
6.0 Permit Requirements**D. Management Programs****4. Trash and Litter**

Baltimore County drains to at least two major water bodies (the Middle Branch and Northwest Branch of the Patapsco River) determined to be impaired by trash. The trash and litter section of this permit is to assist in efforts to address water quality improvements. Increases in trash discharges to receiving water have become a growing concern both nationally and within Maryland. This section requires Baltimore County to evaluate current trash and litter control efforts; develop strategies to reduce trash, floatables, and debris within those areas draining to the Middle Branch and Northwest Branch of the Patapsco River; and bolster public education.

- a. Within one year of permit issuance, the County shall inventory and evaluate all current trash and recycling pick-up operations, litter control programs, and public outreach efforts. The analysis shall identify opportunities for improving overall efficiency, especially in the Middle Branch and Northwest Branch of the Patapsco River.
- b. Within one year of permit issuance, develop and implement a public education and outreach strategy with specific performance goals, and corresponding deadlines to initiate or increase residential and commercial recycling rates, improve trash management, and reduce littering. The strategy shall include:
 - i. Educating the public on the importance of reducing, reusing, and recycling;
 - ii. Disseminating information by using signs, articles, and other media outlets;
 - iii. Promoting educational programs in schools, businesses, community associations, etc.; and
 - iv. Providing the strategy to interested parties upon request.
- c. Evaluating annually the effectiveness of the education program.
- d. Within one year of the Environmental Protection Agency's (EPA) approval of a trash total maximum daily load (TMDL) for the Middle Branch and Northwest Branch of the Patapsco River, implement those program improvements identified in Part III.D.4.a above and any additional programs needed to address the TMDL.
- e. Submit an annual report that details progress toward implementing the trash reduction strategies. The report shall describe the status of trash elimination

efforts including resources (e.g., personnel and financial) expended and the effectiveness of all program components.

6.1 Introduction

The 2008 Integrated Report indicated that the mesohaline portion of the Patapsco River basin was listed for impairment of aquatic life by debris/floatables/trash. This listing only applies to the Middle Branch from the mouth (Ferry Bar Park to Harbor Hospital Center) extending westward and the Northwest Branch from the Hull Street Pier to Canton Waterfront Park, which includes the Inner Harbor at the base of Gwynns Falls and Jones Falls. In October 2010 Baltimore County initiated a monitoring program to collect data for development of a Total Maximum Daily Load (TMDL) for trash, which was completed in November 2011. Following this yearlong study, a long-term trend monitoring program was initiated in March 2012 with a fixed and random site study design. The draft TMDL report was made public on September 11, 2012. The public comment period ended on October 29, 2012. An informational briefing was held prior to the closing on September 21, 2012. Comments were addressed and the trash TMDL was submitted to EPA in August of 2014 for approval. In January 2015, the EPA approved the trash TMDL for the Harbor.

Baltimore County developed a TMDL Implementation Plan for trash, to outline how the County plans to meet the pollutant reduction requirements in the impaired waterbody. A draft of the plan was posted for public comment in November of 2015 and submitted to MDE for approval in December. MDE provided comments on the plan and Baltimore County responded to those comments before resubmitting the revised plan in July, 2016.

To target areas of high trash accumulation, an upland trash assessment monitoring plan was developed in 2015 to determine the sources of trash within the Gwynns Falls and Jones Falls. A pilot of the upland trash monitoring program was tested in 2015 and a full scale assessment began in April of 2016. Upland trash monitoring data will continue to be collected on an annual basis and results will be reported in this report, each year.

A county-wide Trash and Litter Reduction Strategy has also been developed to address the trash issue throughout the county in response to a requirement in the county's 2013 MS4 permit. The Trash and Litter Reduction Strategy was submitted to MDE in 2014. This section will describe the progress of the Trash and Litter Reduction Strategy and include any monitoring data collected as part of strategy implementation and tracking. In future NPDES Annual Reports, this section will also include progress and monitoring relating to the Trash TMDL Implementation Plan.

6.2 TMDL Compliance

This section describes the key assessment, outreach and progress tracking components of the Trash TMDL Implementation Plan and the Trash Reduction Strategy. The Trash and Litter Reduction Strategy outlines a County wide program to reduce litter pollution and addresses a requirement in part IV.D.4 of the current MS4 permit. The Trash TMDL Implementation Plan addresses the requirement to develop a plan to meet TMDL reductions in Baltimore County within one year of approval of the TMDL.

6.2.1 Trash and Litter Reduction Strategy

Baltimore County EPS has created a Trash and Litter Reduction Strategy. This plan introduces actions to reduce trash, enhance public education, and ensure that Baltimore County meets the compliance requirements of the TMDL.

The strategy addresses MS4 permit requirements as stated in Part IV.D.4 of the current permit. This strategy was developed by Baltimore County's Department of Environmental Protection & Sustainability (EPS) in close partnership with various county agencies, public stake holders, local watershed associations, and with input from Trash Free Maryland. Suggestions from the public, via community input events held throughout the county, are the main driver of the actions within this plan. Suggestions for litter reduction actions, made by individual citizens, were compiled into a report in the initial phase of strategy development. Those suggestions were then evaluated for their feasibility and potential effectiveness. This plan is the result of that evaluation.

6.2.2 Trash TMDL Implementation Plan

A Trash TMDL Implementation Plan was developed to outline the County's strategy for compliance with the Trash and Debris TMDL reduction requirements by 2036. This implementation plan will be complete, pending final approval from MDE.

The implementation plan is a two phase plan. Much like the Trash and Litter Reduction Strategy, the first phase of the plan is to focus on education and outreach, incentives and enforcement actions to meet the reduction requirements. These are the actions that will stop the trash pollution at its source. Baltimore County will first try to reach the requirements set forth by MDE using these source reduction actions alone. An evaluation of phase I success will be performed after 10 years. At this time, the County will determine if the contingent phase II is necessary or if the reductions can be reached with phase I actions.

Phase II is the implementation of trash trapping devices. These devices trap trash after it has already been littered in the environment. This phase will be more costly than phase I of the plan. It is contingent only on a determination that the TMDL requirements cannot be met with phase I alone.

There is limited available data on the pathways of trash pollution to fresh water bodies and on the efficiency of best management practices to reduce trash pollution. For this reason, this TMDL Implementation Plan emphasizes an adaptive management strategy with emphasis on gathering data to improve our understanding of these uncertainties throughout the implementation process.

6.2.3 Inventory and Evaluation of Operations and Outreach

Baltimore County EPS worked closely with Baltimore County Department of Public Works' (DPW) Bureau of Solid Waste Management, Baltimore County Department of Permits, Approvals, and Inspections (PAI), Baltimore County Police Department and the Department of Health in an effort to identify opportunities for improving efficiency within programs pertaining to trash and recycling pickup, litter control, and public outreach.

In 2009, MDE approved a Ten Year Solid Waste Management Plan covering the years 2009-2018. The goals of this plan are to promote waste prevention, increase recycling, increase

resource recovery, and decrease the quantity of solid waste requiring use of the landfills. The use of this plan will allow for identifying effective ways to improve waste management efforts.

