events in April 2018. GROW Centers are an incentive program to connect property owners with resources (technical expertise, materials, and equipment) to promote the installation of green practices on their private property or vacant lots, while diverting re-usable materials from the solid waste disposal stream. In addition to the pop-up events, an alternatives analysis and business plan for the GROW centers was initiated in FY 2019. This effort was partially funded by a grant from the USDA.

- **Part IV.E.1. Watershed Assessment** – Watershed Assessments for the Lower North Branch Patapsco watershed and the Baltimore Harbor watershed were completed and posted for public comment in November 2018. Final versions of the assessments will be submitted to MDE in December 2018. The assessments were completed using in-house resources and include prioritization maps (by community statistical area); a summary of BMP locations found infeasible; and an evaluation of social-economic factors (including equity) within the watersheds. Watershed assessment for the Back River, Jones Falls, and Gwynns Falls were already approved by MDE, but updates to these watershed assessments began in FY 2020 and will be coordinated with Baltimore County.

- **Part IV. E. 2. Restoration Plans**— In August 2015, the City submitted a revised MS4 and TMDL Watershed Implementation Plan (WIP). The WIP included a list of programs, projects and partnerships that would be part of the ISRP. Programs included street sweeping and inlet cleaning, previously addressed in Part IV.D.5 of this executive summary. Partnerships include BMPs installed as either voluntary restoration projects by non-profits / community organizations or as redevelopment projects. The impervious acreage completed for partnerships are listed in the "Specific Actions" table of the FAP, under the category of "Other". Design and construction costs were not the responsibility of the City; therefore the costs were listed as zero. Projections for redevelopment and volunteer restoration projects are projected in the "All Actions" table of the FAP, based on the experience of the last 5 years.

  The projects portion of the WIP included capital projects to be installed by DPW. The projects completed up to FY 2020 are listed in the "Specific Actions" are used to meet the ISR requirement of the current permit. Many of the projects in the WIP were either found to be not feasible or were still in the design phase at the time of this FAP. Only one project was under construction, planned to be complete in FY 2021. The WIP projects currently in design or under construction are listed in the "All Actions" table of the FAP and will be used to meet the ISR requirements for the next permit, in addition to some new capital projects which are still in a planning phase. These estimated costs only include direct costs for design and construction services, plus land acquisition, permit fees, and mitigation efforts. The costs listed in the "All Actions" table of the FAP do not include maintenance; maintenance as a specific line item in the "ISR Costs" table. The reasons for the delay in progress on the projects include the following:

  - Contracted services procurement and negotiations were hindered by a competitive market (i.e. other MS4 jurisdictions). This also increased implementation costs.
  - Two of the stream restoration projects were delayed to align with sanitary capital projects, in order to reduce land disturbance, community disruption and construction costs, like mobilization.
  - Site selection for ESD projects, especially in the right-of-way, was limited by compacted soils, accessibility, traffic patterns, and existing utilities.

Typically, only one in 10 locations were identified as feasible (treating more than 0.2 acre / facility and costing less than $300,000 / acre). The results of the site selection were included in the FY 2018 Annual Report and DPW's interactive BMP planning tool.
    - Stream restoration and regenerative stormwater conveyance projects required access agreements with private property owners.
    - Although MDE improved their process for the Joint Permit Application process for work in the floodplain and wetlands, the overall permitting process (local, state, and federal) increased the project life cycle, based on the total increase in the number of restoration projects. The City also received State Revolving Loans from the state, which added another layer of plan review to the project schedule.

- Part IV.E.5. TMDL Compliance – Nutrient and sediment TMDL compliance is aligned with the restoration plan progress (ISRP). The Trash TMDL implementation plan was submitted in FY 2016, efforts for compliance were already described in Part IV.D.4 of this executive summary. The bacteria TMDL implementation plan and PCB implementation plan were submitted as part of the WIP; modifications to the bacteria implementation plan schedule and the PCB study details were submitted to MDE in September 2018. The PCB Study (with USGS and UMBC) was completed in 2020 and will impact future PCB source tracking efforts to meet the next permit.

- Part IV.F. Assessment of Controls – DPW approved agreements with USGS to add monitoring parameters to existing stations in the County (reservoir) and City. Biological assessment of controls continues. Physical assessment of controls for Stony Run were completed in FY 2018 and included the FY 2018 Annual Report.

- Other FAP discussions:

    - The 2016 FAP and 2014-2016 WPRP reports were submitted based on limited financial information related to stormwater fee revenue. Since those submittals, certified annual financial reports for the stormwater utility have resulted in revisions of revenues listed in "Fund Sources' table of the FAP for the stormwater remediation fees. Furthermore, the 2018 and 2020 FAPs only lists 70 percent of stormwater remediation fee revenue, since the fee is also used for non-NPDES activities such as flood control and stormwater sewer asset management.
    - The stormwater fee rate had remained constant from FY 2014 to 2018. Annual rate increases of 9% were approved by the Board of Estimates for FY 2019, 2020 and 2021. Although the rate study supporting the increases showed continued annual rate increases for FY 2022 to 2025, the FAP kept the rates constant (assuming the same revenue for the WPR fund from FY 2021 to 2025) to be conservative.

MS4 Information	
Jurisdiction	Baltimore City
Contact Name	Kimberly Grove
Phone	410-396-0732
Address	3001 Druid Park Drive
City	Baltimore
State	MD
Zip	21215
Email	kimberly.grove@baltimorecity.gov
Impervious Acre Baseline (Untreated Acres)	21456.00
Permit Number	11-DP-3315
Reporting Year	2020

Check with MS4 Geodatabase:

Should match Permit Info table of Geodatabase.

VERSION 8/20/20

Article 4-202.1(j)(1)(i)1: Actions that will be required of the county or municipality to meet the requirements of its National Pollutant Discharge Elimination System Phase I Municipal Separate Storm Sewer System Permit.

Note: To identify all "actions" required under the MS4 permit, provide an executive summary of the jurisdiction's MS4 programs. See MDE's FAP Guidance. For proposed actions to meet the impervious surface restoration plan, fill in the table below.

Baseline: 21,456

REST BMP TYPE[1]	BMP CLASS	IMP ACRES	IMPL COST	% ISRP COMPLETE	IMPL STATUS[2]	PROJECTED IMPL YR[3]
Operational Programs[4]						
VSS	A	5,475	$6,134,215	25.5%	Planning	FY21
VSS	A	6,722	$6,379,584	31.3%	Planning	FY22
VSS	A	7,199	$6,634,767	33.6%	Planning	FY23
VSS	A	7,199	$6,900,158	33.6%	Planning	FY24
VSS	A	7,199	$7,176,164	33.6%	Planning	FY25
CBC	A	226	$4,517,391	1.1%	Planning	FY21
CBC	A	226	$4,698,087	1.1%	Planning	FY22
CBC	A	350	$4,886,011	1.6%	Planning	FY23
CBC	A	350	$5,081,451	1.6%	Planning	FY24
CBC	A	350	$5,284,709	1.6%	Planning	FY25
Average Operations Next Two Years (FY2021-FY2022)[5]		6,325	$21,729,277	29%		
Average Operations Next Five Years (FY2021-FY2025)[5]		7,059	$57,692,537	33%		
Average Operations All Years[5]		6,390	$105,749,831	30%		
Capital Projects						
STRE	A	254	$11,440,864	1.2%	Under Construction	FY21
STRE	A	78	$10,880,034	0.4%	Under Construction	FY22
FBIO	S	16	$2,774,700	0.1%	Design	FY22
IMPP	E	4	$883,677	0.0%	Design	FY22
MMBR	E	13	$934,932	0.1%	Design	FY22
SPSC	A	14	$1,180,295	0.1%	Design	FY22
STRE	A	75	$7,236,437	0.3%	Design	FY22
FBIO	S	14	$2,014,252	0.1%	Design	FY23
IMPP	E	1	$425,690	0.0%	Design	FY23
MENF	E	6	$1,088,072	0.0%	Design	FY23
MMBR	E	8	$1,124,962	0.0%	Design	FY23
STRE	A	239	$15,595,077	1.1%	Design	FY23

REST BMP TYPE[1]	BMP CLASS	IMP ACRES	IMPL COST	% ISRP COMPLETE	IMPL STATUS[2]	PROJECTED IMPL YR[3]
WPWS	S	2	$150,909	0.0%	Design	FY23
MMBR	E	6	$825,000	0.0%	Planning	FY24
MWRH	A	47	$1,200,000	0.2%	Planning	FY24
OUT	A	40	$3,790,000	0.2%	Planning	FY24
MMBR	E	12	$1,650,000	0.1%	Planning	FY25
MWRH	A	47	$1,200,000	0.2%	Planning	FY25
OUT	A	40	$3,790,000	0.2%	Planning	FY25
STRE	A	254	$22,550,000	1.2%	Planning	FY26
MWRH	A	12	$1,800,000	0.1%	Planning	FY26
OUT	A	40	$3,790,000	0.2%	Planning	FY26
Subtotal Capital Next Two Years (FY2021-FY2022)		454	$35,330,939	1%		
Subtotal Capital Next Five Years (FY2021-FY2025)		916	$68,184,901	3%		
Subtotal Capital All Years		1,326	$103,766,984	3%		
Other						
IDDE	A	152	$12,677,542	0.7%	Complete	FY21
IDDE	A	164	$8,268,064	0.8%	Planning	FY25
FPU	A	6	$1,000,000	0.0%	Planning	FY25
IMPP	A	11	$0	0.1%	Planning	FY25
MMBR	E	82	$0	0.4%	Planning	FY25
FSND	S	41	$0	0.2%	Planning	FY25
WPWS	S	26	$0	0.1%	Planning	FY25
Subtotal Other Next Two Years (FY2021-FY2022)		152	$12,677,542	0.7%		
Subtotal Other Next Five Years (FY2021-FY2025)		482	$20,945,606	1.5%		
Subtotal Other All Years		968	$20,945,606	4.5%		
Total Next Two Years (FY2021-FY2022)		**6,931**	**$69,737,758**	**30.8%**		
Total Next Five Years (FY2021-FY2025)		**8,457**	**$146,823,044**	**37.1%**		
Total All Years		**8,684**	**$230,462,421**	**37.4%**		

REST BMP TYPE[1]	BMP CLASS	IMP ACRES	IMPL COST	% ISRP COMPLETE	IMPL STATUS[2]	PROJECTED IMPL YR[3]

Check with MS4 Geodatabase:

Type, class, impervious acres, implementation cost and implementation status should match the various geodatabase tables for BMPs (AltBMPLine, AltBMPPoint, AltBMPPoly, and RestBMP)- aggregated by type and status.

Notes:

1. Use BMP domains from the MS4 Geodatabase.
2. Complete, Under Construction, Planning, or Proposed.
3. Use Fiscal Year (FY)
4. For street sweeping indicate the annual frequency that the streets are swept, and for storm drain or catch basin cleaning report the pounds of material removed.
5. Average IMP ACRES for Operational BMPs should be the average of BMP 1 + the average of BMP 2, etc.
   IMPL COST is a summation and not an average.

VERSION 8/20/20

Article 4-202.1(j)(1)(i)2: Projected annual and 5-year costs for the county or municipality to meet the impervious surface restoration plan requirements of its National Pollutant Discharge Elimination System Phase I Municipal Separate Storm Sewer System Permit.

DESCRIPTION	PAST UP THRU FY 2019	CURRENT YEAR FY 2020	PROJECTED YEAR 1 FY 2021	PROJECTED YEAR 2 FY 2022	PROJECTED YEAR 3 FY 2023	PROJECTED YEAR 4 FY 2024	PROJECTED YEAR 5 FY 2025	TOTAL COSTS
Operating Expenditures (costs)								
Street Sweeping Program	$26,402,239	$4,733,052	$6,134,215.00	$6,379,584	$6,634,767	$6,900,158	$7,176,164	$64,360,179
Inlet Cleaning	$12,578,358	$4,343,646	$4,517,391	$4,698,087	$4,886,011	$5,081,451	$5,284,709	$41,389,652
Support of Capital Projects	$4,569,160	$766,216	$796,865	$828,739	$861,889	$896,364	$932,219	$9,651,452
Debt Service Payment	$6,257,812	$4,022,296	$5,663,412	$7,017,707	$9,366,927	$9,854,788	$11,323,539	$53,506,481
Other (IDDE)	$9,005,227	$1,800,154	$1,872,160	$1,947,047	$2,024,929	$2,105,926	$2,190,163	$20,945,606
Other (BMP Maintenance)	$19,538	$150,000	$150,000	$200,000	$500,000	$600,000	$650,000	$2,269,538
Capital Expenditures (costs)								
General Fund (Paygo)	$586,515							$586,515
WPR Fund (Paygo)	$13,737,672	$788,339	$2,404,530	$2,430,972	$1,304,410	$1,019,408	$1,621,238	$23,306,569
Debt Service	$7,385,470	$5,659,362	$1,554,337	$17,711,726	$10,040,206	$8,627,343	$13,032,513	$64,010,957
Grants & Partnerships					$100,000	$100,000		$200,000
Other (please stipulate capital expenditure)*	-	-	-	-	-	-	-	$0
Subtotal Operation and Paygo:	$73,156,521	$16,603,703	$21,538,573	$23,502,136	$25,578,933	$26,458,095	$29,178,032	$216,015,992
Total Expenditures:	**$80,541,991**	**$22,263,065**	**$23,092,910**	**$41,213,862**	**$35,719,139**	**$35,185,438**	**$42,210,545**	**$280,226,949**
							Total ISRP costs except debt service:	**$226,720,468**
							Compare ISRP costs (except debt service) / total ISRP proposed actions:	**98%**

Check with MS4 Geodatabase:

The total current FY2020 expenditure should be less than the combined total of the "OP_COST" and "CAP_COST" fields in the Fiscal Analyses table of the geodatabase.

The total projected FY2021 expenditure should be less than the combined total of the "OP_BUDGET" and "CAP_BUDGET" fields in the Fiscal Analyses table of the geodatabase.

*Insert additional rows as needed.

VERSION 8/20/20

Article 4-202.1(j)(1)(i)3: Projected annual and 5-year revenues or other funds that will be used to meet the cost for the county or municipality to meet the impervious surface restoration plan requirements under the National Pollutant Discharge Elimination System Phase I Municipal Separate Storm Sewer System Permit.

