

# Baltimore City Department of Public Works



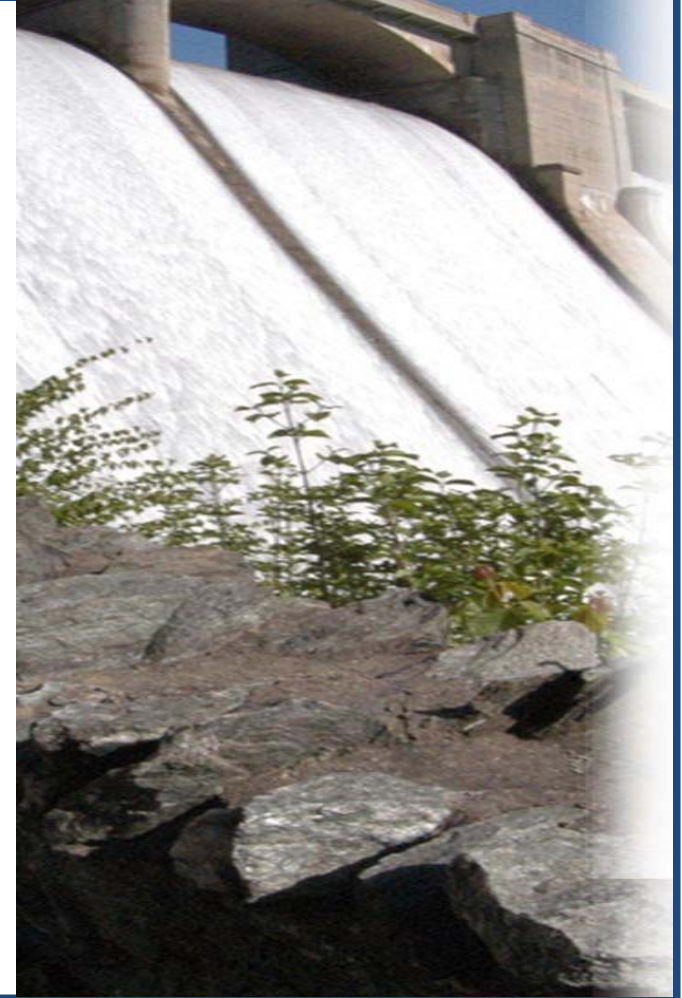
CATHERINE E. PUGH  
MAYOR

BALTIMORE CITY

**DPW**

DEPARTMENT OF PUBLIC WORKS

RUDOLPH S. CHOW, P. E.  
DIRECTOR



# Clean Sweep: Baltimore's Street Sweeping Program



**Kimberly L. Grove, P.E.  
Department of Public Works  
City of Baltimore**

**December 2016**

# Street Sweeping since 1999

- Fleet of 37 vacuum sweepers
  - 18 Elgin
  - 19 Auto Car
- Staff
  - 35 MSS Operators
  - 4 supervisors & admin
- Schedule
  - 5 days / week (7 am – 3pm)
  - 5 nights / week (12am – 8am)
- Prescribed routes and special requests
- Flexibility of routes and frequency