Enforcement of trash regulations is conducted by PAI and by the Baltimore County Police Department. The Baltimore County Bureau of Solid Waste Management has a comprehensive education and outreach program to improve county recycling rates and reduce the amount of trash generated. The Bureau of Solid Waste also has a Community Clean Up Program and Recycle Bin Loan Program. The Baltimore County Bureau of Highways runs several litter reduction programs including county street sweeping, Adopt-A-Road, Inmate Litter Crew Highway Cleanup, District Litter Removal, and Neighborhood Dumpster Clean-Ups. Collaboration with these departments will ensure effective litter control and trash reduction programs.

Existing programmatic and municipal trash reduction actions that have associated measurable load reductions have been inventoried in Section 9 of the Trash TMDL Implementation Plan. Those actions with calculable load reductions are street sweeping, storm drain cleaning, SWM facilities, Clean Green 15, Community Clean Ups, Project Clean Stream, and Enforcement programs. Calculated reductions are based on the best available data. This section will serve as the means for reporting any reduction calculation changes based on future data.

A gap analysis is also available in Section 9 of the Trash TMDL Implementation Plan, which shows the remaining reductions needed to meet the TMDL requirements for trash and the process of analysis used to select opportunities for program enhancements. The program enhancements are projected to achieve the remaining reductions. This section will also serve to report progress of program enhancements and the status of Phase I and II of the Trash TMDL Implementation Plan.

6.2.4 Public Education and Outreach

To provide outreach to schools, businesses, community associations, etc., collaboration will be required with the Baltimore County School System, as well as community and watershed groups. Trash activities with high citizen involvement and publicity, such as Project Clean Stream, and watershed group clean-ups, will be beneficial in reaching the targeted audiences.

A county wide litter reduction media campaign is being developed as part of the Trash and Litter Reduction strategy and Trash TMDL Implementation Plan. The media campaign is intended to reach as many Baltimore County Citizens as possible with the message to stop littering in Baltimore County. EPS has retained the services of an on-call environmental consulting firm. Our goal is to use this consultant to help build our public education and outreach campaigns, utilizing targeted marketing and other methods. A more detailed review of activities and plans is available in Section 8 of this report. This is one of several education and outreach actions described in the Trash and Litter Reduction Strategy. Other potential actions outlined in the Trash and Litter Reduction Strategy include: development of a county based trash treaty, promoting service learning opportunities, school litter awareness programs, anti-littering signage, and continued support of cleanups by watershed groups and faith based institutions.

Baltimore County EPS has developed an educational door-hanger that can be used as an alternative to a citation, as a means to educate communities with high trash accumulation. The use of websites, e-newsletters, local newspaper, etc. will also provide a valuable tool in promoting information. Many departments within Baltimore County have media programs

already established that can be built upon to cater to specific trash and recycling information needs.

6.2.5 Program Updates

Baltimore County has retained the services of a consulting firm to develop a county wide education and outreach campaign for the reduction of trash and litter. The County has begun to explore the possibility of coordinating with other jurisdictions and/or the state on this outreach campaign and will continue to do so once the consultant is brought on board. That consultant will also help with many of the Trash and Litter Reduction Strategy implementation efforts. Initial planning efforts for a county based trash treaty conclude that the expertise of the education and outreach consultant will enhance the potential development and research into best practices for trash treaty development.

EPS has also explored the idea of convening a Trash and Litter Reduction Oversight Committee. Those invited to join this committee would include any Baltimore County agencies that may contribute to trash and litter reduction efforts in the county.

Initial feasibility exploration of a trash bin decorating contest, as described in the Trash and Litter Reduction Strategy, led to the decision that funding for such a program should be evaluated in terms of the broader education and outreach campaign. Expertise from our education and outreach coordinators will help to determine if such a program is the best use of funds or if other education and outreach efforts may be more effective and reach a broader audience.

An evaluation of our reporting system for dumping and littering complaints concludes that the education and outreach campaign may be utilized to improve public education on such issues. Messages may include reminders of who to contact if evidence of littering or dumping is found.

Finally, the upland trash assessment program was piloted in 2015 and a full roll out of the program was implemented in 2016. Trash hotspots identified in this assessment are reported to the appropriate county department or may be suggested as a potential volunteer clean-up site for local watershed organizations. Once a hotspot is identified, EPS may do a secondary site visit to further evaluate the issue and decide if the issue requires reporting to Baltimore County Department Permits Approvals (PAI) and Inspections. If it is not under the jurisdiction of PAI, then a letter may be written to the business owner, making them aware of the issue. Each confirmed hotspot will be revisited by Baltimore County EPS every year until resolved. Potential hotspots will be revisited every five years. The hotspot and potential hotspot areas may also be used to target education and outreach efforts. Improved outreach materials developed through the new campaign may be used to encourage anti-littering values in areas where these trash hotspots tend to be more concentrated.

6.2.6 Program Effectiveness

The effectiveness of the education and outreach programs can be evaluated annually through the NPDES report. Information will be compiled from all responsible agencies with education materials. DPW Bureau of Solid Waste Management analyzes the annual recycling rate throughout communities in Baltimore County on its website <http://www.bcrecycles.com>. This is an example of how EPS can deliver information to the public while promoting trash and recycling activities.

Baltimore County EPS will also track the effectiveness of its Trash and Litter Reduction Strategy and Trash TMDL Implementation Plan as part of the initial phase of implementation. The Trash TMDL Implementation Plan requires that the need for the contingent structural phase be evaluated after 10 years. The Trash and Litter Reduction Strategy has a similar contingent structural phase, but at a County wide level. This too will be addressed in this section of future NPDES reports. The data collected from the initial phase can also be used to better target actions to areas where they will be most beneficial.

6.3 Monitoring

Following the TMDL development study, the trash monitoring program has developed into a long-term trend monitoring program for stream sites. Trash from both fixed and random sampling sites will be collected on an annual basis to document trends and identify problem areas. A monitoring program for trash in the upland areas of the county has also been developed. Upland trash monitoring sites include revisited hotspot and potential hotspot site as well as new random sites each year. Results of these programs will help to target improvement efforts.

6.3.1 Fixed and Random Study (in-stream monitoring)

The twenty stream sites from the previous trash survey were defined as fixed sites, and were randomly selected to be alternately sampled in groups of ten during odd and even years. Each year, twenty additional randomly selected sites (ten in Gwynns Falls, ten in Jones Falls) are added to the survey along with the ten fixed sites. The random sites will not be repeated in the survey during the following years. Figure 6-1 below shows the locations of the fixed and random sites for 2015 throughout the Gwynns Falls and Jones Falls.