DESCRIPTION	PAST UP THRU FY 2019	CURRENT YEAR FY 2020	PROJECTED YEAR 1 FY 2021	PROJECTED YEAR 2 FY 2022	PROJECTED YEAR 3 FY 2023	PROJECTED YEAR 4 FY 2024	PROJECTED YEAR 5 FY 2025	TOTAL NEXT 2-YEARS FY 21-22[1]	TOTAL
Annual Revenue[2] Appropriated for ISRP	$164,598,102	$16,523,364	$19,134,043	$21,071,164	$24,274,523	$25,438,687	$27,556,794	$40,205,207	$298,596,677
Annual Costs towards ISRP[3]	$80,541,991	$22,263,065	$23,092,910	$41,213,862	$35,719,139	$35,185,438	$42,210,545	$64,306,772	$280,226,949

Compare revenue appropriated / annual costs: **63%**

WPRP 2020 Reporting Criteria: **100%**

ISRP = Impervious Surface Restoration Program

Notes:

1. Article 4-202.1(j)(2): Demonstration that county or municipality has sufficient funding in the current fiscal year and subsequent fiscal year budgets to meet its estimated cost for the 2-year period immediately following the filing date of the FAP.
2. Revenue means "dedicated revenues, funds, or sources of funds (per Article 4-202.1(j)(4)(ii)).
3. See table of ISRP Cost.

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Article 4-202.1(j)(1)(i)4: Any sources of funds that will be utilized by the county or municipality to meet the requirements of its National Pollutant Discharge Elimination System Phase I Municipal Separate Storm Sewer System Permit.

SOURCE	PAST UP THRU FY 2019	CURRENT YEAR FY 2020	PROJECTED YEAR 1 FY 2021	PROJECTED YEAR 2 FY 2022	PROJECTED YEAR 3 FY 2023	PROJECTED YEAR 4 FY 2024	PROJECTED YEAR 5 FY 2025	TOTAL NEXT FIVE YEARS
Paygo Sources								
Stormwater Remediation Fees (WPR Fund)	$ 120,834,379	$ 23,854,851	$ 22,496,466	$ 25,452,550	$ 25,452,550	$ 25,452,550	$ 25,452,550	$ 124,306,666
Miscellaneous Fees (WPR Fund)	$ 701,492	$ 212,376	$ 210,000	$ 210,000	$ 210,000	$ 210,000	$ 210,000	$ 1,050,000
General Fund	$ 8,514,655	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Funds 1 (Water / WW Utility)	$ 8,005,106	$ 1,436,609	$ 1,494,073	$ 1,553,836	$ 1,615,990	$ 1,680,629	$ 1,747,855	$ 8,092,383
Other Funds 2 (please stipulate funding source)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Funds 3 (please stipulate funding source)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal Paygo Sources	$ 138,055,632	$ 25,503,836	$ 24,200,539	$ 27,216,386	$ 27,278,540	$ 27,343,179	$ 27,410,405	$ 133,449,049
Debt Service (paygo sources will be used to pay off debt service. Note that previous appropriations for debt service used for ISRP is listed in FY 2017).								
County Transportation Bonds	$ 5,432,180							$ -
General Obligation Bonds	$ 1,400,000							$ -
Revenue (Utility) Bonds	$ 51,825,226	$ 346,920						$ -
State Revolving Loan Fund	$ 43,363,965	$ 290,280	$ -	$ -	$ -	$ -	$ -	$ -
Public-private partnership (debt service)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Subtotal Debt Service	$ 102,021,371	$ 637,200	$ -	$ -	$ -	$ -	$ -	$ -
Grants and Partnerships (no payment is expected)								
State funded grants	$ 30,602							$ -
Federal funded grants	$ 200,000							$ -
Public-private partnership (matched grant)								$ -
Subtotal Grants and Partnerships	$ 230,602	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Annual Sources of Funds	**$ 240,307,605**	**$ 26,141,036**	**$ 24,200,539**	**$ 27,216,386**	**$ 27,278,540**	**$ 27,343,179**	**$ 27,410,405**	**$ 133,449,049**
Percent of Funds Directed Toward ISRP								

Compare total permit term paygo ISRP costs / subtotal permit term paygo sources: 34%

Compare total permit term ISRP costs / total permit term annual sources of funds: 48%

* WPR Fund: Watershed Protection and Restoration Fund

Check with MS4 Geodatabase:

The total sources related to WPR Funds in Current FY2020 should match the "WPR_FUND" field of the geodatabase.

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Article 4-202.1(j)(1)(i)5: Specific actions and expenditures that the county or municipality implemented in the previous fiscal years to meet its impervious surface restoration plan requirements under its National Pollutant Discharge Elimination System Phase I Municipal Separate Storm Sewer System Permit.

Baseline: 21,456 **Requirement:** 20%

REST BMP ID	REST BMP TYPE[1]	BMP CLASS	NUM BMP	IMP ACRES	BUILT DATE	IMPL COST	% ISRP Complete	IMPL STATUS[2]	GEN COMMENTS
Operational Programs[3]									
	VSS	A	80,187	5,475	FY 2019	$26,402,239	25.5%	Complete	Uses miles from FY 2019 report, but total costs (FY 15 - 19)
	VSS	A	52,253	3,568	FY 2020	$4,733,052	16.6%	Complete	Service interruption due to COVID
	CBC	A	564	226	FY 2019	$12,578,358	1.1%	Complete	Avg tonnage (FY 17-19), total costs (FY 17 - 19)
	CBC	A	412	165	FY 2020	$4,343,646	0.8%	Complete	Service interruption due to COVID
Average Operations Complete To Date[4]			66,708	4,717		$48,057,294	22.0%		
Capital Projects									
	STRE	A	2080	21	2014	$700,000	0.1%	Complete	Leakin Park
	MMBR	E	1	0.2	2017	$102,900	0.0%	Complete	WS 263 - Bush
	MMBR	E	1	0.7	2017	$308,900	0.0%	Complete	WS 263 - Lafayette
	STRE	A	800	8	2018	$1,135,000	0.0%	Complete	East SR
	STRE	A	4600	46	2018	$4,199,700	0.2%	Complete	Lower Lower SR
	WSHW	S	1	20	2018	$0	0.1%	Complete	Part of LLSR
	SPSC	A	1	5	2018	$0	0.0%	Complete	Part of LLSR
	IMPP	A	6	3	2020	$995,583	0.0%	Complete	Schools
Subtotal Capital Complete To Date			7,490	104		$7,442,083	0.35%		
Other									
	MMBR	E	563	278	2019	$0	1.3%	Complete	Private - Redev (ESD)
	OTH	S	143	206	2019	$0	1.0%	Complete	Private - Redev (structural)
	IMPP	E	23	3	2019	$0	0.0%	Complete	Private - Redev (IA removal)
	FPU	A	30,145	132	2019	$0	0.6%	Complete	Tree Baltimore, voluntary

REST BMP ID	REST BMP TYPE[1]	BMP CLASS	NUM BMP	IMP ACRES	BUILT DATE	IMPL COST	% ISRP Complete	IMPL STATUS[2]	GEN COMMENTS
	MMBR	A	29	33	2019	$0	0.2%	Complete	NGO voluntary
							0.0%	Complete	
Subtotal Other Complete To Date			30,903	652		$0	3.0%		
Total Complete to Date			**105,101**	**5,473**		**$55,499,377**	**25.4%**		

Check with MS4 Geodatabase:

Rest BMP ID, type, class, number of BMPs, impervious acres, built date, implementation cost and implementation status should match the various geodatabase tables for BMPs (AltBMPLine, AltBMPPoint, AltBMPPoly, and RestBMP)-- aggregated by type and status.

Notes:

1. Use BMP domains from the MS4 Geodatabase.
2. Complete, Under Construction, Planning, or Proposed.
3. For street sweeping indicate the annual frequency that the streets are swept, and for storm drain or catch basin cleaning report the pounds of material removed
4. Average IMP ACRES for Operational BMPs should be the average of BMP 1 + the average of BMP 2, etc.
   IMPL COST is a summation and not an average.

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Appendix J: Microbial Source Tracking Study

Microbial Source Tracking Analysis Report

Wolf T. Pecher, College of Arts and Sciences, University of Baltimore

Sample Date: Oct. 24, 2019

Report: November 29, 2019

1 Results

Eight water samples collected by the Department of Public Works (DPW) on Oct. 24, 2019 were tested for the presence and levels of human and canine fecal waste, and mammalian fecal waste in general. Results are summarized in Table 1.

In addition to the quantitative standards for human and canine fecal contamination, a standard consisting of diluted Back River sewage was analyzed. This provides an internal reference for performance of the method and permits the levels of human fecal waste to be expressed in %sewage equivalent. This will give an empirical estimate of the proportion of raw sewage in the sample, if all human stool stems from sewage.

1.1 Human Fecal Matter Contribution

Out of the eight environmental samples, the water sample collected at Cecil Elementary #2 (Sample D070) had the highest amount of sewage. Based on the levels of the human marker in raw sewage, and assuming that the source of the human marker in environmental samples is sewage, about 50% of the sample was raw sewage. Next highest levels of contamination were found at 3907 Cloverhill Alley (Sample D067; 20% raw sewage) and 39th ST inlet (Sample D066; 14% raw sewage). The water sample collected at JF 11.5 (Sample D069) had a neglectable amount of sewage (Table 1).

1.2 Canine Fecal Matter Contribution

One sample, 748 E 36th ST inlet (Sample D069), showed some amount of canine fecal contamination with a corrected amount of 0.47 µg canine feces in 100 ml sample (Table 1).

1.3 General Mammalian Fecal Matter

Highest (mammalian) fecal contamination was detected at Cecil Elementary #2 (Sample D070) with 7.4×10^6 copies of the generic marker in 1 ml sample. The second highest level of mammalian fecal contamination was detected at 3907 Cloverhill Alley (Sample D067) with 1.73×10^6 copies (Table 1).

2 Method Summary

2.1 Sample Processing & DNA extraction

On Oct. 24, 2019 eight water samples were collected by the Department of Public Works (DPW). The samples and a field blank consisting of 500 ml phosphate buffered water were delivered to the University of Baltimore (UB). Samples were recoded to D064 to D071.

Processing of Environmental Samples. 50 – 500 ml of environmental samples and 500 ml of the field blank were filtered through mixed cellulose ester (MCE) membranes with a pore size of 0.45 μm. Membranes were stored at -80°C prior to DNA extraction.

DNA was extracted from the membranes on Oct. 31, 2019 using the DNeasy® PowerLyzer® PowerSoil® DNA extraction kit (QIAGEN Inc., Germantown, MD) following the manufacturer's recommendation with slight modification to maximize DNA recovery. DNA extracts were eluted in 100 μl elution buffer, divided between analytical and archived samples, and stored at -80°C. An extraction blank was included. Analytical samples were delivered to UMCES/IMET for quantitative molecular microbial source tracking (mMST) analysis.

Sewage Reference. A sewage reference sample was used consisting of DNA extracts from 5 raw sewage samples that were collected from the Back River Watertreatment plant. Briefly, from each sewage sample, 5 ml was filtered through MCE membranes. DNA was extracted from the membranes, eluted in 100 μl elution buffer, and stored as described above for Environmental samples. DNA extracts were pooled prior to analysis.

Canine Reference Sample. A canine reference sample was used consisting of DNA extracts from feces collected from 5 dogs. Briefly, 250 mg of feces was collected from each dog, DNA extracted, eluted in 100 μl elution buffer, and stored as described above. DNA extracts were pooled prior to analysis.

2.2 mMST analysis using qPCR

mMST analysis was performed by Dr. Eric Schott (UMCES/IMET). Briefly, DNA extracts were tested by quantitative Polymerase Chain Recation (qPCR) for the levels of human, and canine fecal contamination with published molecular probes. DNA preparations from environmental samples were diluted 5-fold, and 4 μl of the dilutions used for each qPCR reaction. Using qPCR results on DNA extracts from pooled sewage and dog fecal samples as a reference (4 μl of a 100-fold dilution each), the amount of sewage and canine fecal matter was calculated. The level of contamination was expressed as copy number of human marker per ml sample and %sewage equivalent, and as copy number of canine marker in 1 ml sample and mg or μg of feces in 100 ml sample (Table 1).[1] It should be noted that in the reference sewage sample, canine fecal matter was detected (4.76×10^4 copies of canine marker in 1 ml sewage). Levels of canine fecal matter reported in field samples were adjusted accordingly to reflect the amount from non-sewage canine sources only (Table 1, column "Canine Only").

[1] The concentration of sewage varies, and there is variability of the amount of dog associated gut bacteria in different dogs. Therefore the volume of fecal contamination is an estimate.

Table 1: **Summary of MST Results.** %Sewage equivalent was calculated using the amount of human marker in raw sewage (5.8×10^5 copies in 1 ml) as a reference. Amount of canine feces (μg) in 100 ml was calculated using the amount of canine marker in canine feces (2.77×10^9 copies in 1 g feces) as a reference. **Total**: amount of canine feces (in μg) observed in 100 ml sample; **Canine Only**: amount of canine feces in 100 ml sample corrected for the amount of canine marker in raw sewage (4.8×10^4 copies in 1 ml sewage).

					Canine Marker		
		Mammalian Marker	Human Marker			Fecal Waste (μg) in 100 ml	
Sample ID	Sample Description	Copy Nr. in 1 ml	Copy Nr. in 1 ml	%Sewage Equivalent	Copy Nr. in 1 ml	Total	Canine Only
D064	Chelsea Ter & Mondawmin Ave	69,360	4,086	0.70	1	0.03	0.00
D065	39th ST	160,478	21,769	3.74	135	4.86	0.00
D066	39th ST inlet	458,748	81,820	14.07	217	7.85	0.00
D067	3917 Cloverhill Alley	1,727,127	114,652	19.71	0	0.00	0.00
D068	3907 Cloverhill Alley	470,926	24,402	4.20	102	3.70	0.00
D069	748 E 36th ST inlet	1,205,819	34	0.01	16	0.57	0.47
D070	Cecil Elementary #2	7,399,859	288,228	49.56	0	0.00	0.00
D071	JF 11.5	64,589	1,244	0.21	14	0.49	0.00

Microbial Source Tracking Analysis Report

Wolf T. Pecher, College of Arts and Sciences, University of Baltimore

Sample Date: Dec. 05, 2019

Report: December 18, 2019

```
humansew
```

```
[1] 1219096
```

```
canine sew
```

```
[1] 43191
```

```
gensew
```

```
[1] 9865479
```

```
formatC(10000)
```

```
[1] "1e+04"
```

1 Results

Eight water samples collected by the Department of Public Works (DPW) on Dec. 05, 2019 were tested for the presence and levels of human and canine fecal waste, and mammalian fecal waste in general. Results are summarized in Table 1.

In addition to the quantitative standards for human and canine fecal contamination, a standard consisting of diluted Back River sewage was analyzed. This provides an internal reference for performance of the method and permits the levels of human fecal waste to be expressed in %sewage equivalent. This will give an empirical estimate of the proportion of raw sewage in the sample, if all human stool stems from sewage.

1.1 Human Fecal Matter Contribution

Out of the eight environmental samples, the water sample collected at 940 Chester (Sample D079) had the highest amount of sewage. Based on the levels of the human marker in raw sewage, and assuming that the source of the human marker in environmental samples is sewage, about 3% of the sample was raw sewage. Next highest levels of contamination were found at Lakewood & Eastern (Sample D077; 2% raw sewage) and Lakewood & Hudson (Sample D076; 1% raw sewage). The water sample collected at Powder Mill (Sample D075) had a neglectable amount of sewage (Table 1).