Trash  
Recyclables  
Metals  
Rocks  
Soil  
Organics  
Pet waste

Safety

Cleanliness

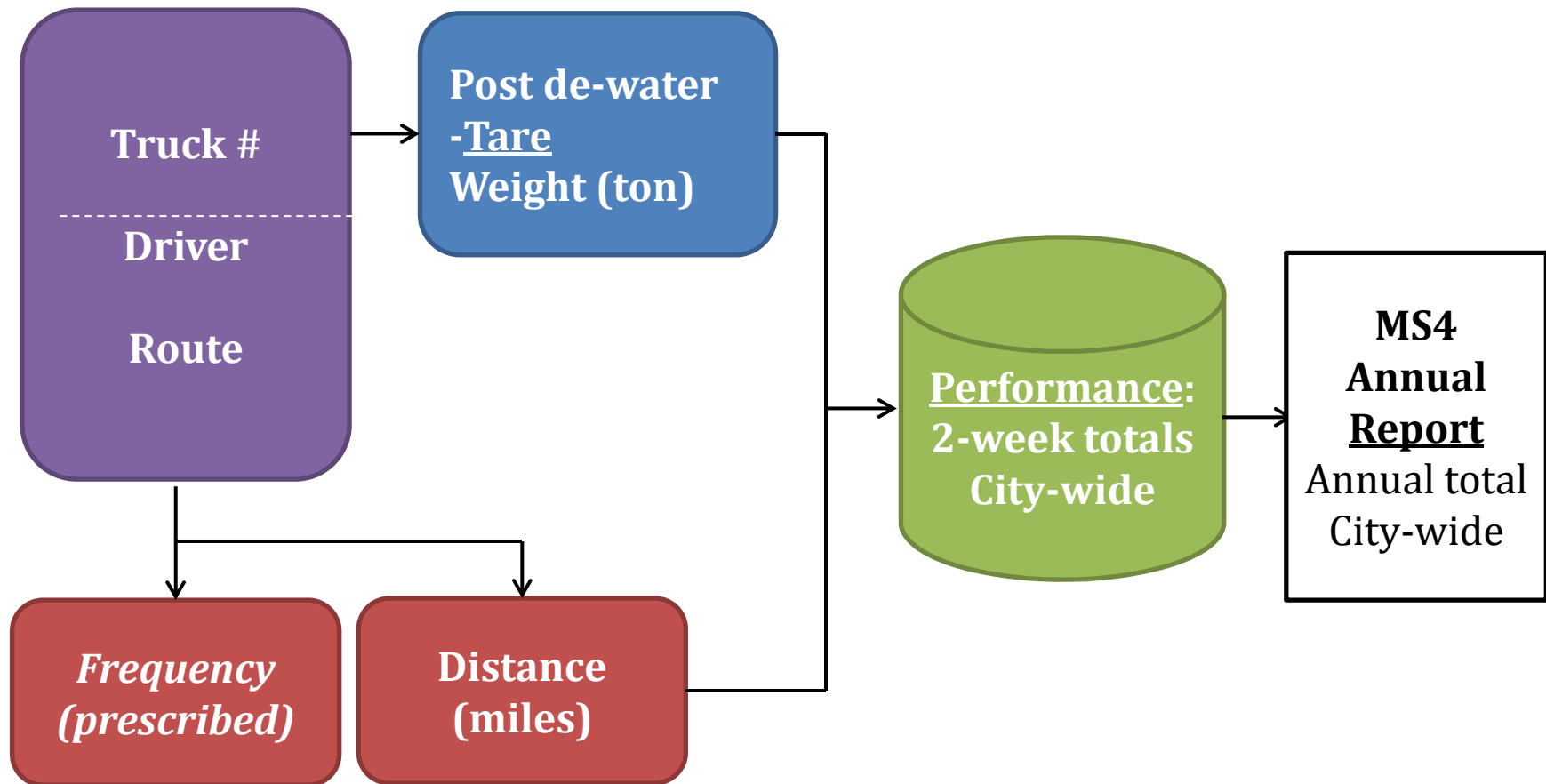
Compliance



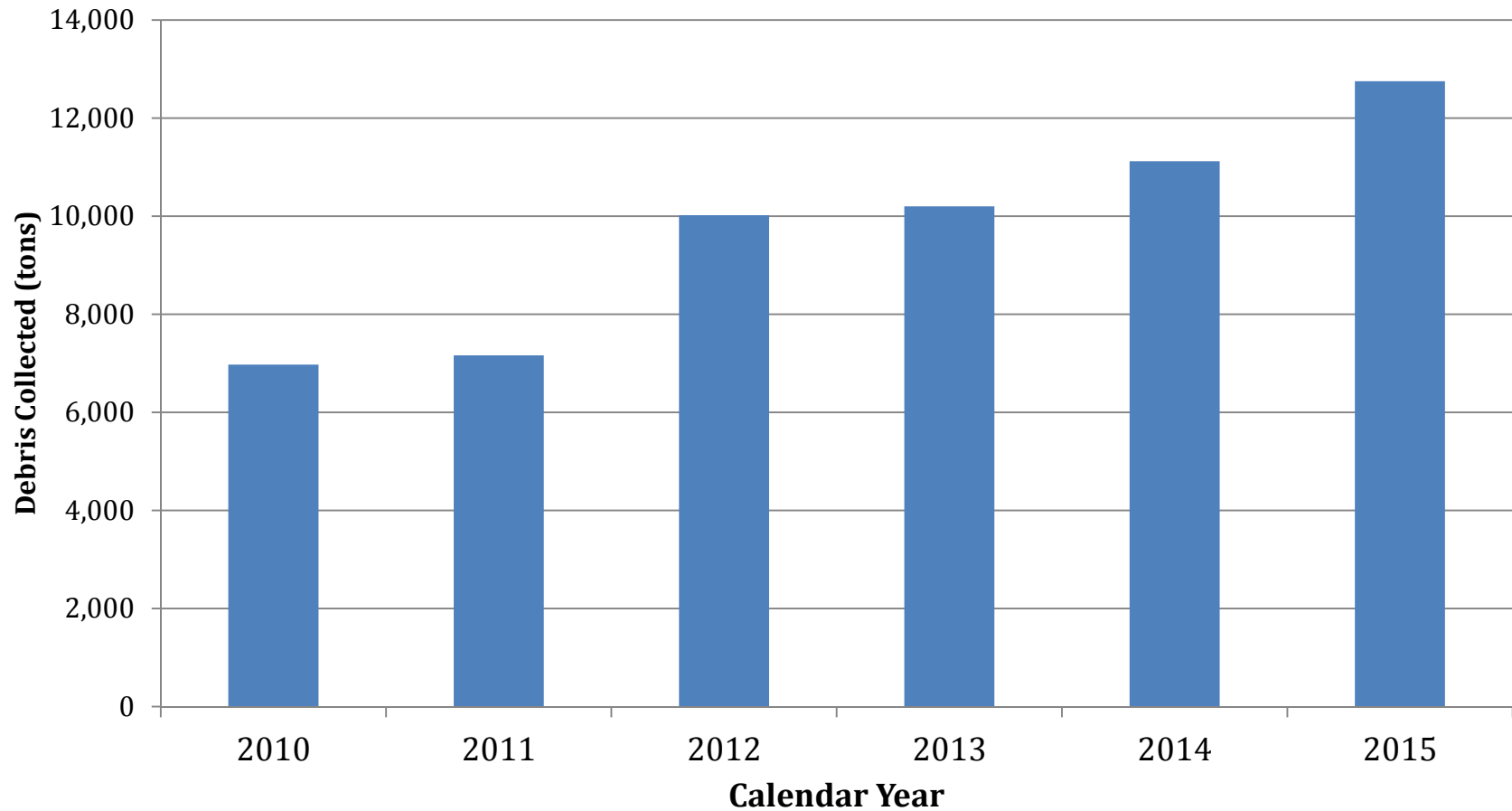
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# Current Data Collection



# Debris Collected



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# Solid Waste Generation & Collection

Method	Annual Collection (tons)
Non-recyclable	822,312
Recycling collection	349,812
<b>Total Generation in the City</b>	<b>1,172,124</b>
Mechanical street sweeping	12,750
Inlet cleaning (3-1-1 response)	1,500
Skimmer boats	400

Trash TMDL: Annual WLA = 108.6 tons / year WLA



# Expanded Routes in 2014

- Only Wed. routes changed
- New quadrant routes
- Improved routing
- Fleet improvement, but no additional staff
- Goal: Increase sweeping from 30% to 90% of City streets.