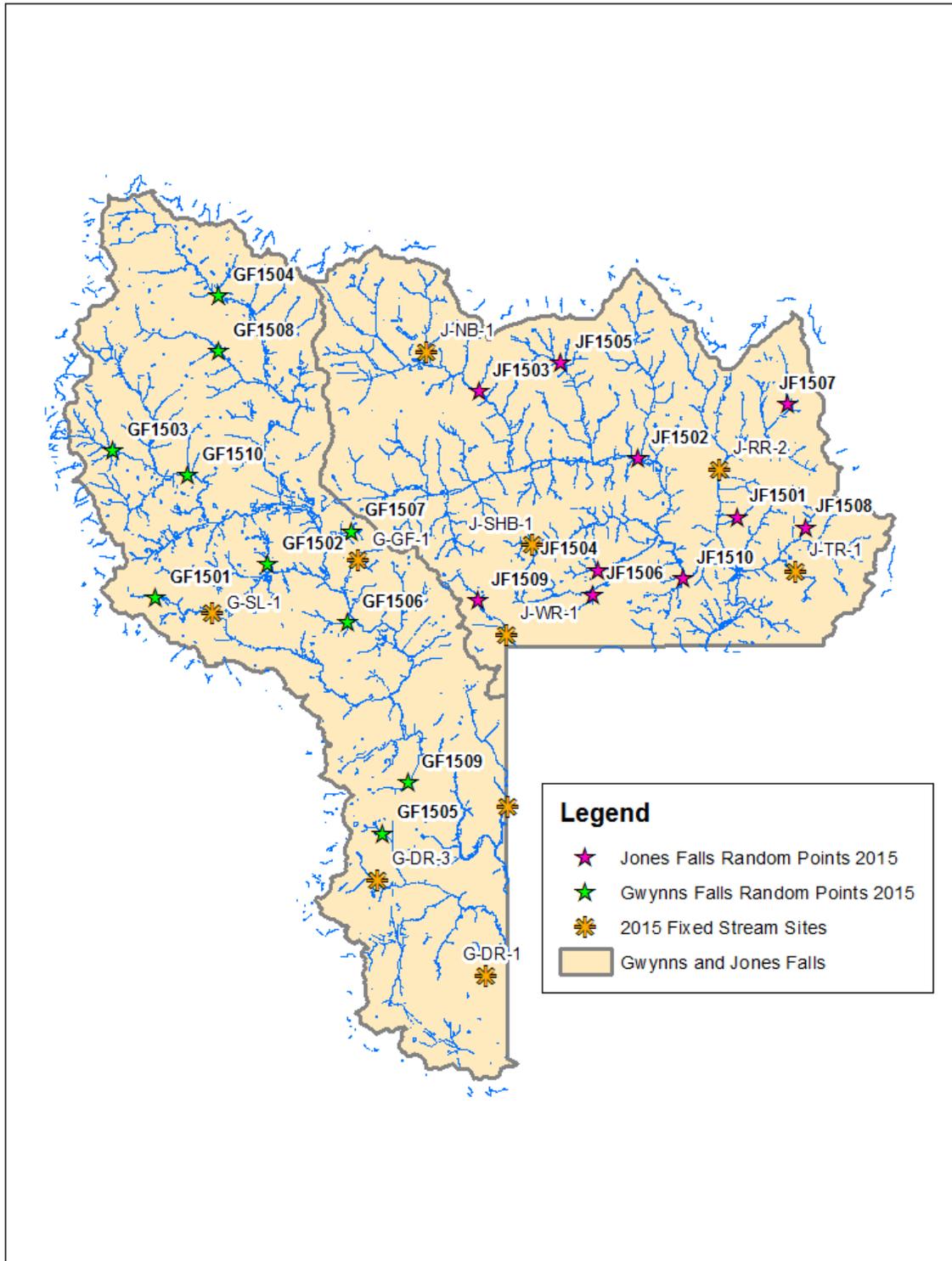


Figure 6-1: Map of 2015 Fixed and Random Monitoring Locations

6.3.1.1 Results

The results from the 2015 fixed/random survey are presented below. The data is broken into total pounds of trash collected per site, count of bottles/cans per site, and the loading rates with and without dumping (lbs/acre) per site. Dumping composed a large portion of the total weight in trash at random sites sampled in 2015. Most of the large item dumping weight was found at three sites (GF1507, GF1509, and GF1510) containing approximately 100 lbs of large item dumping each. Table 6-1 displays the site-specific information, grouped by watershed.

Table 6-1: 2015 Fixed and Random Site Information

Stream Site	Fixed/Random	Stream Name	Watershed	Major Designation Land Use*	Drainage Area (acres)	Trash Total (lbs)	Trash (lbs/acre)	Trash w/o dumping (lbs/acre)
G-DR-1	Fixed	Dead Run	Gwynns Falls	HDR	238.41	68.18	0.2860	0.2440
G-DR-3	Fixed	Dead Run	Gwynns Falls	MDR	408.97	237.70	0.5812	0.3952
G-GF-1	Fixed	Gwynns Falls	Gwynns Falls	LDR	83.74	7.07	0.0844	0.0844
G-PM-1	Fixed	Powder Mill	Gwynns Falls	MDR	2435.8	419.98	0.1724	0.1724
G-SL-1	Fixed	Scotts Level Br.	Gwynns Falls	MDR	738.66	28.46	0.0385	0.0385
J-NB-1	Fixed	North Branch	Jones Falls	LDR	642.02	0.30	0.0005	0.0005
J-RR-2	Fixed	Roland Run	Jones Falls	MDR	3009.8	20.71	0.0069	0.0069
J-SHB-1	Fixed	Slaughterhouse Branch	Jones Falls	LDR	265.8	33.48	0.1260	0.0507
J-TR-1	Fixed	Towson Run	Jones Falls	HDR	320.41	13.87	0.0433	0.0433
J-WR-1	Fixed	Western Run	Jones Falls	OU	583.8	5.88	0.0101	0.0101
GF1501	Random	Scotts Level	Gwynns Falls	MDR	279.84	98.30	0.3513	0.0779
GF1502	Random	Trib to Horsehead Branch	Gwynns Falls	Forest	235.75	0.42	0.0018	0.0018
GF1503	Random	Trib to Red Run	Gwynns Falls	Forest	546.71	0.00	0.0000	0.0000
GF1504	Random	Gwynns Falls	Gwynns Falls	MDR	1869.82	54.88	0.0294	0.0133
GF1505	Random	Dead Run	Gwynns Falls	Industrial	233.86	20.31	0.0869	0.0869