1.2 Canine Fecal Matter Contribution

One sample, 940 Chester (Sample D079), showed some amount of canine fecal contamination with a corrected amount of 3.37 µg canine feces in 100 ml sample (Table 1).

1.3 General Mammalian Fecal Matter

Highest (mammalian) fecal contamination was detected at 717 Lakewood (Sample D078) with 3.56×10^6 copies of the generic marker in 1 ml sample. The second highest level of mammalian fecal contamination was detected at 1213 Milton (Sample D080) with 1.13×10^6 copies (Table 1).

2 Method Summary

2.1 Sample Processing & DNA extraction

On Dec. 05, 2019 eight water samples were collected by the Department of Public Works (DPW). The samples and a field blank consisting of 500 ml phosphate buffered water were delivered to the University of Baltimore (UB). Samples were recoded to D074 to D081.

Processing of Environmental Samples. 50 – 500 ml of environmental samples and 500 ml of the field blank were filtered through mixed cellulose ester (MCE) membranes with a pore size of 0.45 µm. Membranes were stored at -80°C prior to DNA extraction.

DNA was extracted from the membranes on Dec. 13, 2019 using the DNeasy® PowerLyzer® PowerSoil® DNA extraction kit (QIAGEN Inc., Germantown, MD) following the manufacturer's recommendation with slight modification to maximize DNA recovery. DNA extracts were eluted in 100 µl elution buffer, divided between analytical and archived samples, and stored at -80°C. An extraction blank was included. Analytical samples were delivered to UMCES/IMET for quantitative molecular microbial source tracking (mMST) analysis.

Sewage Reference. A sewage reference sample was used consisting of DNA extracts from 5 raw sewage samples that were collected from the Back River Watertreatment plant. Briefly, from each sewage sample, 5 ml was filtered through MCE membranes. DNA was extracted from the membranes, eluted in 100 µl elution buffer, and stored as described above for Environmental samples. DNA extracts were pooled prior to analysis.

Canine Reference Sample. A canine reference sample was used consisting of DNA extracts from feces collected from 5 dogs. Briefly, 250 mg of feces was collected from each dog, DNA extracted, eluted in 100 µl elution buffer, and stored as described above. DNA extracts were pooled prior to analysis.

2.2 mMST analysis using qPCR

mMST analysis was performed by Dr. Eric Schott (UMCES/IMET). Briefly, DNA extracts were tested by quantitative Polymerase Chain Recation (qPCR) for the levels of human, and canine fecal contamination with published molecular probes. DNA preparations from environmental samples were diluted 5-fold, and 4 µl of the dilutions used for each qPCR reaction. Using qPCR results on

DNA extracts from pooled sewage and dog fecal samples as a reference (4 µl of a 100-fold dilution each), the amount of sewage and canine fecal matter was calculated. The level of contamination was expressed as copy number of human marker per ml sample and %sewage equivalent, and as copy number of canine marker in 1 ml sample and mg or µg of feces in 100 ml sample (Table 1).[1] It should be noted that in the reference sewage sample, canine fecal matter was detected (4.32×10^4 copies of canine marker in 1 ml sewage). Levels of canine fecal matter reported in field samples were adjusted accordingly to reflect the amount from non-sewage canine sources only (Table 1, column "Canine Only").

[1] The concentration of sewage varies, and there is variability of the amount of dog associated gut bacteria in different dogs. Therefore the volume of fecal contamination is an estimate.

Table 1: **Summary of MST Results.** %Sewage equivalent was calculated using the amount of human marker in raw sewage (1219096.06933594 1.2×10^6 copies in 1 ml) as a reference. Amount of canine feces (µg) in 100 ml was calculated using the amount of canine marker in canine feces (2.77×10^9 copies in 1 g feces) as a reference. **Total**: amount of canine feces (in µg) observed in 100 ml sample; **Canine Only**: amount of canine feces in 100 ml sample corrected for the amount of canine marker in raw sewage (4.8×10^4 copies in 1 ml sewage).

					Canine Marker		
		Mammalian Marker	Human Marker			Fecal Waste (µg) in 100 ml	
Sample ID	Sample Description	Copy Nr. in 1 ml	Copy Nr. in 1 ml	%Sewage Equivalent	Copy Nr. in 1 ml	Total	Canine Only
D074	Powder Mill	590	6	0.00	5	0.19	0.18
D075	Kennison Outfall	1	0	0.00	0	0.00	0.00
D076	Lakewood & Hudson	177,584	13,314	1.09	192	6.94	0.00
D077	Lakewood & Eastern	325,883	29,913	2.45	599	21.64	0.00
D078	717 Lakewood	3,563,342	6,858	0.56	16	0.59	0.00
D079	940 Chester	457,467	38,487	3.16	1,457	52.60	3.37
D080	1213 Milton	1,125,978	1,990	0.16	27	0.97	0.00
D081	1413 Wolfe	160,192	4,400	0.36	200	7.21	1.59

Microbial Source Tracking Analysis Report

Wolf T. Pecher, College of Arts and Sciences, University of Baltimore

Sample Date: Jan. 30, 2020

Report: February 6, 2020

1 Results

Eight water samples collected by the Department of Public Works (DPW) on Jan. 30, 2020 were tested for the presence and levels of human and canine fecal waste, and mammalian fecal waste in general. Results are summarized in Table 1.

In addition to the quantitative standards for human and canine fecal contamination, a standard consisting of diluted Back River sewage was analyzed. This provides an internal reference for performance of the method and permits the levels of human fecal waste to be expressed in %sewage equivalent. This will give an empirical estimate of the proportion of raw sewage in the sample, if all human stool stems from sewage.

1.1 Human Fecal Matter Contribution

Out of the eight environmental samples, the water sample collected at 2338 Monument St (Sample D091) had the highest amount of sewage. Based on the levels of the human marker in raw sewage, and assuming that the source of the human marker in environmental samples is sewage, about 0.5% of the sample was raw sewage. Next highest levels of contamination were found at Lakewood & McElderry (Sample D086; 0.3% raw sewage) and Linwood @ Patterson Park (Sample D087; 0.3% raw sewage). The water samples collected at Lakewood & Orleans (Sample D085) had no detectable sewage (Table 1).

1.2 Canine Fecal Matter Contribution

The highest amount of canine fecal contamination was detected at Kenwood & Fairmount (Sample D084), with a corrected amount of 11.69 µg canine feces in 100 ml sample. This sample was followed by Lakewood & McElderry (Sample D086) and 105 N East Ave (Sample D088) with a corrected amount of 8.44 µg and 8.09 µg of canine feces in 100 ml sample, respectively (Table 1).

1.3 General Mammalian Fecal Matter

Highest (mammalian) fecal contamination was detected at Linwood @ Patterson Park (Sample D087) with 2.8×10^5 copies of the generic marker in 1 ml sample. The second highest level of mammalian fecal contamination was detected at Clinton & Fairmount (Sample D089) with 1.75×10^5 copies (Table 1).

2 Method Summary

2.1 Sample Processing & DNA extraction

On Jan. 30, 2020 eight water samples were collected by the Department of Public Works (DPW). The samples and a field blank consisting of 500 ml phosphate buffered water were delivered to the University of Baltimore (UB). Samples were recoded to D084 to D091.

Processing of Environmental Samples. 50 – 500 ml of environmental samples and 500 ml of the field blank were filtered through mixed cellulose ester (MCE) membranes with a pore size of 0.45 µm. Membranes were stored at -80°C prior to DNA extraction.

DNA was extracted from the membranes on Jan. 31, 2020 using the DNeasy® PowerLyzer® PowerSoil® DNA extraction kit (QIAGEN Inc., Germantown, MD) following the manufacturer's recommendation with slight modification to maximize DNA recovery. DNA extracts were eluted in 100 µl elution buffer, divided between analytical and archived samples, and stored at -80°C. An extraction blank was included. Analytical samples were delivered to UMCES/IMET for quantitative molecular microbial source tracking (mMST) analysis.

Sewage Reference. A sewage reference sample was used consisting of DNA extracts from 5 raw sewage samples that were collected from the Back River Watertreatment plant. Briefly, from each sewage sample, 5 ml was filtered through MCE membranes. DNA was extracted from the membranes, eluted in 100 µl elution buffer, and stored as described above for Environmental samples. DNA extracts were pooled prior to analysis.

Canine Reference Sample. A canine reference sample was used consisting of DNA extracts from feces collected from 5 dogs. Briefly, 250 mg of feces was collected from each dog, DNA extracted, eluted in 100 µl elution buffer, and stored as described above. DNA extracts were pooled prior to analysis.

2.2 mMST analysis using qPCR

mMST analysis was performed by Dr. Eric Schott (UMCES/IMET). Briefly, DNA extracts were tested by quantitative Polymerase Chain Recation (qPCR) for the levels of human, and canine fecal contamination with published molecular probes. DNA preparations from environmental samples were diluted 5-fold, and 4 µl of the dilutions used for each qPCR reaction. Using qPCR results on DNA extracts from pooled sewage and dog fecal samples as a reference (2 µl of a 100-fold dilution each), the amount of sewage and canine fecal matter was calculated. The level of contamination was expressed as copy number of human marker per ml sample, %sewage equivalent, copy number of canine marker in 1 ml sample, and mg or µg of feces in 100 ml sample (Table 1).[1] The %sewage equivalent was calculated using the amount of human marker in raw sewage (1.05×10^6 copies in 1ml) as a reference. It should be noted that in the reference sewage sample, canine fecal matter was detected (7.08×10^4 copies of canine marker in 1 ml sewage). Levels of canine fecal matter reported in field samples were adjusted accordingly to reflect the amount from non-sewage canine sources only (Table 1, column "Canine Only").

[1] The concentration of sewage varies, and there is variability of the amount of dog associated gut bacteria in different dogs. Therefore the volume of fecal contamination is an estimate.

Table 1: **Summary of MST Results.** %Sewage equivalent was calculated using the amount of human marker in raw sewage (1.05×10^6 copies in 1 ml) as a reference. Amount of canine feces (μg) in 100 ml was calculated using the amount of canine marker in canine feces (2.77×10^9 copies in 1 g feces) as a reference. **Total**: amount of canine feces (in μg) observed in 100 ml sample; **Canine Only**: amount of canine feces in 100 ml sample corrected for the amount of canine marker in raw sewage (7.08×10^4 copies in 1 ml sewage).

					Canine Marker		
		Mammalian Marker	Human Marker			Fecal Waste (μg) in 100 ml	
Sample ID	Sample Description	Copy Nr. in 1 ml	Copy Nr. in 1 ml	%Sewage Equivalent	Copy Nr. in 1 ml	Total	Canine Only
D084	Kenwood & Fairmount	9,905	711	0.07	372	13.42	11.69
D085	Lakewood & Orleans	5,524	0	0.00	210	7.60	7.60
D086	Lakewood & McElderry	120,422	3,454	0.33	467	16.85	8.44
D087	Linwood @ Patterson Park	279,519	3,335	0.32	91	3.27	0.00
D088	105 N East Ave	4,136	19	0.00	225	8.14	8.09
D089	Clinton & Fairmount	174,690	1,483	0.14	114	4.11	0.49
D090	1829 N Chester St	31,282	1,294	0.12	11	0.40	0.00
D091	2338 Monument St	82,196	4,992	0.48	58	2.09	0.00

Microbial Source Tracking Analysis Report

Wolf T. Pecher, College of Arts and Sciences, University of Baltimore

Sample Date: Jun 18, 2020

Report: July 24, 2020

1 Results

Eight water samples collected by the Department of Public Works (DPW) on Jun 18, 2020 were tested for the presence and levels of human and canine fecal waste, and mammalian fecal waste in general. Results are summarized in Table 1.

In addition to the quantitative standards for human and canine fecal contamination, a standard consisting of diluted Back River sewage was analyzed. This provides an internal reference for performance of the method and permits the levels of human fecal waste to be expressed in %sewage equivalent. This will give an empirical estimate of the proportion of raw sewage in the sample, if all human stool stems from sewage.

1.1 Human Fecal Matter Contribution

Out of the eight environmental samples, the water sample collected at Reverdy Rd (Sample D094) had the highest amount of sewage. Based on the levels of the human marker in raw sewage, and assuming that the source of the human marker in environmental samples is sewage, about 1.3% of the sample was raw sewage. Next highest levels of contamination were found at 940 Chester St (Sample D098; 0.7% raw sewage) and Lakewood & Hudson (Sample D100; 0.4% raw sewage) (Table 1).

1.2 Canine Fecal Matter Contribution

One sample, Lakewood & Elliot (Sample D101), showed some amount of canine fecal contamination with a corrected amount of 10.15 µg canine feces in 100 ml sample (Table 1).

1.3 General Mammalian Fecal Matter

Highest (mammalian) fecal contamination was detected at 1830 Chester St (Sample D097) with 3×10^5 copies of the generic marker in 1 ml sample. The second highest level of mammalian fecal contamination was detected at 940 Chester St (Sample D098) with 1.36×10^5 copies (Table 1).

2 Method Summary

2.1 Sample Processing & DNA extraction

On Jun 18, 2020 eight water samples were collected by the Department of Public Works (DPW). The samples and a field blank consisting of 500 ml phosphate buffered water were delivered to the University of Baltimore (UB). Samples were recoded to D094 to D101.

Processing of Environmental Samples. 50 – 500 ml of environmental samples and 500 ml of the field blank were filtered through mixed cellulose ester (MCE) membranes with a pore size of 0.45 µm. Membranes were stored at -80°C prior to DNA extraction.

DNA was extracted from the membranes on Jun 23, 2020 using the DNeasy® PowerLyzer® PowerSoil® DNA extraction kit (QIAGEN Inc., Germantown, MD) following the manufacturer's recommendation with slight modification to maximize DNA recovery. DNA extracts were eluted in 100 µl elution buffer, divided between analytical and archived samples, and stored at -80°C. An extraction blank was included. Analytical samples were delivered to UMCES/IMET for quantitative molecular microbial source tracking (mMST) analysis.

Sewage Reference. A sewage reference sample was used consisting of DNA extracts from 5 raw sewage samples that were collected from the Back River Watertreatment plant. Briefly, from each sewage sample, 5 ml was filtered through MCE membranes. DNA was extracted from the membranes, eluted in 100 µl elution buffer, and stored as described above for Environmental samples. DNA extracts were pooled prior to analysis.

Canine Reference Sample. A canine reference sample was used consisting of DNA extracts from feces collected from 5 dogs. Briefly, 250 mg of feces was collected from each dog, DNA extracted, eluted in 100 µl elution buffer, and stored as described above. DNA extracts were pooled prior to analysis.