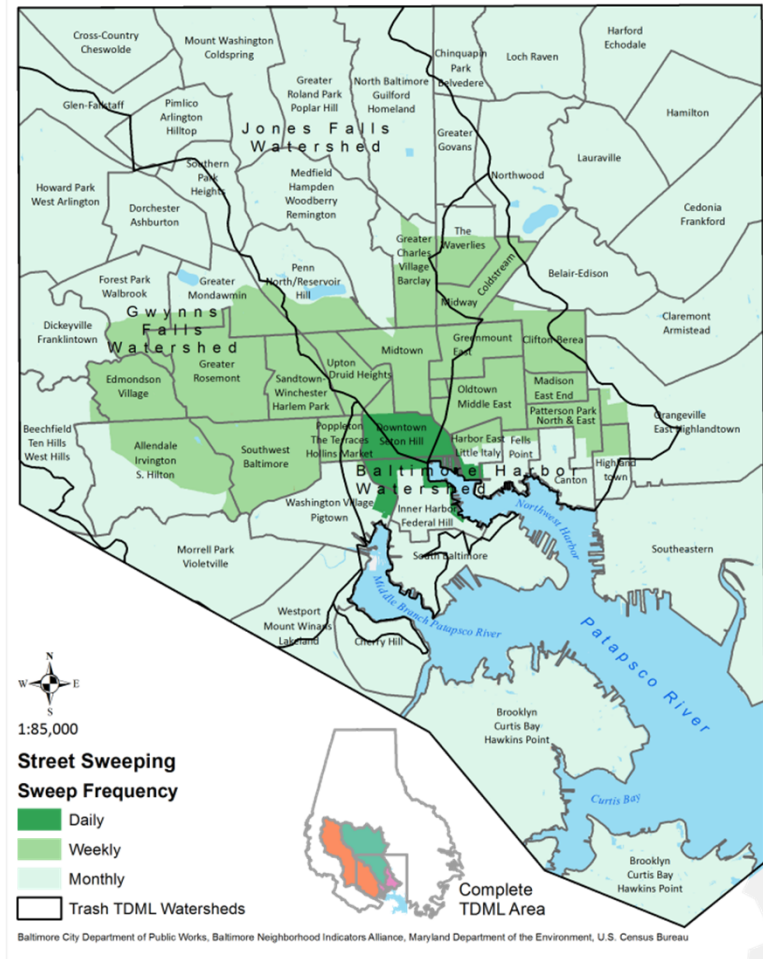
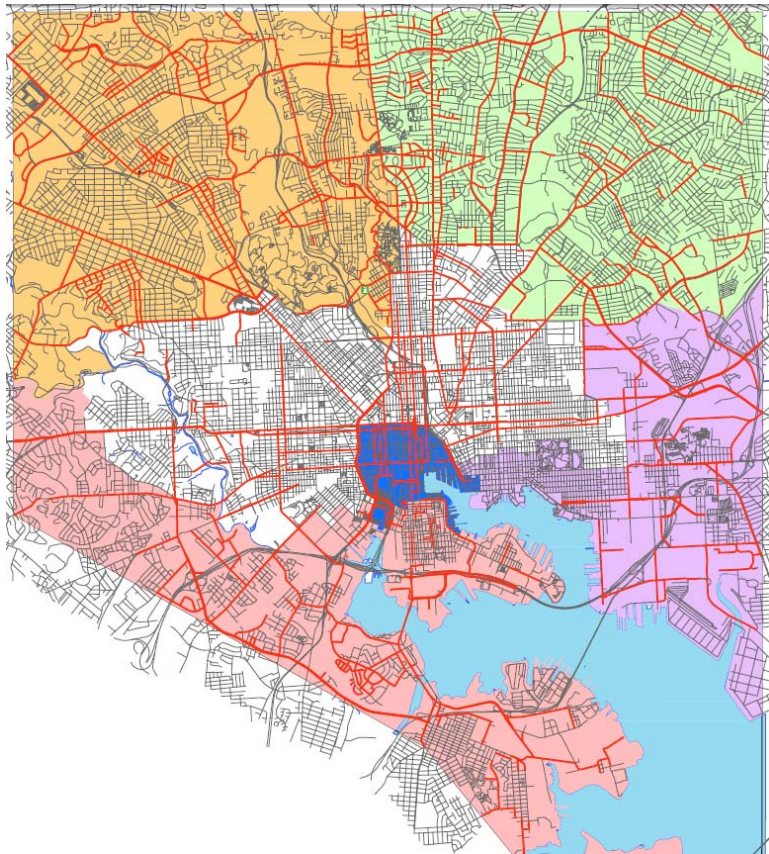
Weekly Routes	Prev.	Exp.
AM Routes	25	25
PM Routes	25	25
Posted Routes	74	42
Downtown	21	21
Quadrant		25
<b>Total</b>	<b>145</b>	<b>138</b>

76,100 More Miles Swept





# Street Sweeping Expansion



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# Restoration & TMDLs

## NUTRIENT AND SEDIMENT TMDLS

Bay TMDL: Phase II WIP

20% Impervious Surface Restoration (ISR) in MS4 Permit (Dec. 2013 - 2018)

MS4 & TMDL WIP:

- Projects
- Programs
- Partnerships

Local TMDLs (7)