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Stream Site	Fixed/ Random	Stream Name	Watershed	Major Designation Land Use*	Drainage Area (acres)	Trash Total (lbs)	Trash (lbs/acre)	Trash w/o dumping (lbs/acre)
GF1506	Random	Trib to Gwynns Falls	Gwynns Falls	HDR	193.61	29.42	0.1519	0.1519
GF1507	Random	Trib to Gwynns Falls	Gwynns Falls	Commercial	86.98	135.57	1.5587	0.2365
GF1508	Random	Trib to Gwynns Falls	Gwynns Falls	MDR	1040.81	94.61	0.0909	0.0736
GF1509	Random	Trib to Gwynns Falls	Gwynns Falls	MDR	189.07	203.00	1.0737	0.4919
GF1510	Random	Red Run	Gwynns Falls	LDR	3000.22	103.84	0.0346	0.0013
JF1501	Random	Trib to Roland Run	Jones Falls	LDR	72.37	20.12	0.2780	0.2780
JF1502	Random	Mainstem Jones Falls	Jones Falls	LDR	11104.63	0.00	0.0000	0.0000
JF1503	Random	North Branch Jones Falls	Jones Falls	LDR	3810.87	0.07	0.0000	0.0000
JF1504	Random	Trib to Moores Branch	Jones Falls	LDR	137.82	8.19	0.0594	0.0594
JF1505	Random	Dipping Pond Run	Jones Falls	LDR	539.05	0.00	0.0000	0.0000
JF1506	Random	Trib to Moores Branch	Jones Falls	MDR	265.07	7.83	0.0295	0.0295
JF1507	Random	Trib to Roland Run	Jones Falls	Industrial	397.90	32.69	0.0822	0.0671
JF1508	Random	Trib to Towson Run	Jones Falls	MDR	145.70	4.28	0.0294	0.0294
JF1509	Random	Unnamed Tributary	Jones Falls	MDR	323.05	1.77	0.0055	0.0055
JF1510	Random	Trib to Jones Falls	Jones Falls	HDR	335.25	63.27	0.1887	0.0247

*-Note: The abbreviations used in the Land Use column are as follows: LDR – Low Density Residential, MDR – Medium Density Residential, HDR – High Density Residential, OU – Open Urban.

In order to analyze the trend of trash loading at random sites, a 1-way analysis of variance (ANOVA) was performed between the random sites from 2014 and 2015.

Table 6-2: Results of 1-way ANOVA

Year	Average Loading Rate w/o Dumping	P-value
2014	0.15	
2015	0.08	
Between Years		0.46

Despite the difference in Average Loading Rate, the P-value of 0.46 implies that the random sites chosen in 2014 and 2015 are fairly similar.

A two-tailed, paired t-test was also performed on data from fixed sites analyzed in 2013 and 2015, to ensure that the trash loading rates remained consistent. The results of this test indicate that, with a p-value of 0.12, loading rates between 2013 and 2015 did not change significantly at the fixed sites. The fixed site G-DR-3, located on a tributary to Dead Run downstream of Lord Baltimore Dr., showed the highest increase in loading rate between 2013 and 2015. This increase in loading rate is almost entirely due to a 60 pound increase in trash classified as ‘other’—i.e., non-recyclable litter or small-item dumping.

Table 6-3: Comparison of Fixed Site Results 2013-2015 (#s/Acre)

Site	Loading Rate 2013	Loading Rate 2015	Difference 2013 to 2015
G-DR-1	0.2421	0.2440	+0.0019
G-DR-3	0.2356	0.3952	+0.1596
G-GF-1	0.0473	0.0844	+0.0371
G-PM-1	0.1270	0.1724	+0.0454
G-SL-1	0.0341	0.0385	+0.0044
J-NB-1	0.0016	0.0005	-0.0011
J-RR-2	0.0036	0.0069	+0.0033
J-SHB-1	0.0286	0.0507	+0.0221
J-TR-1	0.0343	0.0433	+0.0090
J-WR-1	0.0187	0.0101	-0.0086
Mean	0.0773	0.1046	+0.2732

As can be seen in Table 6-4 and Table 6-5 below, the total pounds of trash per sorting category and total count of bottles and cans were moderately higher at the random sites than at the fixed sites. This may be due to the fact that the fixed sites had been previously monitored 5 times during the course of the TMDL development study, which removed a significant amount of trash from prior years. Trash collected from the random monitoring sites could include items that have been there for many years, in addition to any trash dumping that may have occurred. The

amount of trash collected during the survey was most likely higher due to the land use, which was predominately medium density residential at both the fixed and random sites.

Table 6-4: Pounds of Trash Collected by Sorting Category

Sorting Category	Fixed (lbs)	Random (lbs)	Project Total (lbs)
Plastic Bottles	26.22	22.97	49.19
Glass Bottles	9.49	18.06	27.55
Aluminum Cans	15.97	6.78	22.75
Other – Floatables	508.28	222.85	731.13
Other – Small Item	169.62	97.39	267.01
Dumping	106.06	510.50	616.56
Total	835.64	878.56	1714.20

Table 6-5: Count of Bottles and Cans Collected

Bottle Counts	Fixed	Random	Project Total
Plastic Bottles	211.5	250	461.5
Glass Bottles	20.75	27.75	48.5
Aluminum Cans	107	63	170

The results of the loading rate analysis, displayed in Figure 6-2 and Figure 6-4 show that the loading rates for several of the random stream sites are skewed higher due to moderate amounts of trash found at streams with small drainage areas and large item dumping. For example, at random site GF1507, had 135 pounds of trash, with 115 pounds of large items. With a drainage area of 89 acres, this site had a loading rate of 1.56 pounds per acre, by far the highest loading rate amongst the random sites. Large item dumping was again a large source of trash for the random sites, with over half of the trash by weight accounted for by large items.