2.2 mMST analysis using qPCR

mMST analysis was performed by Dr. Eric Schott (UMCES/IMET). Briefly, DNA extracts were tested by quantitative Polymerase Chain Recation (qPCR) for the levels of human, and canine fecal contamination with published molecular probes. DNA preparations from environmental samples were diluted 5-fold, and 4 µl of the dilutions used for each qPCR reaction. Using qPCR results on DNA extracts from pooled sewage and dog fecal samples as a reference (2 µl of a 100-fold dilution each), the amount of sewage and canine fecal matter was calculated. The level of contamination was expressed as copy number of human marker per ml sample, %sewage equivalent, copy number of canine marker in 1 ml sample, and mg or µg of feces in 100 ml sample (Table 1).[1] The %sewage equivalent was calculated using the amount of human marker in raw sewage (1.28×10^6 copies in 1ml) as a reference. It should be noted that in the reference sewage sample, canine fecal matter was detected (4.69×10^4 copies of canine marker in 1 ml sewage). Levels of canine fecal matter reported in field samples were adjusted accordingly to reflect the amount from non-sewage canine sources only (Table 1, column "Canine Only").

[1] The concentration of sewage varies, and there is variability of the amount of dog associated gut bacteria in different dogs. Therefore the volume of fecal contamination is an estimate.

Table 1: **Summary of MST Results.** %Sewage equivalent was calculated using the amount of human marker in raw sewage (1.28×10^6 copies in 1 ml) as a reference. Amount of canine feces (μg) in 100 ml was calculated using the amount of canine marker in canine feces (2.77×10^9 copies in 1 g feces) as a reference. **Total**: amount of canine feces (in μg) observed in 100 ml sample; **Canine Only**: amount of canine feces in 100 ml sample corrected for the amount of canine marker in raw sewage (4.69×10^4 copies in 1 ml sewage).

					Canine Marker		
		Mammalian Marker	Human Marker			Fecal Waste (μg) in 100 ml	
Sample ID	Sample Description	Copy Nr. in 1 ml	Copy Nr. in 1 ml	%Sewage Equivalent	Copy Nr. in 1 ml	Total	Canine Only
D094	Reverdy Rd	55,728	16,326	1.28	28	1.01	0.00
D095	Mary Ave	74,811	111	0.01	60	2.18	2.03
D096	Hamilton Ave	88,161	3,939	0.31	19	0.70	0.00
D097	1830 Chester St	300,447	143	0.01	116	4.18	3.99
D098	940 Chester St	136,360	9,110	0.71	228	8.25	0.00
D099	35 N Ellwood St	44,974	228	0.02	39	1.40	1.09
D100	Lakewood & Hudson	88,525	4,963	0.39	221	7.99	1.41
D101	Lakewood & Elliot	25,924	222	0.02	289	10.45	10.15

Appendix K: Summary of PST Investigations

Appendix L: Supporting calculations for IDDE Credit

SDUO ID	Location Description	WS[1]	Start Date	End Date	Elimination Year	Measured In-flow (gpm)	Observed Flow consistency	Calc. Daily Flow (gpd)[2]	TN Red (lb / year)[3]	TP Red (lb / year)[4]	ISR (ac)[5]
15BR01	3018 Pinewood Avenue	BR	12/14/15	2/19/16	2016	0.03	1.0	43.2	4.34	0.79	0.2
15GF01	4500 Block of Bonner St	GF	7/20/15	9/17/15	2015	0.60	0.8	691.2	69.48	12.63	3.2
15GF02	4520 Wakefield Road	GF	7/30/15	10/22/15	2015	0.03	1.0	43.2	4.34	0.79	0.2
15HB01	707 S President St.	BH	12/4/15	1/6/16	2016	0.03	1.0	43.2	4.34	0.79	0.2
15HB02	114 E Lexington St	BH	11/18/15	5/18/16	2016	2	1.0	2880	289.48	52.63	13.3
15JF02	3731 Greenmount Ave	JF	7/10/15	3/12/16	2016	0.10	1.0	144	14.47	2.63	0.7
15JF03	3804 Juniper Road	JF	7/21/15	10/19/15	2015	0.10	1.0	144	14.47	2.63	0.7
15JF07	3501 St Paul Street	JF	12/9/15	12/19/15	2015	10	0.3	4320	434.23	78.95	19.9
16BR02	1501 Edison Highway	BR	6/14/16	8/18/16	2016	0.05	1.0	72	7.24	1.32	0.3
16JF03	Friends School (Pre-K building)	JF	4/18/16	5/31/16	2016	3	0.3	1296	130.27	23.69	6.0
16BH05	3807 Bank St	BH	11/22/2016	1/4/2017	2017	0.1	1.0	144	14.47	2.63	0.7
17BR02	6001 Harford Rd	BR	10/17/2017	11/3/2017	2017	0.22	1.0	316.8	31.84	5.79	1.5
17BH01	2024 Fleet Street	BH	4/21/2017	5/17/2017	2017	0.1	1.0	144	14.47	2.63	0.7
17JF02	101 W Read Street	JF	6/1/2017	1/19/2018	2018	3.9	1.0	5616	564.50	102.64	25.9
17JF03	217-221 W Read St	JF	6/8/2017	9/27/2017	2017	0.07	1.0	100.8	10.13	1.84	0.5
18GF05	813 Spedden St	GF	12/11/2018	8/15/2019	2019	0.1	1.0	144	14.47	2.63	0.7
19BR01[6]	4505 Lasalle Ave	BR	4/26/2019	6/18/2019	2019	0.05	1	72	7.24	1.32	0.3
19BR02	4701 Hazelwood Ave	BR	8/22/2019	11/6/2019	2019	0.16	1.0	230.4	23.16	4.21	1.1
19JF01	4 Elmwood Rd	JF	3/28/2019	11/6/2019	2019	0.2	1.0	288	28.95	5.26	1.3
19JF02	211 Longwood Rd	JF	4/4/2019	9/18/2019	2019	0.13	1.0	187.2	18.82	3.42	0.9
19JF04	2000 Cecil Ave-1	JF	7/26/2019	11/5/2019	2019	0.16	1.0	230.4	23.16	4.21	1.1
19JF05	2000 Cecil Ave-2	JF	7/30/2019	11/14/2019	2019	5	1.0	7200	723.71	131.58	33.2
20BR01	6660 Belair Rd	BR	2/26/2020	6/22/2020	2020	0.17	1.0	244.8	24.61	4.47	1.1
Total Credit for Direct Connections for FY 2020:				**23**					**2472.2**	**449.5**	**113.5**

Notes

1. WS = Watershed. BH = Baltimore Harbor, BR = Back River, GF = Gwynns Falls, JF = Jones Falls
2. Daily Flow = Measured In-flow (gpm) * Observed Consistency * 60 min / hr * 24 hr / day
3. TN Red =Total Nitrogen Reduction = Daily flow * 33 mg / L * (8.345×10^{-6} lbs*L/ gal*mg) * 365 days / year [Ref. Protocol 1, IDDE Expert Panel]
4. TP Red = Total Phosphorus Reduction = Daily flow * 6 mg / L * (8.345×10^{-6} lbs*L/ gal*mg) * 365 days / year [Ref. Protocol 1, IDDE Expert Panel]
5. ISR = Impervious Surface Restoration = ((TN Load Reduction / 17.81 lb / acre* year) + (TP Load Reduction / 2.23 lb / acre* year)) /3. Different method from FY 2019 report.
6. Previously listed as SDUO in FY 2019 report.

SDUO ID	Location Description	WS[1]	Start Date	End Date	Duration (days)	Elimination Year	Measured In-flow (gpm)	Flow consist-ency	Calc. Daily Flow (gpd)[2]	Duration (days)	Limited Duration (calc)[3]	TN Red (lb / yr)[4]	TP Red (lb / yr)[5]	ISR (ac)[6]
15JF01	3513 3521 N Calvert St	JF	7/7/15	8/21/15	45	2015	0.20	1	288	45	45	1.8	0.3	0.1
15JF04	3119 N. Calvert St	JF	7/23/15	8/29/15	37	2015	0.05	0.5	36	37	37	0.2	0.0	0.0
15JF05	224 39th St	JF	7/30/15	4/20/17	630	2017	0.09	1	129.6	630	365	6.5	1.2	0.3
15JF06	2101 Rogene Drive	JF	11/14/15	12/15/15	31	2015	5	0.05	360	31	31	1.5	0.3	0.1
15PT01	Fairhaven Avenue	LNBP	7/17/15	8/5/15	19	2015	0.25	0.3	108	19	19	0.3	0.1	0.0
16BR01	1501 Hartsdale Rd	BR	3/1/16	6/6/17	462	2017	0.25	1	360	462	365	18.1	3.3	0.8
16GF01	4500 Block of Wakefield Rd	GF	11/14/2016	7/14/2017	242	2017	0.02	0.5	14.4	242	242	0.5	0.1	0.0
16GF02	2402 Talbot Road	GF	10/18/2016	12/11/2016	54	2016	1	1	1440	54	54	10.7	1.9	0.5
16HB01	Perkins Homes	BH	4/15/16	10/12/17	545	2017	0.7	1	1008	545	365	50.7	9.2	2.3
16HB02	2400 Fairmount Ave	BH	5/31/16	6/24/16	24	2016	0.1	0.05	7.2	24	24	0.0	0.0	0.0
16HB03	Perkins Homes (Ballou Court)	BH	9/2/2016	10/12/2017	405	2017	1	1	1440	405	365	72.4	13.2	3.3
16HB04	2109 E North Ave	BH	11/22/2016	1/13/2017	52	2017	0.02	1	28.8	52	52	0.2	0.0	0.0
16JF01	Dale Rd & Cross Country Blvd	JF	1/7/16	4/20/16	104	2016	1.5	1	2160	104	104	30.9	5.6	1.4
16JF02	Crest Rd & Greenspring Rd	JF	1/8/2016	11/14/2016	311	2016	1.1	1	1584	311	311	67.8	12.3	3.1
16JF04	2900 block of Woodland Ave	JF	11/1/2016	9/7/2017	310	2017	0.05	1	72	310	310	3.1	0.6	0.1
16JF05	5400 Block of Purlington Way	JF	11/21/2016	6/14/2017	205	2017	0.1	1	144	205	205	4.1	0.7	0.2
17GF01	3208 Milford Ave	GF	8/9/2017	12/7/2017	120	2017	0.16	1	230.4	120	120	3.8	0.7	0.2
17GF02	4202 Maine Ave	GF	8/15/2017	9/15/2017	31	2017	0.1	1	144	31	31	0.6	0.1	0.0
17GF03	5104 Norwood Ave	GF	9/27/2017	8/21/2018	328	2018	0.017	1	24.48	328	328	1.1	0.2	0.1
17JF01	5114 N Charles St, Friends School	JF	3/30/2017	7/26/2017	118	2017	10	0.2	2880	118	118	46.8	8.5	2.1
17JF04	1001 Wilmot Court	JF	7/14/2017	10/19/2017	97	2017	1.5	1	2160	97	97	28.8	5.2	1.3
17JF05	1035 Wilmot Court	JF	10/19/2017	1/3/2018	76	2018	1.5	1	2160	76	76	22.6	4.1	1.0
17JF06	2231 Crest Rd	JF	11/8/2017	11/22/2017	14	2017	0.05	1	72	14	14	0.1	0.0	0.0
18BR01	4206 Frankford Ave	BR	1/25/2018	1/25/2018	0.61	2018	2	1	2880	1	1	0.2	0.0	0.0
18BR02	York Rd & E Coldspring Ln (4711 Yo	BR	2/14/2018	8/15/2018	182	2018	0.01	1	14.4	182	182	0.4	0.1	0.0
18BR03	Kavon & Shannon Dr Outfall	BR	12/13/2018	2/6/2019	55	2019	0.05	1	72	55	55	0.5	0.1	0.0
18GF01	Frederick Ave & Catherine St	GF	6/8/2018	7/26/2018	48	2018	0.5	1	720	48	48	4.8	0.9	0.2
18GF02	2800 Block of Springhill Ave	GF	7/12/2018	11/21/2018	132	2018	0.015	1	21.6	132	132	0.4	0.1	0.0
18GF03	Artaban Townhome Sanitary	GF	9/7/2018	12/6/2018	90	2018	0.5	1	720	90	90	8.9	1.6	0.4
18GF04	5322 Frederick Ave.	GF	11/28/2018	12/12/2018	14	2018	13.64	1	19641.6	14	14	37.9	6.9	1.7
18JF01	4801 Laurel Ave.	JF	1/24/2018	11/21/2018	301	2018	0.03	1	43.2	301	301	1.8	0.3	0.1
18JF02	3316 Bancroft Road	JF	4/6/2018	10/22/2018	199	2018	1	1	1440	199	199	39.4	7.2	1.8
18JF02	3316 Bancroft Road	JF	10/22/2018	2/23/2019	123	2019	0.5	1	720	123	123	12.2	2.2	0.6
18JF03	3732 Old York Rd	JF	8/29/2018	9/5/2018	7	2018	0.167	1	240.48	7	7	0.2	0.0	0.0
18JF04	Homewood Ave & Walpert Ave	JF	11/1/2018	3/8/2019	127	2019	0.103	1	148.32	127	127	2.6	0.5	0.1
19GF01	4001 Alto Rd	GF	1/10/2019	1/18/2019	8	2019	0.10069	1	144.9936	8	8	0.2	0.0	0.0
19GF02	3000 presbury st.	GF	3/13/2019	6/20/2019	99	2019	0.055	1	79.2	99	99	1.1	0.2	0.0
19GF03	1705 N Longwood st	GF	3/13/2019	6/20/2019	99	2019	0.268	1	385.92	99	99	5.3	1.0	0.2
19GF04	1701 N Longwood st	GF	4/9/2019	6/20/2019	72	2019	0.002	1	2.88	72	72	0.0	0.0	0.0
19JF03	Green spring Ave and Dupont Ave	JF	04/11/19	5/29/2019	48	2019	0.003	1	4.32	48	48	0.0	0.0	0.0
20BH02	808 N Luzerne Ave	BH	01/22/20	3/20/2020	58	2020	0.017	1	24.48	58	58	0.2	0.0	0.0
Total Credit for Exfiltration via Sanitary Discharges of Unknown Origin for FY 2020:						41						**488.7**	**88.9**	**22.4**

Notes

1. WS = Watershed. BH = Baltimore Harbor, BR = Back River, GF = Gwynns Falls, LNBP = Lower North Branch Patapsco, JF = Jones Falls
2. Daily Flow = Measured In-flow (gpm) * Observed Consistency * 60 min / hr * 24 hr / day
3. Duration is limited to 365 days for calculation of annual load reduction.
4. TN Red =Total Nitrogen Reduction = Daily flow * 33 mg / L * (8.345 x 10^{-6} lbs*L/ gal*mg) * 365 days / year * 0.5 [Ref. Protocol 2, N-6, IDDE Expert Panel]
5. TP Red = Total Phosphorus Reduction = Daily flow * 6 mg / L * (8.345 x 10^{-6} lbs*L/ gal*mg) * 365 days / year * 0.5 [Ref. Protocol 2, N-6, IDDE Expert Panel]
6. ISR = Impervious Surface Restoration = ((TN Load Reduction / 17.81 lb / acre* year) + (TP Load Reduction / 2.23 lb / acre* year)) /3. Different method from FY 2019 report.