Directs distribution of ISR

Local nutrients achieved in current MS4 permit

Local sediment, under contention

Bay TMDL: Phase III WIP

More data, better model

Expect more ISR in next MS4 permits until 2025

Maintenance of all BMPs installed as part of 20% ISR

**Chlordane - 2**  
(1999-2001)

**Bacteria-4**  
(2007-9)

**PCB-2**  
(2012)

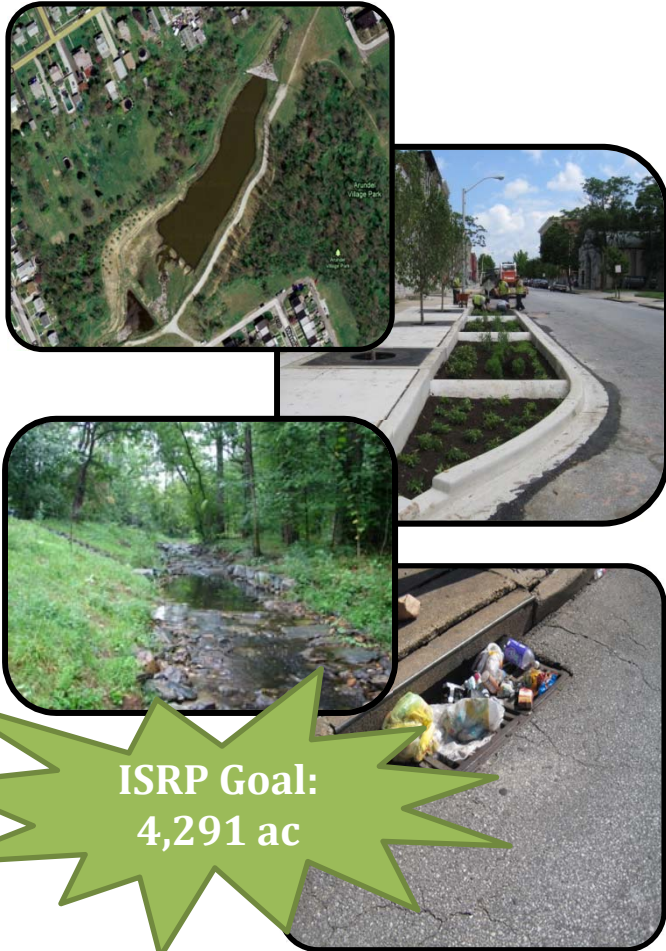
**Trash- 1**  
(2015)



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# MS4 and TMDL WIP



- **Projects**

- Large Stormwater BMPS
- Stream Restoration Projects
- Urban ESD Projects
- Impervious area / Greening Projects

**ISRP**

1,205 ac  
(28%)

- **Programs**

- Increased street sweeping
- Preventative inlet cleaning
- Illicit Discharge Detection and Elimination Program

5,347 ac  
(>65%)

- **Partnerships**

- Volunteer projects
- Development regulations
- Grants and incentives
- Education / outreach