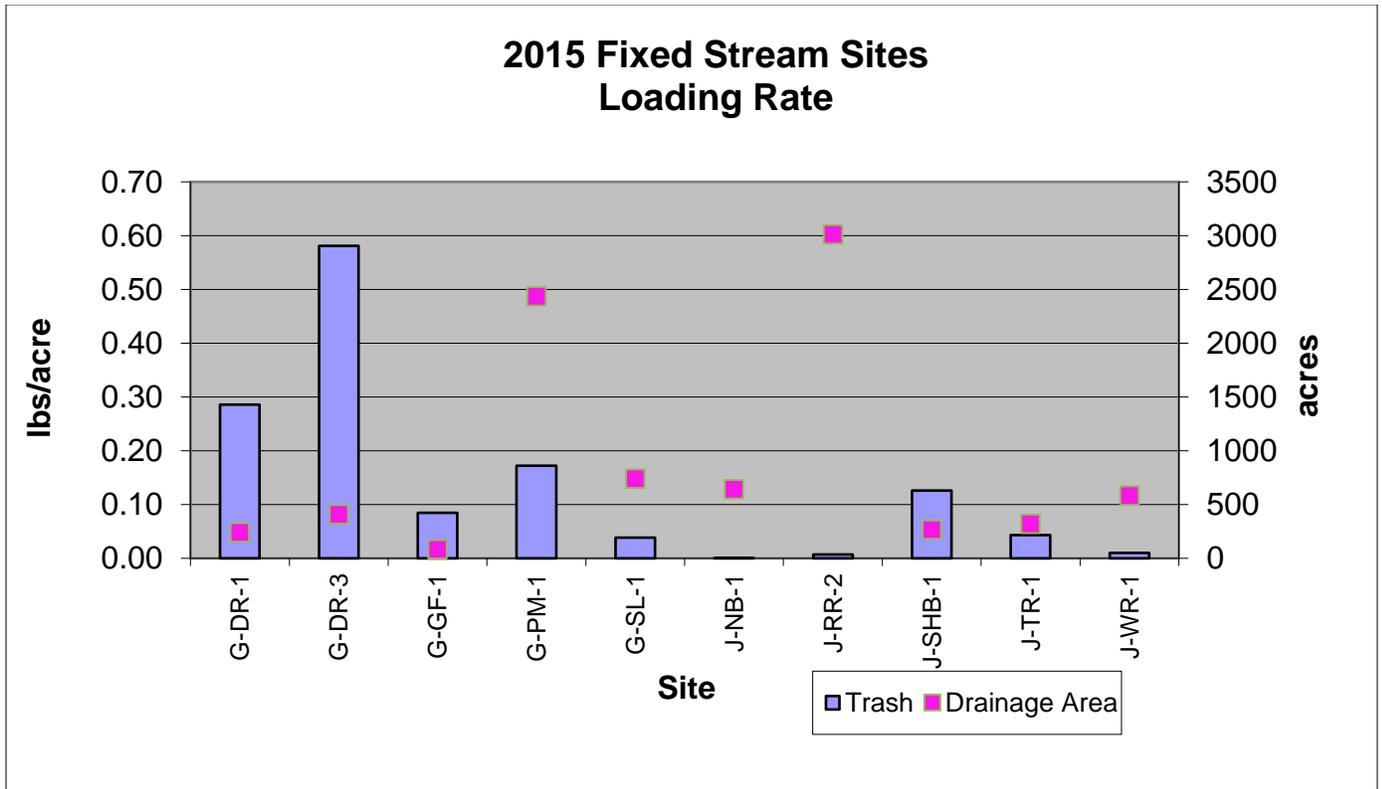


Figure 6-2: Fixed Stream Sites Loading Rates

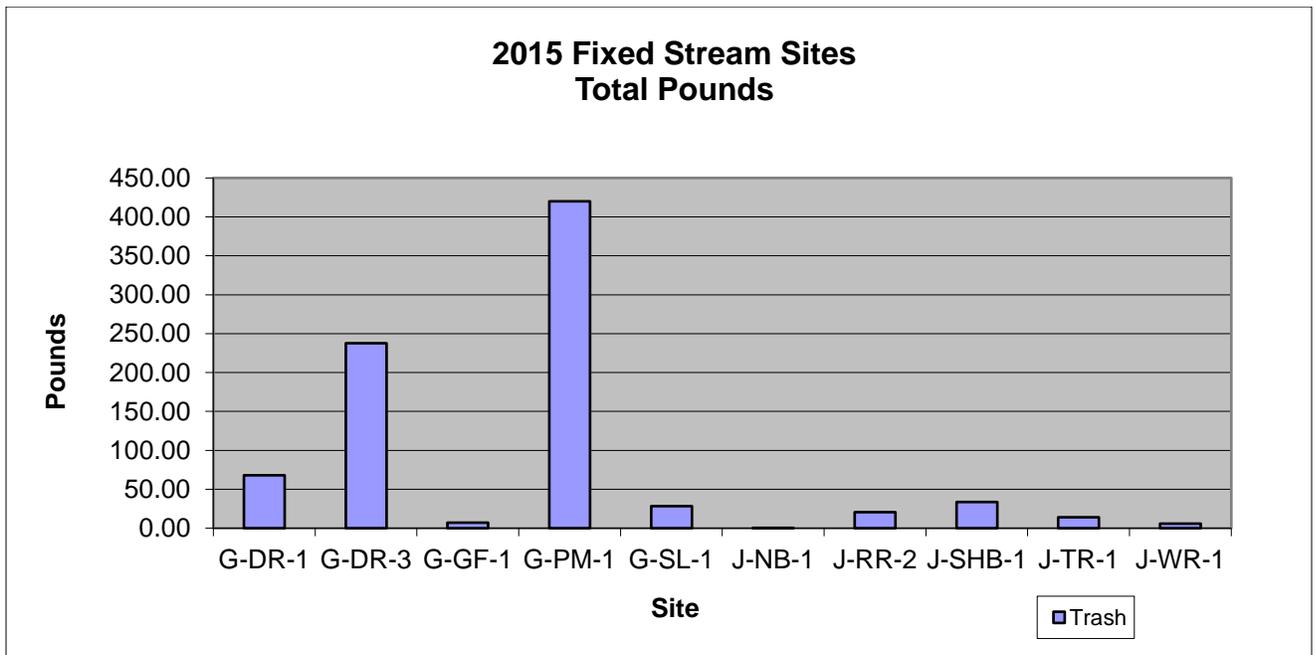


Figure 6-3: Fixed Stream Sites Total Pounds

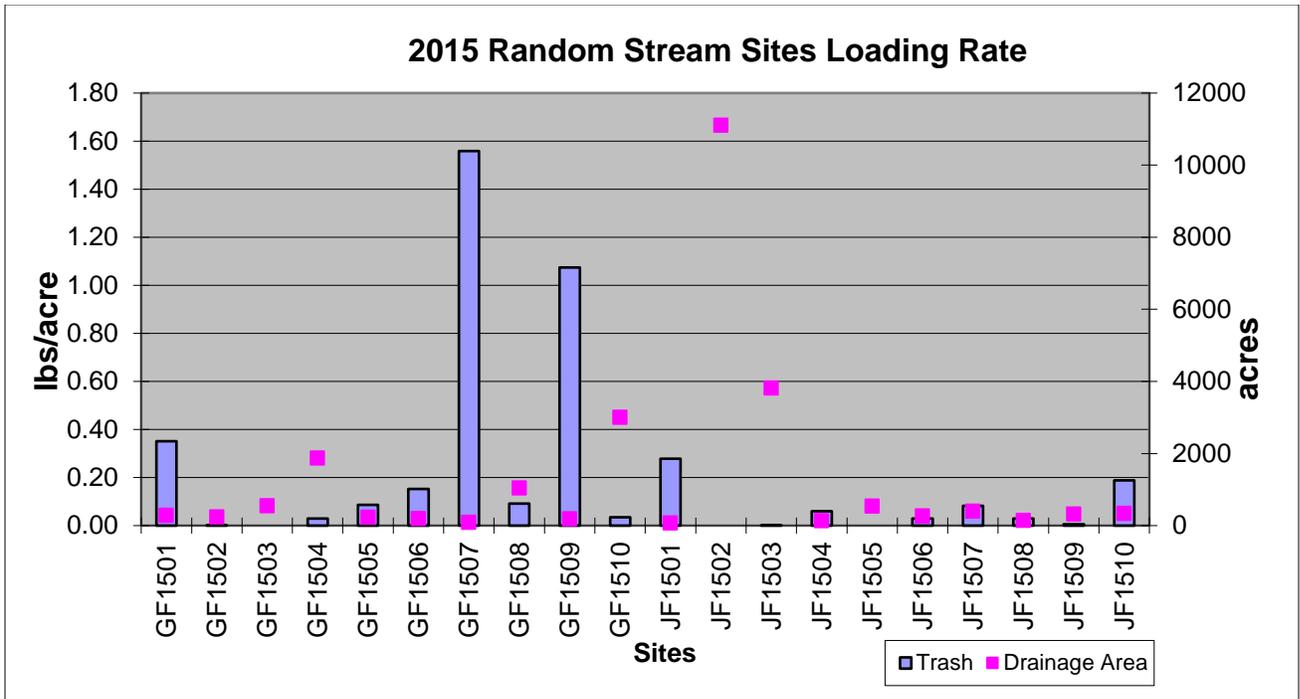


Figure 6-4: Random Stream Sites Loading Rates

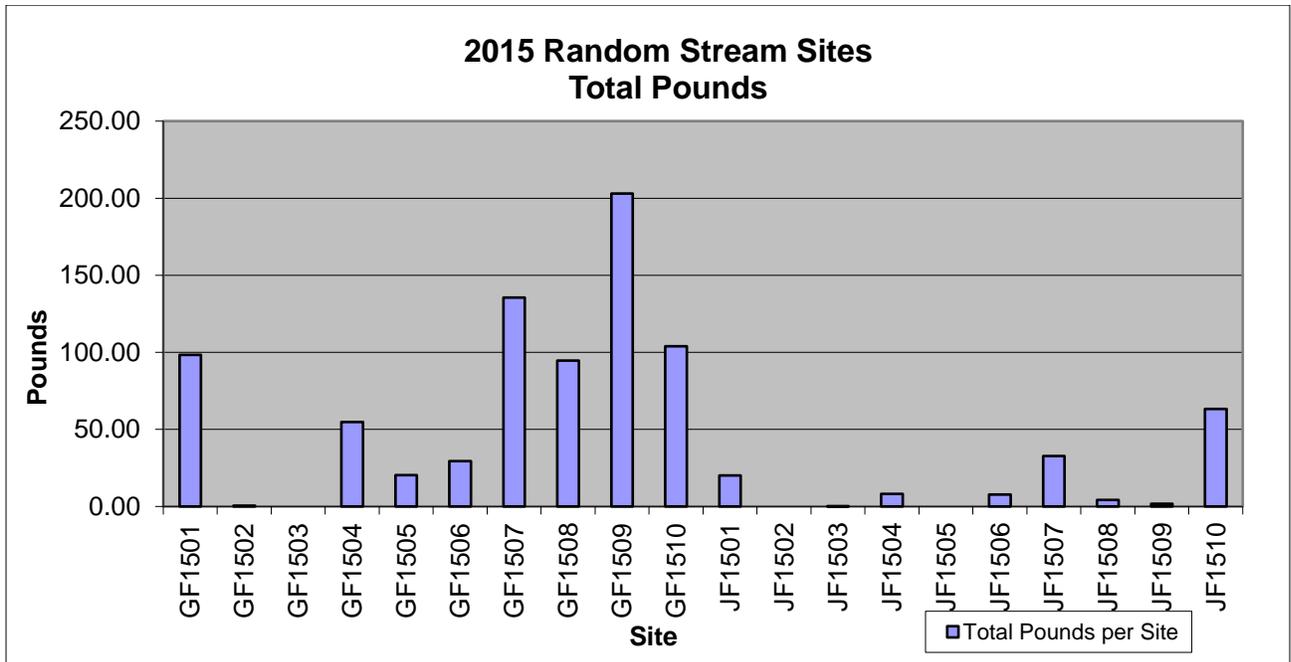


Figure 6-5: Random Stream Sites Total Pounds

6.3.2 Upland Trash Assessment

In order to assess the sources of trash throughout the study area, an upland assessment has been developed. Upland trash monitoring will be used as a tool to track the sources of trash in

watersheds. Specifically, this program will be used in the watersheds draining to the Middle Branch and Northwest Branch of the Patapsco River to address the trash TMDL. The results of this assessment may be a valuable resource for targeting trash reduction actions in order to meet the TMDL requirements.

An initial pilot of this Upland Trash Assessment took place in 2015. The data collected from the initial pilot can be found in Table 6-6. Baltimore County then implemented a full version of the program beginning in 2016. Geographic Information System mapping was used to randomly select commercial and industrial sites in the area of interest. Upon arrival at each site a visual inspection is made to assess trash at the street level which may enter nearby/connected watercourses. After the assessment, the site is assigned numerous “litter index” scores to help in ranking the types of sites/localities with the highest prevalence of trash. This is similar to the “windshield” surveys conducted for the Anacostia Watershed Trash Reduction Plan. This type of survey may be useful in targeting areas for education and for trash removal or street sweeping activities.

This type of assessment may be beneficial in investigating why sites such as G-PM-1 from the in-stream trash survey have large amounts of trash.