Table L-3
Sewer Exfiltration Reported as SSO, Found by IDDE

SSOID	LOCATION	WS[1]	Report Date	Elimination Year	Reported Volume (gal)[2]	TN Red (lb / yr)[3]	TP Red (lb / yr)[4]	ISR (ac)[5]
3498	977 Ellicott Driveway	GF	1/15/2015	2015	19,500	2.7	0.5	0.1
3512	252 N Hilton St	GF	1/25/2015	2015	46,650	6.4	1.2	0.3
3516	Greenspring Ave & Loyola Southway	JF	1/28/2015	2015	8,325	1.1	0.2	0.1
3645	Orville Ave and E Federal St	GF	4/8/2015	2015	34,940	4.8	0.9	0.2
3699	Guilford Ave and 26th St	JF	5/1/2015	2015	7,575	1.0	0.2	0.0
3702	203 Chancery Rd	JF	5/5/2015	2015	9,900	1.4	0.2	0.1
3826	4000 Edmondson Ave	GF	7/7/2015	2015	62,050	8.5	1.6	0.4
3939	5113 Falls Rd	JF	9/16/2015	2015	32,799	4.5	0.8	0.2
4036	5100 Perring Pkwy	BR	11/17/2015	2015	55,400	7.6	1.4	0.4
4074	2900 Waterview Ave & Cherry Hill Rd	LNBP	12/14/2015	2015	12,450	1.7	0.3	0.1
4107	1901 Eagle Dr	GF	1/4/2016	2016	7,860	1.1	0.2	0.0
4110	1901 Eagle Dr	GF	1/6/2016	2016	8,275	1.1	0.2	0.1
4225	5810 Greenspring Ave	JF	3/17/2016	2016	34,992	4.8	0.9	0.2
4402	N Pine St and W Saratoga St	BH	7/4/2016	2016	48,000	6.6	1.2	0.3
4449	N Pine St and W Saratoga St	BH	8/2/2016	2016	54,000	7.4	1.4	0.3
4476	1500 N Chapel St	BH	8/18/2016	2016	83,990	11.6	2.1	0.5
4538	226 S Mount Olivet Ln	GF	10/14/2016	2016	7,779	1.1	0.2	0.0
5024	2501 W Lexington St	GF	8/25/2017	2017	44,250	6.1	1.1	0.3
5051	2505 W Lexington St	GF	9/12/2017	2017	582,639	80.2	14.6	3.7
5073	3500 Parkdale Ave	JF	9/29/2017	2017	57,750	8.0	1.4	0.4
5085	3500 Parkdale Ave	JF	10/7/2017	2017	2,892	0.4	0.1	0.0
5090	508 E Preston St	JF	10/20/2017	2017	41,600	5.7	1.0	0.3
5099	2585 Edmondson Ave	GF	10/25/2017	2017	17,710	2.4	0.4	0.1
5492	301 S Beechfield Ave	GF	7/23/2018	2018	1,309,300	180.3	32.8	8.3
5906	3700 Tudor Arms Ave	JF	3/21/2019	2019	72,080	9.9	1.8	0.5
5986	2501 Shirley Ave	JF	5/9/2019	2019	7,349	1.0	0.2	0.0
6088	914 Wilmington Ave	GF	8/28/2019	2019	16,003	2.2	0.4	0.1
6099	1232 N Franklintown Rd	GF	9/13/2019	2019	1,142,800	157.4	28.6	7.2
6197	3700 Tudor Arms Ave	JF	12/1/2019	2019	194,500	26.8	4.9	1.2
Total Credit for Exfiltration via Sanitary Sewer Overflows (SSOs) for FY 2020:					29	**554.0**	**100.7**	**25.4**

Notes

1. WS = Watershed. BH = Baltimore Harbor, BR = Back River, GF = Gwynns Falls, LNBP = Lower North Branch Patapsco, JF = Jones Falls
2. Reported Volume as listed on SSO report (5-day) to MDE.
3. TN Red =Total Nitrogen Reduction = 33 mg / L * (8.345 x 10^{-6} lbs*L/ gal*mg) * Reported Volume * 0.5 [Ref. Protocol 2, N-6, IDDE Expert Panel]
4. TP Red = Total Phosphorus Reduction = 6 mg / L * (8.345 x 10^{-6} lbs*L/ gal*mg) * Reported Volume * 0.5 [Ref. Protocol 2, N-6, IDDE Expert Panel]
5. ISR = Impervious Surface Restoration = ((TN Load Reduction / 17.81 lb / acre* year) + (TP Load Reduction / 2.23 lb / acre* year)) /3. Different method from FY 2019 report.

Table L-4
Drinking Water Transmission Loss

PST ID	Location	WS[1]	Elimination Year	Start Date	End Date	Measured Flow (gpm)	Calc. Daily Flow (gpd)[2]	Duration (days)	Limited Duration (calc)[3]	TN Red (lb / yr)[4]	TP Red (lb / yr)[5]	ISR (ac)[6]
2542	2955 Frederick Ave	BR	2018	12/6/2017	3/16/2018	50	72,000	100	100	51.1	1.5	1.2
2346	5604 Hamlet Ave	BR	2017	10/14/2016	2/14/2017	50	72,000	123	123	62.8	1.8	1.5
2338	Kelly & Poplin	JF	2017	9/21/2016	4/26/2017	30	43,200	217	217	66.5	2.0	1.5
2474	3213 Southern Ave	BR	2017	6/14/2017	7/17/2017	25	36,000	33	33	8.4	0.2	0.2
2433	4000 Glenarm Ave	BR	2017	2/8/2017	12/4/2017	35	50,400	299	299	106.9	3.1	2.5
2192	901 N. Newkirk St	BR	2016	1/7/2016	5/2/2016	12.5	18,000	116	116	14.8	0.4	0.3
2012	118 W. Hamburg St	BH	2016	2/19/2015	3/25/2016	30	43,200	400	365	111.8	3.3	2.6
2286	Greenspring & Springarden	JF	2016	7/7/2016	9/5/2016	2	2,880	60	60	1.2	0.0	0.0
2057	2802 Oakford	JF	2015	6/11/2015	7/2/2015	22.5	32,400	21	21	4.8	0.1	0.1
2033	833 S Linwood	BH	2015	5/28/2015	6/18/2015	12.5	18,000	21	21	2.7	0.1	0.1
2011	23rd & Huntingdon	JF	2015	5/15/2015	12/7/2015	22.5	32,400	206	206	47.3	1.4	1.1
2029	1525 W. 41st St	JF	2015	4/23/2015	9/14/2015	50	72,000	144	144	73.5	2.2	1.7
2004	W Caton Ave & N Culver St	GF	2015	1/27/2015	3/8/2015	5	7,200	40	40	2.0	0.1	0.0
2058	3817 Clifton	GF	2015	6/18/2015	7/10/2015	5	7,200	22	22	1.1	0.0	0.0
2295	5201 Park Heights	JF	2020	10/13/2016	6/1/2020	50	72,000	1327	365	186.4	5.5	4.3
2330	5971 Western Run Dr	JF	2020	9/21/2016	6/1/2020	5	7,200	1349	365	18.6	0.5	0.4
2429	2770 Wilkens Ave	GF	2020	1/31/2017	3/17/2020	30	43,200	1141	365	111.8	3.3	2.6
2639	5609 Harford Rd	BR	2020	4/18/2018	5/10/2020	30	43,200	753	365	111.8	3.3	2.6
2864	2900 Hillsdale Rd	GF	2019	8/1/2019	8/5/2019	1000	1,440,000	4	4	40.9	1.2	0.9
2887	Rawlings Conservatory	JF	2020	9/19/2019	6/2/2020	5	7,200	257	257	13.1	0.4	0.3
2890	2558 Oswego Ave	JF	2020	9/11/2019	1/30/2020	1	1,440	141	141	1.4	0.0	0.0
2960	Harford & St. Johns	BR	2020	1/7/2020	5/12/2020	20	28,800	126	126	25.7	0.8	0.6
3017	901 N Chester St	BH	2020	3/4/2020	5/10/2020	100	144,000	67	67	68.4	2.0	1.6
Total Credit for Drinking Water Transmission for FY 2020:					23					**1,133.5**	**33.3**	**26.2**

Notes

1. WS = Watershed. BH = Baltimore Harbor, BR = Back River, GF = Gwynns Falls, LJF = Jones Falls
2. Daily Flow = Measured In-flow (gpm) * 60 min / hr * 24 hr / day
3. Duration is limited to 365 days for calculation of annual load reduction.
4. TN Red =Total Nitrogen Reduction = Daily flow * 1.7 mg / L * (8.345 x 10^{-6} lbs*L/ gal*mg) * 365 days / year * 0.5 [Ref. Protocol 2, N-7, IDDE Expert Panel]
5. TP Red = Total Phosphorus Reduction = Daily flow * 0.05 mg / L * (8.345 x 10^{-6} lbs*L/ gal*mg) * 365 days / year * 0.5 [Ref. Protocol 2, N-7, IDDE Expert Panel]
6. ISR = Impervious Surface Restoration = ((TN Load Reduction / 17.81 lb / acre* year) + (TP Load Reduction / 2.23 lb / acre* year)) /3. Different method from FY 2019 report.

Appendix M: Progress Status of Milestones

Table M-1: Progress Status of Trash WIP Milestones for FY 2020

Milestones	Status
Initiate Phase 2 of Modified Inlets installation and debris collection systems.	Delayed, pending increase inlet cleaning. Initial inlet modifications (catch basin inserts) did not show efficiency increase as compared to flood risk. GIS analysis of potential locations of debris collection systems is complete. Installation will be pending staff additions (scheduled for FY 2023).
Evaluate Baseline TMDL.	Pending City / County monitoring of streams, scheduled to begin in FY 2022. Data evaluation of marine debris, inlet cleaning, and street sweeping have not identified trends to change the baseline TMDL.

Table M-2: Progress Status of PCB WIP Milestones for FY 2020

Milestones	Status
Conduct a study on fats, oils and grease (FOG)-bound PCBs. The goal is to determine what role FOG deposits may play in the loading of PCBs to the BRWWTP and to surface water.	Complete. Part of USGS Scientific Investigations Report (Draft Oct. 2020)
Perform a sample analysis and reporting of the interpretation of the Conceptual Site Model for PCBs in Baltimore Streams.	Complete. Part of USGS Scientific Investigations Report (Draft Oct. 2020)

Appendix N: Progress Status of Projects, Programs, and Partnerships for 20% Impervious Surface Restoration

MS4 WIP Project ID	BMP Type	Watershed	Location	Drainage Area (ac)	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)			Estimated Capital Cost	Schedule to Start (FY)		Status as of 6/30/2020	NOTES
						TN	TP	TSS		Design	Construction		
Structural / Traditional BMPs													
S01	SW Pond Retrofit	Gwynns Falls	Gwynns Run, Carrolton Park	38	25	132	17	15,525	$505,000	2016	2018		Removed due to acces constraints with new BGE utility.
												Removed	
S02	SW Pond Retrofit	Gwynns Falls	Seton Business Park Park	62	41	214	27	25,169	$795,000	2016	2018		Not viable based on access and potential for retro-fit.
												Removed	
S03	Pond Retrofit and New Pond	Back River	North Point Road @ Kane and Quad	92	60	317	40	37,260	$3,290,000	2015	2016		Ex. Pond on RCRA site. Retrofit is not practicable.
												Removed	
S04	Wetland / Pond	Back River	Perring Parkway at Cloville (HR-R28B)	23	15	63	13	8,484	$344,000	2016	2018		Access problems. Project deemed not practicable.
												Removed	
S05	Wetland / Pond	Back River	Herring Run Park below Shannon at Lyndale (HR-R15C)	31	20	84	17	11,465	$550,000	2016	2018		Conflict with active recreation (BCRP).
												Removed	
S06	Wetland	Back River	Herring Run Park below Shannon at Kavon Ave (HR-R39)	31	20	84	17	11,465	$550,000	2016	2018		Area restricted for horizontal expansion.
												Removed	
S07	Wetland	Back River	Herring Run Park below Parkside at Sinclair (HR-R15A)	100	65	275	56	37,260	$1,600,000	2016	2018		Conflict with active recreation (BCRP).
												Removed	
S08	Wetland	Back River	Chinquapin Run Park between Belvedere and Alameda (CH-R6A)	69	45	190	39	25,795	$1,840,000	2016	2018		Project was removed since A05 changed, also based on feasibility.
												Removed	
S09	Bioretention Area	Baltimore Harbor	Faring Baybrook Park Rec Center (MC-18a)	5	3	17	3	1,702	$160,000	2016	2018		Same contract as A23.
				5	3	17	3	1,734	$955,080	2016	2022	Under Design	
S10	Bioretention Area	Gwynns Falls	Park Hts Virginia + Homer	3	2	11	2	1,135	$60,000	2016	2018		Access problems.
												Removed	
S11	Shallow extended detention wetland	Jones Falls	West Coldspring and Brand Ave (LJ-R9)	14	9	46	8	4,624	$212,000	2016	2018		Conflict with active recreation (BCRP).
												Removed	
S12	Shallow wetland	Jones Falls	Woodheights and La Plata (LJ-R38)	6	4	21	3	2,102	$96,000	2016	2018		Access problems.
												Removed	
S13	Shallow wetland	Jones Falls	Lower Lower Stony Run	0	0	0	0	0	$0				Part of Project A02. Total costs shown in A02.
				31	20	107	17	10,614	$0	2016	2018	Completed	
			Subtotal Structural / Traditional (WIP):	**475**	**309**	**1,455**	**243**	**181,986**	**$10,002,000**				
			Subtotal Structural / Traditional (Current):	**36**	**24**	**124**	**20**	**12,348**	**$955,080**				