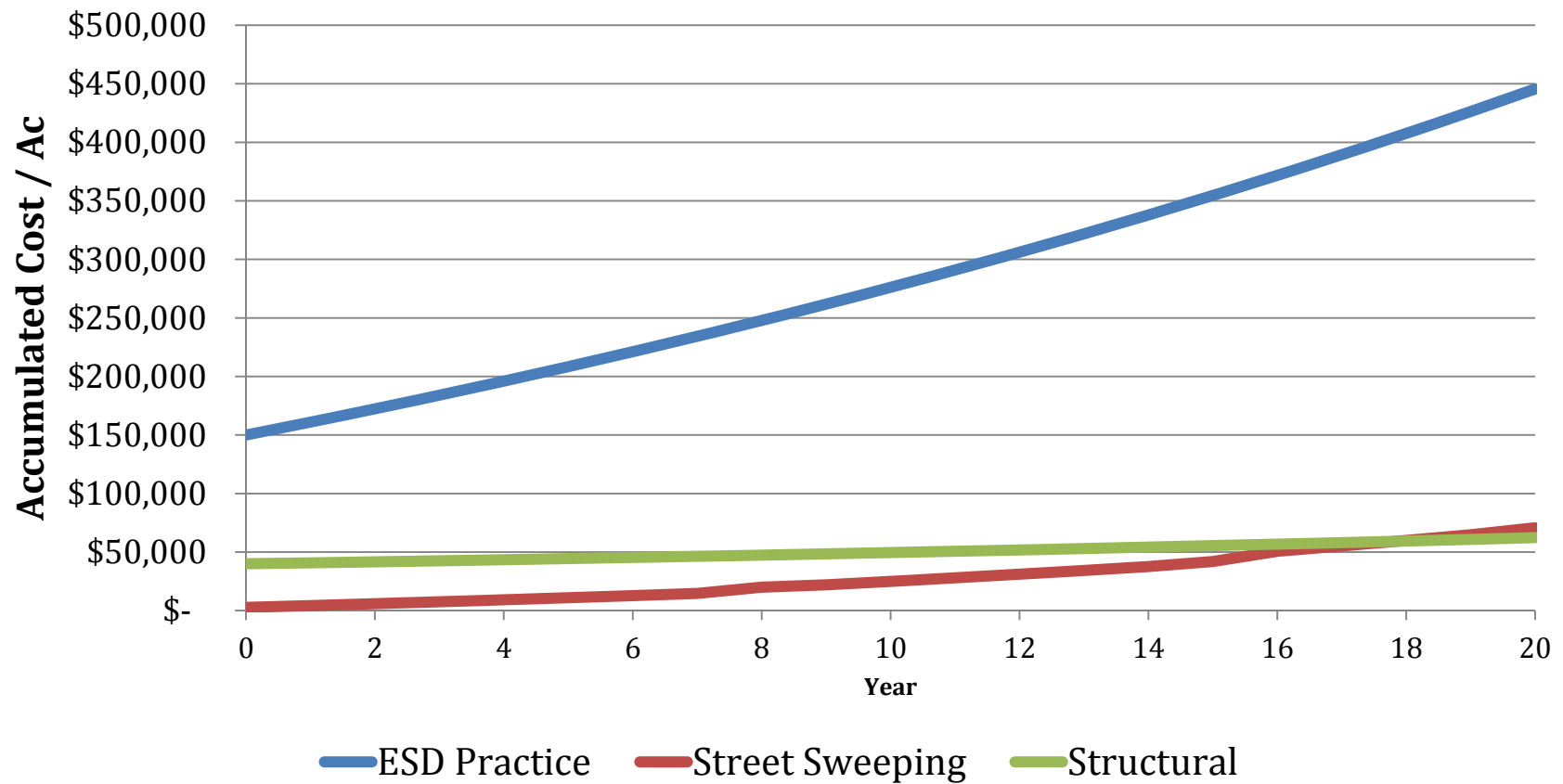
279 ac  
(7%)

# Annual Nutrient Reduction

BMP Type	TN	TP	TSS	Source
	(lb)	(lb)	(ton)	
Stormwater to MEP	5.0	0.6	0.16	MAST
Filtering Practices	4.0	0.6	0.14	MAST
Stormwater Retrofit	2.5	0.3	0.12	MAST
Micro-bioretenion (C/D soils)	2.5	0.4	0.10	MAST
Wetlands and wet ponds	2.0	0.4	0.11	MAST
Micro-scale practice and bioretention (RR)	5.7	0.6	0.13	MDE 2.E
Wet Pond / Filtering Practice (ST)	3.3	0.5	0.12	MDE 2.E
Reforestation of Pervious (100 trees / ac)	6.2	0.4	0.04	MDE 3.E
Impervious to Pervious (greening)	1.4	1.5	0.39	MDE 3.E
Stream Restoration (0.01 ac/ LF)	7.5	6.8	0.75	MDE 3.E
Mechanized Street Sweeping (0.4 ac /ton)	6.1	2.5	0.37	MDE 3.E



# BMP Comparison: Costs



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# Challenge 1: Access to the Curb