Table 6-6: Trash Assessment Results (2015 Pilot)

Assessment Site	Hotspot Classification	Site Type	Highest Index Score
GF-15-5-8	Potential Hotspot	Business	3
GF-15-5-23	Potential Hotspot	Business	3
GF-15-5-19	Potential Hotspot	Shopping Center	3
GF-15-5-1	Potential Hotspot	Residential	3
GF-15-5-3	Potential Hotspot	Residential	3
GF-15-5-9	Potential Hotspot	Residential	3
GF-15-7-14	Potential Hotspot	Business	3
GF-15-7-16	Potential Hotspot	Business	3
GF-15-5-20	Hotspot	Business	4
GF-15-7-15	Hotspot	Business	4

Of the 42 sites surveyed in the pilot study, 8 of the sites were potential hotspots and 2 of the sites were hotspots. Potential hotspots have at least one index score of 3. Hotspots have at least one index score of 4 or 5. Of all of the sites assessed, no sites were determined to have a score of 5. The majority of sites that were classified as potential hotspots or hotspots were business sites and none of them had stenciled storm drains. Two of the littered sites did have anti-litter signage present.

6.3.2.1 Upland Trash Assessment 2016

In 2016, Baltimore County assessed 192 upland trash sites for excessive littering. Commercial sites were selected in each sub-watershed in the Jones and Gwynns Falls and also from three sub-watersheds in Back River: Herring Run, Red House Run, and Stemmers Run. Ten sites were selected in each of these sub-watersheds, unless there were not ten commercial sites existing in the watershed. Sites that were found to be inaccessible or were no longer commercial sites were removed from the survey. A few sites were hotspot sites identified from the pilot study. Of the 192 sites that were surveyed, 3 sites were hotspots and 10 sites were potential hotspots. A map of upland trash hotspots and potential hotspots identified in 2016 can be found below, see Figure 6-6. Table 6-7 describes each of the identified hotspots and potential hotspots.