MS4 WIP Project ID	BMP Type	Watershed	Location	Drainage Area (ac)	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)			Estimated Capital Cost	Schedule to Start (FY)		Status as of 6/30/2020	NOTES
						TN	TP	TSS		Design	Construction		
ESD Practices													
E01	Micro-bioretention	Baltimore Harbor	Cloverleaf - northwest of I-895 and Frankfurst Ave (MC-30)	0.5	0.4	2.1	0.34	217	$50,000	2016	2019		Postponed until next permit.
												Removed	
E02	Micro-bioretention	Baltimore Harbor	Bush St. Curb bump-out	0.3	0.2	1.2	0.20	127	$80,000	2011	2016		
				0.3	0.2	1.2	0.19	121	$102,900	2011	2017	Completed	
E03	Micro-bioretention	Baltimore Harbor	Lafayette inner block retrofit.	0.9	0.7	4.0	0.64	411	$240,000	2011	2016		
				0.9	0.7	4.0	0.64	411	$308,900	2011	2017	Completed	
E14	Micro-bioretention	Baltimore Harbor	Bay Brook MS (MC-18b)	0.3	0.3	1.5	0.2	157	$54,000	2015	2016		School scheduled for renovation
												Removed	
E15	Micro-bioretention	Baltimore Harbor	Bay Brook MS (MC-18c)	0.2	0.2	1.1	0.2	115	$46,800	2015	2016		School scheduled for renovation
												Removed	
E16	Micro-bioretention	Baltimore Harbor	Bay Brook MS - parking lot (MC-18d)	0.2	0.2	1.1	0.2	115	$34,800	2015	2016		School scheduled for renovation
												Removed	
E18	Micro-bioretention	Baltimore Harbor	Brooklyn / Curtis Bay	1.1	0.9	5.0	0.8	513	$19,800	2015	2016		2 facilities
				0.9	0.7	4.2	0.7	423	$138,728	2016	2019	Under Design	
E19	Micro-bioretention	Baltimore Harbor	Patterson Park (HA-R5A)	0.3	0.2	1.4	0.2	139	$40,000	2016	2018		Conflict with active recreation (BCRP).
												Removed	
E20	Micro-bioretention	Baltimore Harbor	Ellwood Park (HA-R8)	0.2	0.1	0.7	0.1	72	$21,000	2016	2018		Conflict with active recreation (BCRP).
												Removed	
E21	Micro-bioretention	Baltimore Harbor	Patterson Park Adjunct (HA-R6)	0.8	0.6	3.6	0.6	362	$105,000	2016	2018		Conflict with active recreation (BCRP).
												Removed	
E22	Micro-bioretention	Baltimore Harbor	Patterson Park / Highlandtown / Baltimore Highlands	5.1	4.1	24.1	3.79	2,446	$710,000	2016	2018		15 facilities
				1.6	1.3	7.7	1.22	785	$530,276	2016	2019	Under Design	
E23	Micro-bioretention	Back River	Frankford / Greater Lauraville / Belair-Edison / Cedonia	4.6	3.6	21.6	3.40	2,198	$671,000	2016	2018		32 facilities
				4.8	3.8	22.6	3.55	2,295	$883,183	2016	2019	Under Design	
E24	Micro-bioretention	Back River	Erdman Avenue	1.4	1.2	6.8	1.07	694	$128,000	2016	2018		
				0.5	0.4	2.4	0.37	242	$129,926	2016	2019	Under Design	
E25	Micro-bioretention	Back River	Belair Road	0.3	0.2	1.2	0.20	127	$77,000	2016	2018		
				0.3	0.2	1.2	0.20	127	$64,693	2016	2019	Under Design	

MS4 WIP Project ID	BMP Type	Watershed	Location	Drainage Area (ac)	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)			Estimated Capital Cost	Schedule to Start (FY)		Status as of 6/30/2020	NOTES
						TN	TP	TSS		Design	Construction		
E26	Micro-bioretention	Jones Falls	Hampden / Remington / Wyman Park	6.3	5.0	29.7	4.67	3,020	$850,000	2016	2018		11 facilities
				1.3	1.0	5.9	0.93	604	$346,821	2016	2019	Under Design	
E27	Micro-bioretention	Gwynns Falls	Howard Park / Grove Park / West Arlington / Fairmount	3.1	2.5	14.9	2.34	1,510	$420,000	2016	2018		14 facilities
				2.9	2.3	13.7	2.15	1,389	$569,043	2016	2019	Under Design	
E28	Micro-bioretention	Gwynns Falls	Hunting Ridge / Rognel Hts / Edmondson Village / Edgewood	3.1	2.5	14.9	2.34	1,510	$420,000	2016	2018		12 facilities
				1.9	1.5	8.9	1.40	906	$371,114	2016	2019	Under Design	
E29	Micro-bioretention	Baltimore Harbor	Sharp-Leadenhall / Federal Hill / Otterbein / S. Baltimore	1.6	1.3	7.4	1.17	755	$215,000	2016	2018		7 facilities
				0.9	0.7	4.2	0.65	423	$208,092	2016	2019	Under Design	
E30	Micro-bioretention	L. N. Branch Patapsco	Cherry Hill	3.1	2.5	14.9	2.34	1,510	$500,000	2016	2018		
				1.9	1.5	8.9	1.40	906	$1,233,400	2015	2019	Under Design	
E31	Micro-bioretention	Baltimore Harbor	Lakeland / Mt. Winans / Westport	1.6	1.3	7.4	1.17	755	$420,000	2016	2018		
				3.3	2.6	15.4	2.43	1,570	$408,851	2016	2019	Under Design	
E32	Micro-bioretention	Baltimore Harbor	McElderry Park / CARE / Milton-Montford / Patterson Place	3.1	2.5	14.9	2.34	1,510	$438,000	2016	2018		
				0.5	0.4	2.4	0.37	242	$324,364	2016	2019	Under Design	
E33	Micro-bioretention	Gwynns Falls	Greater Mondawmin / Walbrook / Rosemont / NW Community Action /	3.1	2.5	14.9	2.34	1,510	$438,000	2016	2018		
				1.0	0.8	4.8	0.75	483	$2,140,081	2016	2019	Under Design	
E34	Micro-bioretention	Jones Falls	Mt. Washington / Glen / Cheswolde / Cross Country	6.3	5.0	29.7	4.67	3,020	$1,350,000	2016	2018		
				0.4	0.3	1.8	0.28	181	$1,284,405	2016	2019	Under Design	
E35	Micro-bioretention	Back River	Cameron Village / Chinquapin Park (upstream to Chinquapin Run)	5.0	4.0	23.8	3.74	2,416	$680,000	2017	2019		
				3.3	2.6	15.4	2.43	1,570	$664,040	2016	2019	Under Design	
E36	Micro-bioretention	Back River	De Wees Park	1.3	1.0	5.9	0.93	604	$180,000	2017	2019		No viable projects founds.
												Removed	
E37	Micro-bioretention	Back River	Orchard Ridge / Armistead Gardens / Orangeville	6.3	5.0	29.7	4.67	3,020	$630,000	2017	2019		No viable projects founds.
												Removed	
E38	Micro-bioretention	Jones Falls	Central Park Heights / Towanda Grantley / Lucille Park	3.1	4.0	14.9	2.34	1,510	$513,000	2017	2019		
				5.0	4.0	23.8	3.74	2,416	$454,742	2016	2019	Under Design	
E39	Micro-bioretention	Gwynns Falls	MorrellPark / Wilhelm Park / Gwynns Falls / Carroll-South Hilton	3.1	6.0	14.9	2.34	1,510	$625,000	2017	2019		
				7.5	6.0	35.6	5.61	3,623	$1,437,153	2016	2019	Under Design	

MS4 WIP Project ID	BMP Type	Watershed	Location	Drainage Area (ac)	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)			Estimated Capital Cost	Schedule to Start (FY)		Status as of 6/30/2020	NOTES
						TN	TP	TSS		Design	Construction		
E41	Micro-bioretention	Back River	Clifton Park	0.3	0.2	1.2	0.19	121	$35,000	2017	2019		Conflict with active recreation (BCRP).
												Removed	
E42	Micro-bioretention	Back River	Clifton Park	2.9	2.3	13.7	2.15	1,389	$400,000	2017	2019		Conflict with active recreation (BCRP).
												Removed	
			Subtotal ESD Practices (WIP):	**69**	**60**	**328**	**52**	**33,359**	**$10,391,400**				
			Subtotal ESD Practices (Current):	**39**	**31**	**184**	**29**	**18,715**	**$11,600,712**				
Alternative BMPs (Stream Restoration)-- Drainage Area = Stream Restoration Length (LF)													
A01	Stream Restoration	Gwynns Falls	Leakin Park Stream Restoration at Fairmount Storm Drain	2,080 LF	21	156	141	62,400	$700,000	2010	2014		
				2,080 LF	21	156	141	62,400	$700,000	2010	2014	Completed	
A02	Stream Restoration	Jones Falls	Lower Lower Stony Run	4,500 LF	45	338	306	135,000	$4,030,000	2015	2016		Cost includes S13 and A43.
				4,600 LF	46	345	313	138,000	$4,199,700	2015	2017	Completed	
A03	Stream Restoration	Gwynns Falls	Powder Mill Phase 1	3,900 LF	39	293	265	117,000	$3,420,000	2009	2017		Proposed to align with sanitary improvements.
				3,900 LF	39	293	265	117,000	$6,140,947	2009	2021	Under Construction	
A04	Stream Restoration	Jones Falls	East Stony Run Project 1	800 LF	8	60	54	24,000	$839,000	2014	2017		
				800 LF	8	60	54	24,000	$1,135,000	2014	2017	Completed	
A05	Stream Restoration	Back River	Chinquapin Run Project 1	2,200 LF	22	165	150	66,000	$3,670,000	2014	2017		Increased length to coincide with sanitary replacement project.
				10,100 LF	101	758	687	303,000	$10,447,503	2014	2021	Under Construction	
A06	Stream Restoration	Back River	Chinquapin Run Project 2	2,600 LF	26	195	177	78,000	$1,772,000	2015	2017		Coincides with A06.
				2,600 LF	26	195	177	78,000	$2,611,876	2015	2021	Under Construction	
A07	Stream Restoration	Gwynns Falls	Franklintown Culvert	2,400 LF	24	180	163	72,000	$1,700,000	2015	2018		Protests from community groups related to tree removal. Alternatives analysis postponed project.
				2,900 LF	29	218	197	87,000	$5,515,082	2015	2022	Under Design	
A08	Stream Restoration	Back River	Lower Moore's Run Project 2	2,500 LF	25	188	170	75,000	$1,960,000	2015	2018		Project no longer.
								0				Removed	
A09	Stream Restoration	Back River	Biddison Run Project 2	3,030 LF	30	227	206	90,900	$3,590,000	2014	2018		Pending right-of-entry agreements.
				3,060 LF	31	230	208	91,800	$3,748,949	2014	2022	Under Design	
A10	Stream Restoration	Jones Falls	Western Run at Kelly Avenue	800 LF	8	60	54	24,000	$1,324,600	2015	2018		FEMA review required re-design.
				2,600 LF	26	195	177	78,000	$5,294,935	2016	2023	Under Design	
A11	Stream Restoration	Jones Falls	East Stony Run Project 2	1,340 LF	13	101	91	40,200	$2,040,000	2015	2018		Postponed due to increased scope of A10 and access issues.
												Removed	

MS4 WIP Project ID	BMP Type	Watershed	Location	Drainage Area (ac)	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)			Estimated Capital Cost	Schedule to Start (FY)		Status as of 6/30/2020	NOTES
						TN	TP	TSS		Design	Construction		
A12	Stream Restoration	Back River	Biddison Run Projects 3	3,850 LF	39	289	262	115,500	$1,800,000	2014	2018		Will be advertised with A09 - Biddison Run Project 2.
				3,850 LF	39	289	262	115,500	$4,726,935	2014	2022	Under design	
A13	Stream Restoration	Back River	Moore's Run Restoration Project 1	2,500 LF	25	188	170	75,000	$1,822,000	2015	2018		Pending right-of-entry agreements.
				3,700 LF	37	278	252	111,000	$4,909,153	2016	2022	Under Design	
A14	Stream Restoration	Back River	Moore's Run Restoration Project 2	2,800 LF	28	210	190	84,000	$1,822,000	2015	2018		Will be advertised with A13 - Moore's Run Stream Restoration
				2,800 LF	28	210	190	84,000	$3,681,864	2016	2022	Under Design	
A15	Stream Restoration	Back River	Herring Run stream	2,665 LF	27	200	181	79,950	$2,702,000	2015	2018		Postponed due to increase of A05 scope
												Removed	
A16	Stream Restoration	Jones Falls	Druid Hill Park Stream Project	1,875 LF	19	141	128	56,250	$2,702,000	2015	2018		Postponed due to increased scope of A10.
												Removed	
A17	Stream Restoration	Gwynns Falls	Dead Run (Huntington Ridge)	2,600 LF	26	195	177	78,000	$2,702,000	2015	2018		Protests from community groups related to tree removal. Alternatives analysis postponed project.
				600 LF	6	45	41	18,000	$2,589,956	2017	2023	Under Design	
A18	Stream Restoration	Gwynns Falls	Maiden's Choice	2,600 LF	26	195	177	78,000	$2,702,000	2015	2018		Access problems. Project deemed not practicable.
												Removed	
A19	Stream Restoration	Gwynns Falls	Maiden's Choice Tributary (Upland)	2,300 LF	23	173	156	69,000	$2,702,000	2015	2018		Delays due to forest mitigation approvals. Anticipate advertising in 2021.
				2,700 LF	27	203	184	81,000	$3,112,295	2017	2022	Under design	
A20	Stream Restoration	Gwynns Falls	Dead Run	2,200 LF	22	165	150	66,000	$2,702,000	2016	2019		Advertised with A19.
				2,700 LF	27	203	184	81,000	$3,493,124	2017	2022	Under design	
A21	Stream Restoration	Back River	Herring Run Western Branch	2,675 LF	27	201	182	80,250	$2,702,000	2016	2019		Advertised with A19.
				3,800 LF	38	285	258	114,000	$4,900,000	2017	2022	Under design	
			Subtotal Alternative BMPs (Stream Restoration) (WIP):	**52,215 LF**	**522**	**3,916**	**3,551**	**1,566,450**	**$49,403,600**				
			Subtotal Alternative BMPs (Stream Restoration) (Current):	**52,790 LF**	**528**	**3,959**	**3,590**	**1,583,700**	**$67,207,319**				
Alternative BMPs (Other)													
A22	Regenerative Step Pool Storm Conveyance	Gwynns Falls	Seamon Avenue	20	6	139	11	5,068	$1,168,000	2015	2017		Pending right-of-entry agreements.
				20	6	139	11	5,120	$1,403,750	2015	2022	Under design	
A23	IA Removal, afforestation, bioretention	Baltimore Harbor	CARE Communities / McElderry Park / Milton-Montford	3.1	3.75	19.2	4.34	2,852	$496,000	2016	2018		Delays due to design contract procurement and financing (EIB).
				0.3	0.25	1.8	0.42	274	$48,800	2016	2022	Under Design	
A24	IA Removal, afforestation	Baltimore Harbor	Harford Hts ES (HA-R19)	0.9	0.60	3.3	0.92	523	$110,000	2016	2018		INSPIRE School- construction conflict
												Removed	