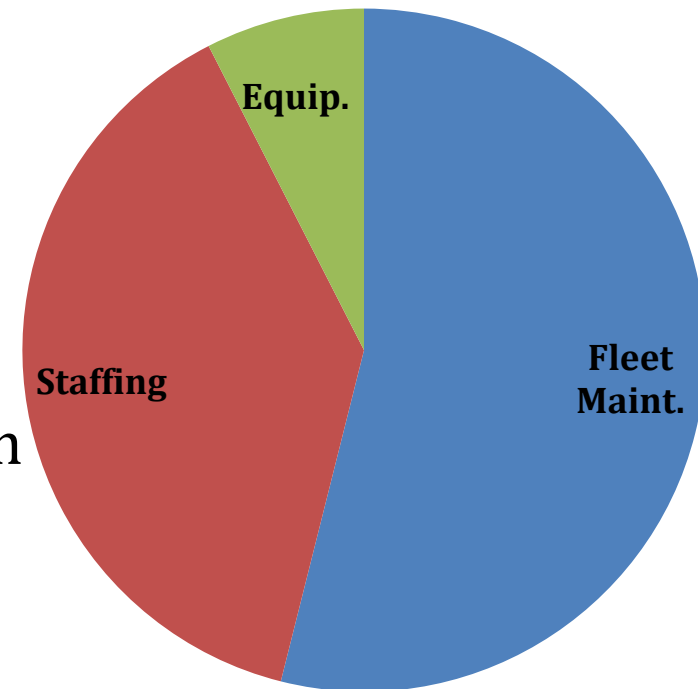
**No  
Parking  
Signs**



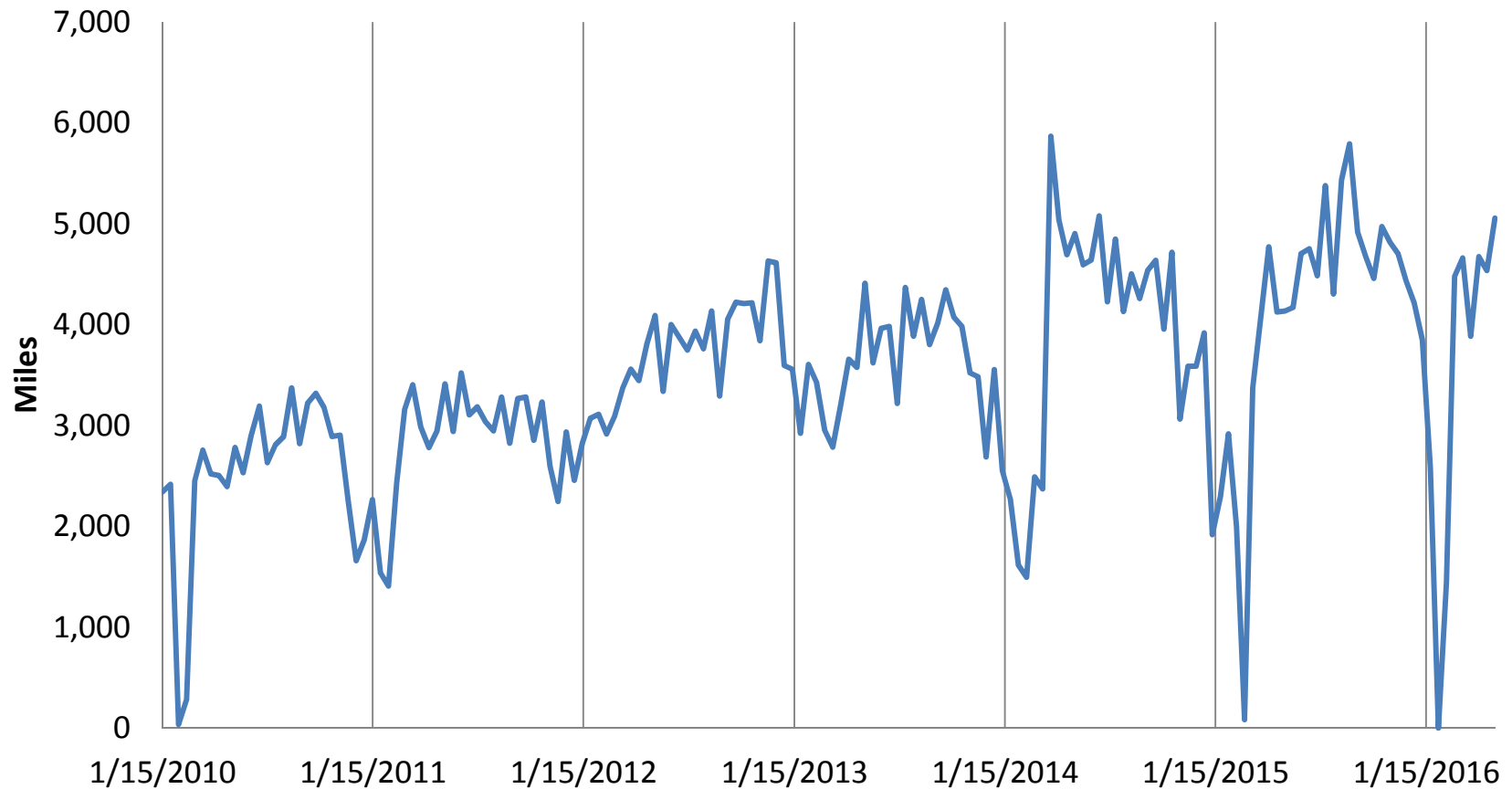
# Challenge 2: Fleet Maintenance

- Typical: 1/4 of fleet “in the shop”
- Service requirements
  - More parts
  - More systems
- Reducing maint. needs
  - Pre- and post- trip checks
  - Indoor storage
  - Wash rack at transfer station
  - Staff training