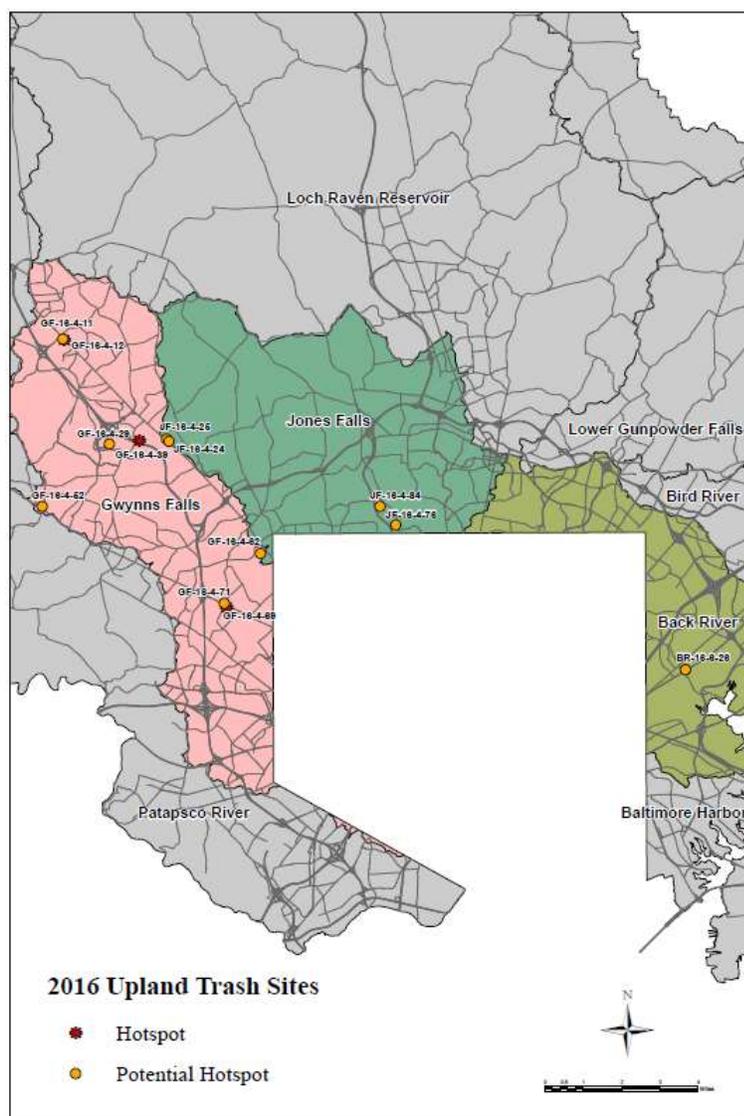


Figure 6-6: Map of 2016 Upland Trash Hotspot and Potential Hotspot Sites

Table 6-7: 2016 Trash Assessment Results

Assessment Site	Hotspot Classification	Site Type	Description	Highest Index Score
GF-16-4-69	Hotspot	Shopping Center	Shopping Plaza	4
GF-16-4-12	Hotspot	Business	Auto Center	4
GF-16-4-39	Hotspot	Business	Members Only Retail Store	4
GF-16-4-62	Potential Hotspot	Business	Nursing and Rehabilitation Center	3
GF-16-4-71	Potential Hotspot	Business	Gas Station	3
GF-16-4-29	Potential Hotspot	Shopping Center	Mall	3
GF-16-4-52	Potential Hotspot	Shopping Center	Shopping Plaza	3
JF-16-4-76	Potential Hotspot	Business	Commercial/Industrial Contractor	3
JF-16-4-84	Potential Hotspot	Business	Industrial/Commercial Center	3
JF-6-4-24	Potential Hotspot	Business	Car Dealership	3
JF-16-4-25	Potential Hotspot	Business	Car Dealership	3
GF-16-4-11	Potential Hotspot	Business	Supermarket	3
BR-16-6-26	Potential Hotspot	Business	Liquor Store	3

Photos of the 2016 hotspots are found below, see Figure 6-7 through Figure 6-11.



Figure 6-7: Photo one of alley behind site GF-16-4-69



Figure 6-8: Photo two of alley behind site GF-16-4-69



Figure 6-9: Photo of alley behind site GF-16-4-12



Figure 6-10: Photo of grassy area, along stream, behind GF-16-4-12



Figure 6-11: Photo of area next to trash compactor at GF-16-4-39

6.4 Watershed Trash Loading Calculations

While the Trash TMDL developed trash loading rates for the Gwynns Falls and the Jones Falls, there were no calculations for the trash loading rates for the rest of the watersheds in Baltimore County. In order to provide the trash loadings on a county-wide basis, EPS has used the information in the Baltimore Harbor Trash TMDL to develop trash loading rates for all 14 watersheds in Baltimore County. The trash TMDL is based on loading rates attributable to the differing land uses in the county (Table 6-8). These land use loading rates plus a 0.5% margin of safety were used to estimate the trash loads in each of the 14 major watersheds in Baltimore County (Table 6-9). Based on the Baltimore County data, it is estimated that 0.57 pounds of trash per acre are dumped each year, in addition to the land use derived trash load.

Table 6-8: Trash Loading Rates by Land Use

Land Use	Land Use Code	Trash Loading rate Lbs/acre/year
Low Density Residential	11, 191, 192	0.9
Medium Density Residential	12	2.45
High Density Residential	13	4.01
Commercial	14	7.91
Industrial	15	7.91
Extractive	17	7.91
Institutional	16	1.99
Open Urban	18	2.15
Roadways	80	2.06
Agriculture	21,22,23,241,242	2.15
Forest	41,42,43,44	0.02
Construction	73	7.91

Table 6-9: Baltimore County Watersheds - Annual Trash Loading Rates

Watershed	Acres	Pounds of Trash per Year
Deer Creek	7,152	14,084
Prettyboy Reservoir	25,551	38,761
Loch Raven Reservoir	139,568	266,591
Lower Gunpowder Falls	29,468	62,516
Little Gunpowder Falls	17,276	30,801
Bird River	16,408	50,460
Gunpowder River	5,859	11,669
Middle River	6,466	23,468
Liberty Reservoir	17,597	27,366
Patapsco River	33,579	82,411
Gwynns Falls	28,654	99,563
Jones Falls	25,933	64,051
Back River	23,115	84,816
Baltimore Harbor	11,406	57,236
Total	388,032	913,793

The trash load calculated for each watershed will be used as the target load for removal each year to reach a goal of zero trash in our waterways.

6.5 Load Removal in 2016

This section describes the trash reduction rates for ongoing litter removal programs in Baltimore County. It includes trash reductions from street sweeping, inlet cleaning, stormwater management ponds, the clean green 15 challenge, project clean stream, and other stream clean-up programs.

6.5.1 Street Sweeping/Inlet and Pipe Cleaning Trash Removal

As discussed in Section 7.3.1, removing the material from the storm drain system reduces street flooding (a potential safety hazard), reduces the amount of trash and sediment from entering streams, and aids in the detection of illicit connections.

A study of debris removed from inlets (Law, DiBlasi and Ghosh 2008) found that trash accounted for 8.9% of the weight of debris from inlets, while sediment and organic material made up 91.1% of the weight of debris. Please refer to PLRC_SOP_RT-022 for protocols on how inlet and pipe cleaning is conducted and how pollutant load calculations are performed in Baltimore County.

We apply this same study to street sweeping debris and multiply the total debris by 8.9% to determine the amount of trash removed through street sweeping. Please refer to PLRC_SOP_RT-021.02 for protocols on how street sweeping is conducted and how pollutant load calculations are performed in Baltimore County.

Table 6-10 shows the amount of trash removed by watershed for street sweeping and inlet cleaning activities throughout the County.