MS4 WIP Project ID	BMP Type	Watershed	Location	Drainage Area (ac)	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)			Estimated Capital Cost	Schedule to Start (FY)		Status as of 6/30/2020	NOTES
						TN	TP	TSS		Design	Construction		
A25	IA Removal, afforestation, bioretention	Back River	Northwood ES and Rec Center (CH-R2A)	2.4	2.85	14.6	3.30	2,167	$565,000	2016	2018		INSPIRE School- construction conflict
												Removed	
A26	IA Removal, afforestation	Back River	Sinclair Lane ES (HR-R18)	1.9	1.31	7.3	2.03	1,154	$260,400	2016	2018		Construction schedule constrained by school year calendar.
				1.4	1.00	5.6	1.54	877	$484,417	2016	2020	Completed	
A27	IA Removal, afforestation	Back River	WEB DuBois (HR-R29A)	0.8	0.53	2.9	0.81	461	$104,200	2016	2018		Postponed to next permit.
												Removed	
A28	IA Removal, afforestation, bioretention	Back River	Various Schools	0.5	0.6	3.1	0.70	456	$120,000	2016	2018		Same contract as A26.
				1.0	0.54	6.2	1.39	913	$266,985	2016	2020	Completed	
A29	IA Removal, afforestation, bioretention	Gwynns Falls	Mt. Winans	3.1	3.75	19.2	4.34	2,852	$496,000	2016	2018		Same contract as A23.
				3.8	3	23.1	5.21	3,422	$585,554	2016	2022	Under Design	
A30	IA Removal, afforestation, bioretention	Back River	Montebello ES (HR-R41A)	0.9	1.05	5.4	1.22	799	$208,000	2016	2018		INSPIRE School- construction conflict
												Removed	
A31	IA Removal, afforestation, bioretention	City-wide	Various Schools	1.5	1.76	9.0	2.03	1,335	$350,000	2016	2018		Same contract as A23.
				7.5	6.25	46.1	10.43	6,845	$199,697	2016	2022	Under Design	
A32	IA Removal, afforestation, bioretention	Jones Falls	Pimlico ES (LJ-R6)	1.1	1.35	6.9	1.56	1,027	$268,000	2016	2018		INSPIRE School- construction conflict
												Removed	
A33	IA Removal, afforestation, bioretention	Jones Falls	Poly Western HS (LJ-R8C)	1.4	1.65	8.5	1.91	1,255	$328,000	2016	2018		Same contract as A23.
				0.9	0.74	5.7	1.29	844	$1,060,164	2016	2022	Under Design	
A34	IA Removal, afforestation, bioretention	Baltimore Harbor	Duane Avenue Park - parking lot (MC-21)	0.3	0.35	1.8	0.40	262	$42,000	2016	2018		Current demand for parking lot.
												Removed	
A35	IA Removal, afforestation	Baltimore Harbor	Oliver / Broadway East	4.0	2.8	15.6	4.32	2,461	$496,000	2017	2019		Locations were not practicable.
												Removed	
A36	IA Removal, afforestation	Gwynns Falls	Carrollton Ridge / Shipley Hill / Mill Hill / Pigtown / New Southwest / Union	4.0	2.8	15.6	4.32	2,461	$496,000	2017	2019		Same contract as A23.
				0.2	0.2	0.8	0.22	123	$149,788	2016	2022	Under Design	
A37	IA Removal, afforestation	Baltimore Harbor	Harlem Park / Sandtown-Winchester / Uplands	2.0	1.40	7.8	2.16	1,230	$248,000	2017	2019		Same contract as A23.
				4.9	4.88	19.0	5.27	3,002	$3,609,904	2016	2022	Under Design	
A38	IA Removal, afforestation	Baltimore Harbor	Various Schools	2.0	1.40	7.8	2.16	1,230	$248,000	2017	2019		Same contract as A23.
				2.6	2.56	10.0	2.76	1,575	$530,083	2016	2022	Under Design	

MS4 WIP Project ID	BMP Type	Watershed	Location	Drainage Area (ac)	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)			Estimated Capital Cost	Schedule to Start (FY)		Status as of 6/30/2020	NOTES
						TN	TP	TSS		Design	Construction		
A39	Aforestation of IA	Gwynns Falls	TreeBaltimore Street Trees	2.0	1.40	19.3	2.29	1,121	$496,000	2017	2019		Shown as part of partnerships.
												Partnership	
A40	Aforestation of IA	Gwynns Falls	TreeBaltimore Street Trees	8.3	5.81	90.2	13.19	6,793	$496,000	NA	2017		Shown as part of partnerships.
												Partnership	
A41	Aforestation of IA	Jones Falls	TreeBaltimore Street Trees	8.3	5.81	90.2	13.19	6,793	$496,000	NA	2018		Shown as part of partnerships.
												Partnership	
A42	Aforestation of IA	City-Wide	TreeBaltimore Street Trees	4.2	2.91	45.1	6.59	3,396	$248,000	NA	2019		Shown as part of partnerships.
												Partnership	
A43	Regenerative Step Pool Storm Conveyance	Jones Falls	Lower Lower Stony Run	0	0	0	0	0	$0				Part of Project A02. Total costs shown in A02.
				5	5	44	6	3,080	$0	2015	2017	Completed	
			Subtotal Alternative BMPs (Other) (WIP):	**72**	**50**	**531**	**82**	**45,696**	**7,739,600**				
			Subtotal Alternative BMPs (Other) (Current):	**48**	**31**	**301**	**45**	**26,074**	**8,339,142**				
			Total Projects (WIP):		**941**	**6,230**	**3,927**	**1,827,491**	**$77,536,600**	**84**	**Projects**	**Proposed**	
			Total Projects (Current):		**613**	**4,568**	**3,684**	**1,640,837**	**$88,102,253**	**48**	**Projects**	**Proposed**	
					0	0	0	0	$0	0	Projects	Pending	
					344	2,595	2,020	902,422	$61,704,025	36	Projects	Under Design	
					166	1,245	1,129	498,000	$19,200,326	3	Projects	Under Construction	
					102	728	535	240,415	$7,197,902	9	Projects	Completed	

Project No. / Type	Equivalent Impervious Surface Restoration, ISR (ac)	Reference Metric	Estimated Pollutant Removal (lbs / yr)			NOTES
			TN	TP	TSS	
Street Sweeping						
Street Sweeping (Annual, as of Dec. 2005)	**3,213**	**47,058 lane miles**	**14,460**	**1,008**	**2,224,560**	Ref: MS4 Annual Report for CY 2005. All operations assumed as min. 2 x / month.
Street Sweeping (Annual, as of Dec. 2009)	**4,790**	**70,143 lane miles**	**21,553**	**1,503**	**3,315,851**	Ref: MS4 Annual Report for CY 2009. All operations assumed as min. 2 x / month.
Sub-total Street Sweeping at full expansion (WIP):	**5,347**	**19,097 tons**	**46,788**	**18,715**	**5,614,518**	Ref: WIP, which only listed tonnage as reference metric.
Sub-total Street sweeping (Current Annual Total):	**3,568**	**52,253 lane miles**	**16,056**	**1,120**	**2,470,142**	Equivalent ISR is based on lane miles swept min. 2x /month. See Section 6.3.2.
Inlet Cleaning & Debris Collection						
Collection within CY 2012	259	926 tons	2,269	907	272,244	Ref: MS4 Annual Report (Jan. 2011 to Dec. 2012). Inlet amount is total inlet cleaning (reactive)
Anticipated Increase after Asset Management (4% Inlets cleaned quarterly):	277	990 tons	2,426	970	291,060	Ref: Preliminary Asset Management Program and CIP Schedule for Inlet Screens.
Sub-total Inlet Cleaning (WIP):	**536**	**1,916 tons**	**4,694**	**1,878**	**563,304**	Both re-active and pro-active cleaning
Sub-total Inlet Cleaning (Current Annual Total):	**158.3**	**396 tons**	**969**	**388**	**116,336**	Tonnage reflects dry weight, due to procedure change in 2016. Only portion of proactive cleaning is used for TMDL compliance, Appendices O and P.
Reactive Inlet Cleaning (daily operation):	*103.5*	*259 tons*	*634*	*254*	*76,058*	
Targeted preventive cleaning (quarterly):	*54.8*	*137 tons*	*336*	*134*	*40,278*	
Illicit Discharge Detection and Elimination Program						
Sanitary Direct Connection	**NA**	10 connections	100	18	**NA**	
Sanitary Direct Connection (current)	**114.0**	23 connections	2,472	450	**NA**	Nutrient reductions per CBP protocol N-5, default values, see Appendix L.
Sewage Exfiltration	**NA**	300 miles lined	5,000	909	**NA**	
Sewage Exfiltration (current)	**47.8**	70 locations	1,043	190	**NA**	Nutrient reductions per CBP protocol N-6, default values, see Appendix L.
Drinking Water Transmission	**NA**	60 miles lined / replaced	1,500	273	**NA**	
Drinking Water Transmission (current)	**26.2**	23 locations	1,134	33	**NA**	Nutrient reductions per CBP protocol N-7, default values, see Appendix L.
Dry Weather SSO	**NA**	30 SSOs / yr red	350	64	**NA**	Asset management / FOG program, education, enforcement, and enhanced IDDE
Sub-total IDDE (WIP):			**9,127**	**1,487**	**0**	
Sub-total IDDE (Current):	**188.0**		**4,649**	**673**	**0**	See Appendix L for watershed designation used in local TMDL compliance (Appendix P).
TOTAL Programs (WIP):	**5,883**		**60,609**	**22,079**	**6,177,822**	
TOTAL Programs (Current):	**3,914**		**21,674**	**2,181**	**2,586,478**	

Project No. / Type	Source ID	Watershed	Location	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)		
					TN	TP	TSS
Development							
Impervious area to pervious	DPW-PRI	City-wide	City-wide	73.8	202	102	59,186
				3.1	6	4	2,292
Treatment by ESD	DPW-PRI	City-wide	City-wide	21.4	113	14	13,289
				291.3	1,311	183	173,274
Treatment by Standard	DPW-PRI	City-wide	City-wide	54.7	288	37	33,938
				206.1	928	130	122,590
			Sub-total Development (WIP):	**150**	**604**	**153**	**106,413**
Sub-total Development (Actual Completed in Jan. 2010 to June 2019):				**501**	**2,245**	**317**	**298,156**
Voluntary - included in the estimate for Development							
Impervious Removal	BWB	Jones Falls	Guilford ES/MS	0.28	0.4	0.1	33
	BWB			0.22	1.1	0.1	52
Impervious Removal	BWB	Gwynns Falls	Calvin Rodwell ES	0.13	1.4	0.2	106.4
Micro-bioretention	BWB	Baltimore Harbor	Library Square	1.1	5.3	0.5	261
	BWB			0.6	2.8	0.3	139

Project No. / Type	Source ID	Watershed	Location	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)		
					TN	TP	TSS
IA Removal, Rain Garden	DOT	Baltimore Harbor	200 N. Duncan Street	0.45	2.3	0.5	342
				0.08	1.0	0.1	59
IA Removal, afforestation	DOT	Baltimore Harbor	2300-2400 Eager St	1.5	7.7	1.7	1141
IA Removal, afforestation, bioretention	GGI Design Comp	Gwynns Falls	2306-8 Riggs Street	0.81	4.2	0.9	616
	CBF			0.18	2.2	0.3	133
IA Removal, afforestation, bioretention	GGI Design Comp	Back River	CHM Gateway 32nd & Harford	0.18	0.9	0.2	137
	Civicworks			0.09	1.1	0.1	67
IA Removal, afforestation, bioretention	GGI Design Comp	Baltimore Harbor	Day Spring Green Parking 1100 block N. Bradford	0.36	1.8	0.4	274
IA Removal, afforestation	GGI Design Comp	Baltimore Harbor	Druid Heights Peace Park Bloom & Druid Hill Ave	0.15	0.8	0.2	114
	Druid Hts CDC			0.04	0.5	0.1	30
IA Removal, afforestation	GGI Design Comp	Baltimore Harbor	Hollins Roundhouse Lots of Art1218-20 W. Lombard	0.06	0.3	0.1	46
	PPF			0.2	2.4	0.3	148
IA Removal, afforestation, and rainwater harvesting	GGI Design Comp	Baltimore Harbor	Janes House of Inspiration A-maze-N Lot728 North Avenue	0.20	1.0	0.2	148

Project No. / Type	Source ID	Watershed	Location	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)		
					TN	TP	TSS
IA Removal, afforestation	GGI Design Comp	Baltimore Harbor	Flower Farm1400 block Gay Street	0.75	3.8	0.9	570
	Civicworks			0.16	1.9	0.2	118
Aforestation of IA	Tree Baltimore	Baltimore Harbor	TBD	25.2	273.7	40.0	20,623.7
			12,804 trees	64.5	1093.2	70.7	27,144
Aforestation of IA	Tree Baltimore	Gwynns Falls	TBD	23.1	250.9	36.7	18,905.0
			8.806 trees	58.7	993.5	64.3	24,668
Aforestation of IA	Tree Baltimore	Jones Falls	TBD	19.6	212.9	31.1	16,040.6
			8,937 trees	45.1	763.2	49.3	18,946
Aforestation of IA	Tree Baltimore	Back River	TBD	21.0	228.1	33.4	17,186.4
			7,578 trees	38.2	646.9	41.8	16,066
Not included in WIP							
Aforestation of IA	Tree Baltimore	LNBP	1,363 trees	6.9	116.6	7.5	2,890
Mico-bioretention	BWB	Back River	Episcopal Church of the Holy Cove	0.16	0.8	0.1	38
Micro-bioretention, Filterra, IA Removal	PPF	Baltimore Harbor	Second Chance	0.29	1.4	0.1	69
Rain Gardens	Cylburn Arboretum	Jones Falls	Cylburn Arboretum Mansion Hous	0.09	0.8	0.1	59
Rain Garden, IA Removal	BWB	LNBP	St. Johns Rain Garden	0.12	0.6	0.1	29

Project No. / Type	Source ID	Watershed	Location	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)		
					TN	TP	TSS
Micro-bioretention	Waterfront Partnership	Baltimore Harbor	Harris Creek Bioretention	0.15	0.7	0.1	36
Micro-bioretention	BWB	Gwynns Falls	Mt. Lebanon Stormwater Planter	0.03	0.1	0.0	7
IA Removal	PPF	Gwynns Falls	Harlem Park Inner Blocks	0.87	10.6	1.4	644
Bioretention	Green Street Academy	Gwynns Falls	Green Street Academy	0.37	1.8	0.2	88
Sidewalk planters	PPF	Jones Falls	Samuel Coleridge-Taylor	0.38	4.6	0.6	281
Micro-bioretention	PPF	Gwynns Falls	Mt. Winans Green Space	0.41	2.0	0.2	97
Micro-bioretention	BWB	Baltimore Harbor	Blue Alley - Bumpouts	0.63	3.0	0.3	150
Bioretention	PPF	Gwynns Falls	Baltimore Street Trolley Turnarou	0.44	2.1	0.2	105
Bioretention	BWB	Baltimore Harbor	Medstar Harbor Hospital	5.27	25.4	2.3	1,252
Bioretention	PPF	Baltimore Harbor	Ambrose Kennedy Park	0.60	2.9	0.3	143
Bioretention	Downtown Partnership	Baltimore Harbor	400 E. Pratt Street	0.13	0.6	0.1	31
Bioswales	BWB	Baltimore Harbor	Prince of Peace	0.26	1.3	0.1	62
Micro-bioretention	BWB	Baltimore Harbor	Gallery Church	0.13	0.6	0.1	31
Micro-bioretention	BWB	Back River	St. Anthony of Padua	0.41	2.0	0.2	97
Rain Garden	BWB	Baltimore Harbor	Amazing Gace / Port Street	0.22	1.1	0.1	52
Regenerative Stormwater Conveyance	PPF	Gwynns Falls	Gwynns Falls Millrace	0.70	10	1	500