\$5.1 M (FY 2016)



# Challenge 3: Seasonal Variation



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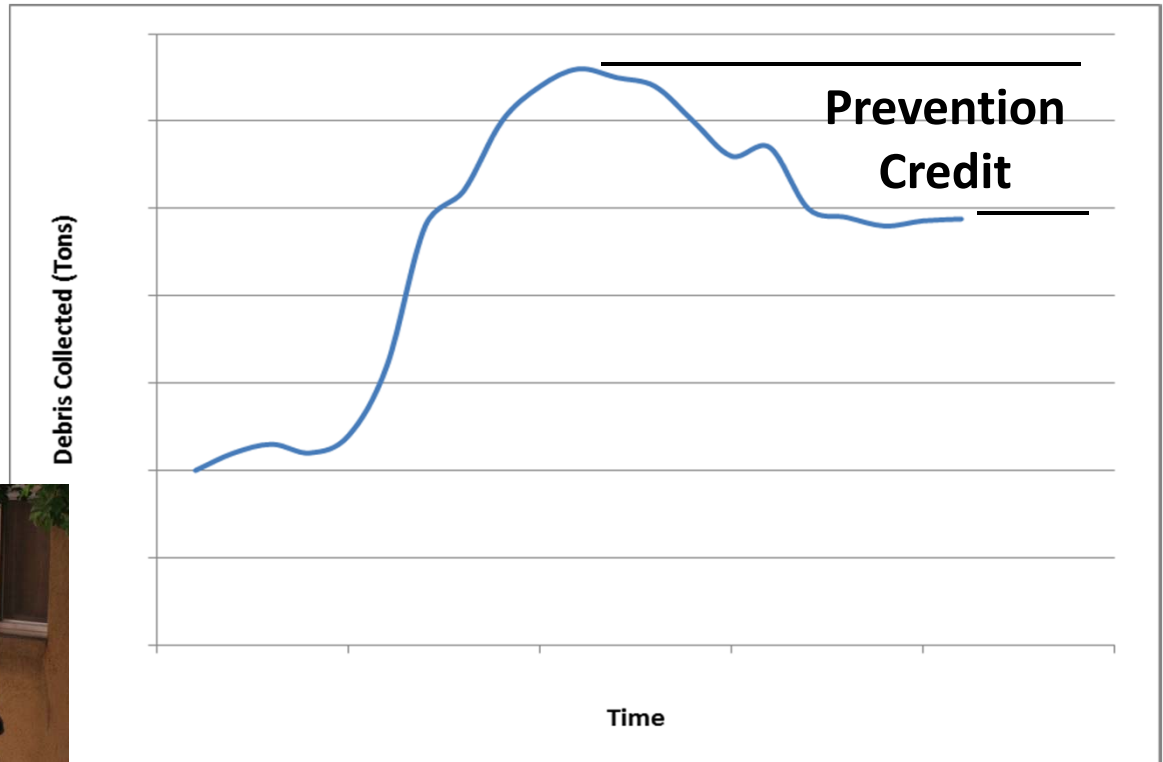
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# Pollution Prevention

- Municipal trash can
- Drop-off centers
- Clean Corps
- Community clean-up
- Enforcement
- V2V Initiative
- Anti-litter campaign



# Looking Forward

- GIS-based data interconnected with Automated Vehicle Locator
  - Better defined data by watershed
  - Accuracy for “brush down” operations
- Parking signs = improved enforcement
- Sweeper wash rack at Northwest Transfer Station
- Opportunity for research / studies
  - Pollution prevention
  - Connection to more TMDLs
  - Inlet screens = efficiency
- Right sized operations



**Thank You for Your Time.**

**Office of Compliance and Laboratories**

**Department of Public Works**

**410-396-0732**

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