Table 6-10: Trash Removed by Watershed through Street Sweeping and Storm Drain Cleaning in FY2016

Watershed	Street Sweeping Trash Removed (pounds)	Storm Drain Cleaning Trash Removed (pounds)
Deer Creek	0	60
Prettyboy Reservoir	0	0
Loch Raven Reservoir	36,600	380
Lower Gunpowder Falls	16,800	540
Little Gunpowder Falls	2,800	260
Bird River	17,800	360
Gunpowder River	5,000	80
Middle River	13,800	360
UWS Totals	92,800	2,040
Liberty Reservoir	200	140
Patapsco River	10,600	1,260
Gwynns Falls	26,400	1,960
Jones Falls	15,800	940
Back River	57,000	3,660
Baltimore Harbor	49,800	1,060
P/Back River Totals	160,000	9,020
Annual County Totals	252,800	11,060

6.5.2 Ongoing Litter Removal from Stormwater Management Facilities

In FY2016, the County began keeping track of the amount of trash removed from stormwater facilities while doing maintenance. Logs of the number of bags of trash collected and any miscellaneous items (shopping carts, mattresses, tires, etc.) are tracked by the stormwater management facility number. Routine and complaint driven maintenance is performed on stormwater management facilities and trash collection is part of that maintenance. This maintenance prevents trash from entering the stream system. Please refer to PLRC_SOP_RT-010 for protocols on how stormwater facility trash removal is tracked in Baltimore County. Table 6-11 shows the debris removed by watershed at stormwater management facilities throughout the county.

Table 6-11: Trash Removed from Stormwater Management Facilities FY2016

Watershed	Trash removed (pounds)
Deer Creek	0.0
Prettyboy Reservoir	0.0
Loch Raven Reservoir	145.8
Lower Gunpowder Falls	731.5
Little Gunpowder Falls	0.0
Bird River	138.3
Gunpowder River	10.6
Middle River	0.0
UWS Totals	1,026.2
Liberty Reservoir	21.3
Patapsco River	914.7
Gwynns Falls	4,565.8
Jones Falls	117.0
Back River	31.9
Baltimore Harbor	0.0
P/Back River Totals	5,650.8
Annual County Totals	6,677.0

6.5.3 Clean Green 15 Challenge

The Clean Green 15 program is a Clean Green County Initiative to encourage citizens to do short 15 minute trash clean-ups around the county and to report the amount of litter that they picked up. The following website has a description of Clean Green 15 and the reporting form for clean-ups <http://www.baltimorecountymd.gov/Agencies/environment/cleangreen/cleangreen15.html>.

An expansion of Clean Green 15 through Baltimore County Public Schools, named Clean Green 15: Team BCPS Litter Challenge, began in 2014. The purposes of the Clean Green 15 Team BCPS Litter Challenge are to prompt young people to internalize an anti-litter ethic, directly remove tons of litter from communities, preventing it from polluting waterways, and generate "buzz" and positive peer pressure about litter and its damaging effects. Baltimore County public schools compete to see whose "school community" can do the most Clean Green 15 litter clean-ups and collect the most litter. "School community" means school-based groups as well as any

civic or community group, business, scout troop, sports team, place of worship, youth group, environmental organization, family, individual, etc. who wants to do a clean-up and designate a school to receive credit. Participants conduct Clean Green 15-minute litter clean-ups, and report their clean-ups on the program web site, designating one BCPS school to receive credit. Winning schools are selected based on clean-up activity credited to their school as well as other anti-litter education and outreach efforts. From 2014 through May 2016, the Team BCPS Litter Challenge was seasonal. Starting in June 2016, the program is now year-round and cleanups can be reported and designated to a BCPS school all year.

Table 6-12 shows the Clean Green 15 trash reduction results by weight and by watershed for the clean ups taking place during FY 2016.

Table 6-12: Clean Green 15 Results FY 2016

Watershed	Debris, trash (pounds) removed
Deer Creek	0
Prettyboy Reservoir	0
Loch Raven Reservoir	114.0
Lower Gunpowder Falls	20.0
Little Gunpowder Falls	0
Bird River	42.6
Gunpowder River	245.9
Middle River	1,374.2
UWS Totals	1,796.7
Liberty Reservoir	0
Patapsco River	1,476.9
Gwynns Falls	8,210.7
Jones Falls	0
Back River	9,195.9
Baltimore Harbor	17,119.8
P/Back River Totals	36,003.3
Annual County Totals	37,800.0

6.5.4 Watershed Association Stream Clean Ups and Project Clean Stream

Stream clean-ups are conducted throughout the county each year by local watershed groups. Watershed associations participating in the county's Watershed Association Restoration, Planning, and Implementation Grant program report stream clean-ups to the county by calendar year.

Project Clean Stream is a program of the Alliance for the Chesapeake Bay. The project has been in existence for about 12 years and gathers volunteers to come together and do a few hours of trash clean-up on a unified day of service. Even though the project is aimed at getting volunteers for this single day event, they support clean-up projects throughout the spring. There are a number of organizations in Baltimore County that have participated in project clean stream.

Table 6-13 shows the results of watershed group and project clean stream reporting for the 2015 calendar year by watershed. This reporting will be transitioned to fiscal year reporting beginning Q3 FY 2017.

Table 6-13: 2015 Watershed Association and Project Clean Stream Clean-ups by Watershed

Watershed	Total lbs Trash Removed
Loch Raven Reservoir	8,780
Lower Gunpowder Falls	2,900
Bird River	835
Back River	99,382
Middle River	4,325
Baltimore Harbor	11,923
Jones Falls	19,912
Gwynns Falls	5,465
Patapsco River	22,608
Total	176,130

6.6 Progress towards the Trash TMDL

Table 6-14 shows the amount of trash per existing program for each Jones Falls and Gwynns Falls watersheds (summarized from the sections above). Reduction estimates for qualifying stormwater management facilities are based on a 95% removal efficiency, as described in Section 8 of the Trash TMDL Implementation Plan. Please refer to PLRC_SOP_RT-010 for protocols on how stormwater facility pollutant load calculations are performed in Baltimore County. All other actions are recorded and reported as pounds removed. Most programs are measured on a fiscal year basis, however the watershed group and in-stream monitoring programs are measured on a calendar year basis.

Table 6-14: Trash TMDL Implementation Actions and Trash Reductions for Existing Programs

Action	Calculation	Calculated Reduction Result Jones Falls (pounds)	Calculated Reduction Result Gwynns Falls (pounds)	Calculated Reduction Result Gwynns + Jones (pounds)	Percent of Total Reduction Goal (159,626 lbs/yr, Table 9.8 of Trash TMDL IP)
Street Sweeping	FY Pounds removed	15,800	26,400	42,200	26.4%
Storm Drain Cleaning	FY Pounds removed	940	1,960	2,900	1.8%
SWM Facilities	Σ (Drainage Acres FY2016 by land use * loading rate for land use) * 95% efficiency	9,230	23,787	33,017	20.7%
Clean Green 15	FY Pounds removed	0	8,211	8,211	5.1%
Watershed Associations	CY Pounds removed	19,912	5,465	25,377	15.9%
In-Stream Trash Monitoring	CY Pounds removed	212	1,502	1,714	1.1%
Total	Pounds removed	45,704	64,920	110,624	69.3%