Project No. / Type	Source ID	Watershed	Location	Eq. Imp Area Restored (ac)	Estimated Pollutant Removal (lbs / yr)		
					TN	TP	TSS
Rain Gardens	BWB	Baltimore Harbor	St. Helena Community Association	0.35	1.7	0.2	83
			Sub-total Volunteer (WIP):	**95**	**996**	**147**	**76,545**
		Sub-total Volunteer (Actual- Completed):		**227**	**3701**	**243**	**94,313**
SW Fee Credit program							
Treatment BMPs	SAIS	City-wide	City-wide	24.0	206.7	26.5	16,157
Private tree planting (Reforestation on pervious)	SAIS	City-wide	City-wide	7.6	142.6	6.6	1596
				6.1	114.0	5.3	1277
Rain gardens	SAIS	City-wide	City-wide	2.0	17.2	2.2	1,346
Rainwater harvesting	SAIS	City-wide	City-wide	0.5	12.4	1.0	485
			Subtotal SW Fee Credit (WIP):	**34.1**	**378.9**	**36.3**	**19,584**
			Subtotal SW Fee Credit (Actual):	**6.1**	**114.0**	**5.3**	**1,277**
			Total for Partnerships (WIP):	**279**	**1,978**	**337**	**202,541**
	Total for Partnerships (Actual Completed 1/2010 -6/2019):			**733**	**6,060**	**565**	**393,746**

Appendix O: Progress of Chesapeake Bay TMDL

Watershed	Area within City sq. mi.)	Area within City (acres)	Imp. Area[2]	Forest Area[3]	TN (lbs)	TP (lbs)	TSS (tons)
Uncontrolled Loading:							
Back River	19.1	12,224	4,584	449	149,214	10,911	2,534
Baltimore Harbor	22.5	14,400	5,949	225	180,574	13,627	3,200
Gwynns Falls	20.7	13,248	5,605	742	162,636	12,559	2,972
Jones Falls	17.5	11,200	4,816	719	137,139	10,690	2,537
LNB Patapsco	1.8	1,152	502	112	13,842	1,098	262
Uncontrolled:	***81.6***	***52,224***	***21,456***	***2,247***	***643,404***	***48,884***	***11,505***
Controls prior to 2010:							
Steam Restoration[4]:					834	757	167
BMPs installed[5]:					682	301	84
Street sweeping[6]:					21,553	1,503	1,658
Total Controls:					***23,069***	***2,561***	***1,909***
Total Loading with Controls:					**620,335**	**46,323**	**9,595**
Urban Impervious Loading Rate (/ acre)[7]					15.3	1.69	0.44
Urban Pervious Loading Rate (/ acre)[7]					10.8	0.43	0.07
Forest Loading Rate (/ acre)[8]					3.16	0.16	0.03

Reference:

1 -Baltimore City MS4 and TMDL WIP, Table 1, August 2015.

2 - Baltimore City MS4 and TMDL WIP, Table 2, 2015, total = 21,456 ac uncontrolled IA.

3 - 2009 conditions, MAST Scenario, total forest = 2,247 ac.

4 - Baltimore City MS4 and TMDL WIP, Table B-1, August 2015

4 - Baltimore City MS4 and TMDL WIP, Tables B-2 and B-3, August 2015 (

5. Table N-2 Programs, Sweeping as of 2010, FY 2020 MS4 Annual Report

6 - Table A.1, Appendix C from MS4 Accounting Guidelines, August 2014. CBWM version 5.3.2

7 - Table D.1, Appendix D from MS4 Accounting Guidelines, August 2014. CBWM version 5.3.0

Location	Estimated Pollutant Removal (lbs / yr)			Reference
	TN	TP	TSS	
Chesapeake Bay Loading for Baltimore City	418,243	32,870	22,025,806	Bay TMDL MAST Scenario 2010 for City
Reduction Goal for Urban Stormwater:	84,903	9,960	418,490	Maryland's Phase II WIP for Bay TMDL, Oct. 2012, Executive Summary
	20.3%	*30.3%*	*1.9%*	
Analysis based on MS4 Accounting Guidelines				
Total Controlled Loading:	**620,335**	**46,323**	**19,190,570**	Table O-1
Reduction Goal:	*125,928*	*14,036*	*364,621*	Based on % reduction goals from Bay TMDL.
Projects related to current MS4 permit:				
Total Projects (WIP):	6,230	3,927	1,827,491	Table N-1.
Total Projects (Current Completed):	**728**	**535**	**240,415**	
Programs related to current MS4 permit:				
Total Programs (WIP)[1]:	36,787	19,669	2,589,727	Table N-2.
Total Programs (Current)[2]:	**4,985**	**807**	**40,278**	
Partnerships related current MS4 permit:				
Total Partnerships (WIP):	1,978	337	202,541	Table N-3.
Total Partnerships (Current):	**6,060**	**565**	**393,746**	
Total Reduction (WIP):	44,996	23,933	4,619,759	
% Reduction (WIP):	7%	52%	24%	
Total Reduction (Current):	**11,772**	**1,907**	**674,439**	
% Reduction (Current):	**2%**	**4%**	**4%**	

NOTES:

1- Total WIP programs includes the increased street sweeping (WIP values less the CY 2009 values), ant. Increase of inlet cleaning, and WIP- IDDE estimates.

2- Total current programs only includes current proactive inlet cleaning and current IDDE values.

Appendix P: Progress of Local TMDLs for Nutrients and Sediment

BMP Type	Estimated Pollutant Removal (lbs / yr) TN	TP	NOTES
TMDL Baseline Load:	**73,429**	**8,315**	TMDL for Back River (2005)
% Reduction Goal:	*15%*	*15%*	TMDL for Back River (2005)
Baseline Load using MDE-AG:	**149,214**	**10,911**	Table O-1.
Reduction Goal:	22,382	1,637	Based on % reduction goals.
BMPs installed between 2005 and 2010:			
Stream Restoration	113	102	Table B-1, WIP. 1,500 LF .
Private / Other City BMPs	27	14	Tables B-2 and B-3, WIP.
Total BMPs (2005 -2010):	**139**	**116**	
Projects related to current MS4 permit:			
Total Projects (WIP):	3,011	1,895	Table N-1.
Total Projects (Current Completed):	12	3	
Programs related current MS4 permit:			
Total Programs (WIP)[1]:	1,247	261	Table N-2.
Total Programs (Current)[3]:	584	48	
Partnerships related current MS4 permit:			
Total Partnerships (WIP):	423	72	Table N-3.
Total Partnerships (Current):	1,153	111	
Total Reduction (WIP):	4,820	2,343	
% Reduction (WIP):	3%	21%	
Total Reduction (Current):	**1,888**	**278**	
% Reduction (Current):	**1%**	**3%**	

NOTES:

1- Total WIP programs includes the increased street sweeping (WIP values less the CY 2005 values), ant. Increase of inlet cleaning, and WIP- IDDE estimates.

2- Total current programs includes the current increased street sweeping (current less the CY 2005), current proactive inlet cleaning, and current IDDE values.

BMP Type	Estimated Pollutant Removal (lbs / yr)		NOTES
	TN	TP	
TMDL Baseline Load:	**260,323**	**28,177**	TMDL for Baltimore Harbor (2007), includes GF, JF, and LNBP
% Reduction Goal:	*15%*	*15%*	
Uncontrolled Load using MDE AG:	**494,190**	**37,973**	Table O-1
Street Sweeping	**14,460**	**1,008**	Table O-1. Assumes 100%
Controlled Load:	**479,731**	**36,965**	
Reduction Goal:	71,960	5,545	Based on % reduction goals.
BMPs installed between 2005 and 2010:			
Stream Restoration	722	655	Table B-1, WIP. 9625 LF
Private / Other City BMPs	655	287	Tables B-2 + B-3, WIP.
Total BMPs (2005 -2010):	**1,377**	**942**	Based on % reduction goals.
Projects proposed related current MS4 permit:			
Total Projects (WIP):	3,219	2,032	Table N-1.
Total Projects (Current Completed):	716	533	
Programs proposed related to current MS4 permit:			
Total Programs (WIP)[1]:	17,399	2,691	Table N-2
Total Programs (Current)[2]:	5,996	870	
Partnerships related to current MS4 permit:			
Total Partnerships (WIP):	1,556	265	Table N-3.
Total Partnerships (Current):	**4,908**	**454**	
Total Reduction (WIP):	23,551	5,930	
% Reduction (WIP):	5%	16%	
Total Reduction (Current):	**12,998**	**2,798**	
% Reduction (Current):	**3%**	**8%**	

NOTES:

1- Total WIP programs includes the increased street sweeping (WIP values less the CY 2009 values), ant. Increase of inlet cleaning, and WIP- IDDE estimates.

2- Total current programs includes the current proactive inlet cleaning and current IDDE values.

Location	Estimated Pollutant TSS (lb/ year)	NOTES
MS4 Baseline Load (TMDL Report)	14,410,000	TMDL for Gwynns Falls (2010)
% Reduction Goal (TMDL Report)	*49%*	TMDL for Gwynns Falls (2010)
Uncontrolled Load using MDE-AG:	**5,943,099**	See Table O-1
Street Sweeping as of CY 2009	1,260,023	See Table N-2. Assumed 38% total of CY09
Stream Restoration	81,000	Table B-1, WIP. 2,700 LF .
Private / Other City BMPs	63,396	Tables B-2 and B-3, WIP.
Total Controls by 2010:	***1,404,419***	
Controlled Load:	**4,538,680**	
Reduction Goal:	**2,201,260**	Based on % reduction goals.
Projects proposed related to current MS4 permit:		
Total Projects (WIP):	608,562	Table N-1.
Total Projects (Current Completed):	62,400	
Programs related to current MS4 permit:		
Total Programs (WIP)[1]:	979,627	Table N-2.
Total Programs (Current)[2]:	16,111	
Partnerships related current to MS4 permit:		
Total Partnerships (WIP):	52,904	Table N-3
Total Partnerships (Current):	104,454	
Total Reduction (WIP):	1,641,092	
% Reduction (WIP):	36%	
Total Reduction (Current):	**182,965**	
% Reduction (Current):	**4%**	

NOTES:

1- Total WIP programs includes the increased street sweeping (WIP values less the CY 2009 values) and ant. increase of inlet cleaning.

2- Total current programs includes the current proactive inlet cleaning.

Location	Estimated Pollutant TSS (lb/ year)	NOTES
MS4 Baseline Load (TMDL Report)	9,466,000	TMDL for Jones Falls (2011)
% Reduction Goal (TMDL Report)	*26.3%*	TMDL for Jones Falls (2011)
Uncontrolled Load using MDE AG:	**5,074,317**	See Table O-1
Street Sweeping as of CY 2009	1,027,914	See Table N-2. Assumed 31% total of CY09
Stream Restoration	207,750	
Private / Other City BMPs	14,053	
Total Controls by 2010:	***1,249,717***	
Baseline Load:	**3,824,600**	
Reduction Goal:	***1,005,870***	
Projects proposed within current MS4 permit:		
Total Projects (WIP):	302,799	Table N-1.
Total Projects (Current Completed):	175,694	
Programs related to current MS4 permit:		
Total Programs (WIP)[1]:	513,025	Table N-2.
Total Programs (Current)[2]:	6,444	
Partnerships related current to MS4 permit:		
Total Partnerships (WIP):	45,471	Table N-3
Total Partnerships (Current):	67,615	
Total Reduction (WIP):	861,294	
% Reduction (WIP):	23%	
Total Reduction (Current):	**249,754**	
% Reduction (Current):	**7%**	

NOTES

1- Total WIP programs includes the increased street sweeping (WIP values less the CY 2009 values) and ant. increase of inlet cleaning.

2- Total current programs includes the current increased street sweeping and current proactive inlet cleaning.

Location	Estimated Pollutant TSS (lb/ year)	NOTES
MS4 Baseline Load (TMDL Report)	**1,220,000**	TMDL for Lower North Branch Patapsco (2011)
% Reduction Goal (TMDL Report)	*25.1%*	TMDL for Gwynns Falls (2010)
Uncontrolled Load using MDE AG:	**523,772**	See Table O-1. No controls assumed.
Reduction Goal:	**131,467**	
Projects proposed related current MS4 permit:		
Total Projects (WIP):	1,510	Table N-1.
Total Projects (Current Completed):	0	
Programs proposed related current MS4 permit:		
Total Programs (WIP)[1]:	51,955	Table N-2.
Total Programs (Current)[2]:	3,625	
Partnerships proposed related current MS4 permit:		
Total Partnerships (WIP):	4,739	Table N-3.
Total Partnerships (Current):	28,871	
Total Reduction (WIP):	58,205	
% Reduction (WIP):	11%	
Total Reduction (Current):	**32,496**	
% Reduction (Current):	**6%**	

NOTES:

1- Total WIP programs includes the increased street sweeping (WIP values less the CY 2009 values) and ant. increase of inlet cleaning.

2- Total current programs includes current proactive inlet cleaning.

Location	Estimated Pollutant TSS (lb/ year)	NOTES
MS4 Baseline Load (TMDL Report)	3,661,838	TMDL for Back River (2018). 44.3% WS in City
% Reduction Goal (TMDL Report)	*69%*	TMDL for Jones Falls (2011)
Uncontrolled Load using MDE AG:	**5,067,568**	See Table O-1
Street Sweeping as of FY 2019	119,954	See Table N-2, FY 2019 Annual Report
Inlet Cleaning as of FY 2019	58,153	See Table N-2, FY 2019 Annual Report
Stream Restoration (prior to WIP)	45,000	Table B-1, WIP. 1,500 LF .
Private/Other City BMPs (prior to WIP)	8,209	Tables B-2 and B-3, WIP.
Partnerships (FY 2015- 2019)	18,980	See Table N-3, FY 2019 Annual Report
Total Controls by 2010:	**250,296**	
Controlled Load:	**4,817,272**	
Reduction Goal:	**3,332,345**	
Restoration completed after FY 2019:		
Total Projects (FY 2020):	1,789	Table N-1
Total Partnerships (Current):	61,150	Table N-3 (less the amount for FY 2019)
Total Reduction (Current):	**62,939**	
% Reduction (Current):	**1%**	