

# Managing Stormwater Runoff

## Where are we now and where are we going?

D. Lee Currey

Maryland Department of the Environment

Chesapeake Water Environment Association

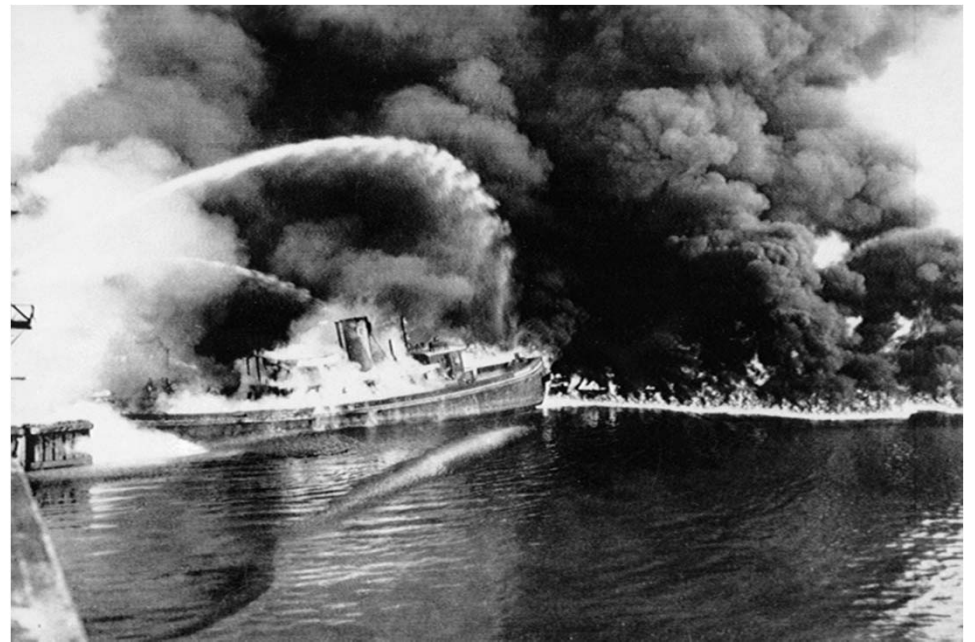
Lessons Learned in Restoration & Program  
Implementation

2017 Spring Seminar



# History of the Clean Water Act

- Rivers and Harbors Act (1899)
- Water Pollution Control Act (1948)
- Federal Water pollution Control Act (1956)
- Water Quality Act (1965)
- Federal Water Pollution Control Act Amendments (1972)
  - Clean Water Act (1977)
  - Water Quality Act (1987) – Stormwater Permitting – Chesapeake

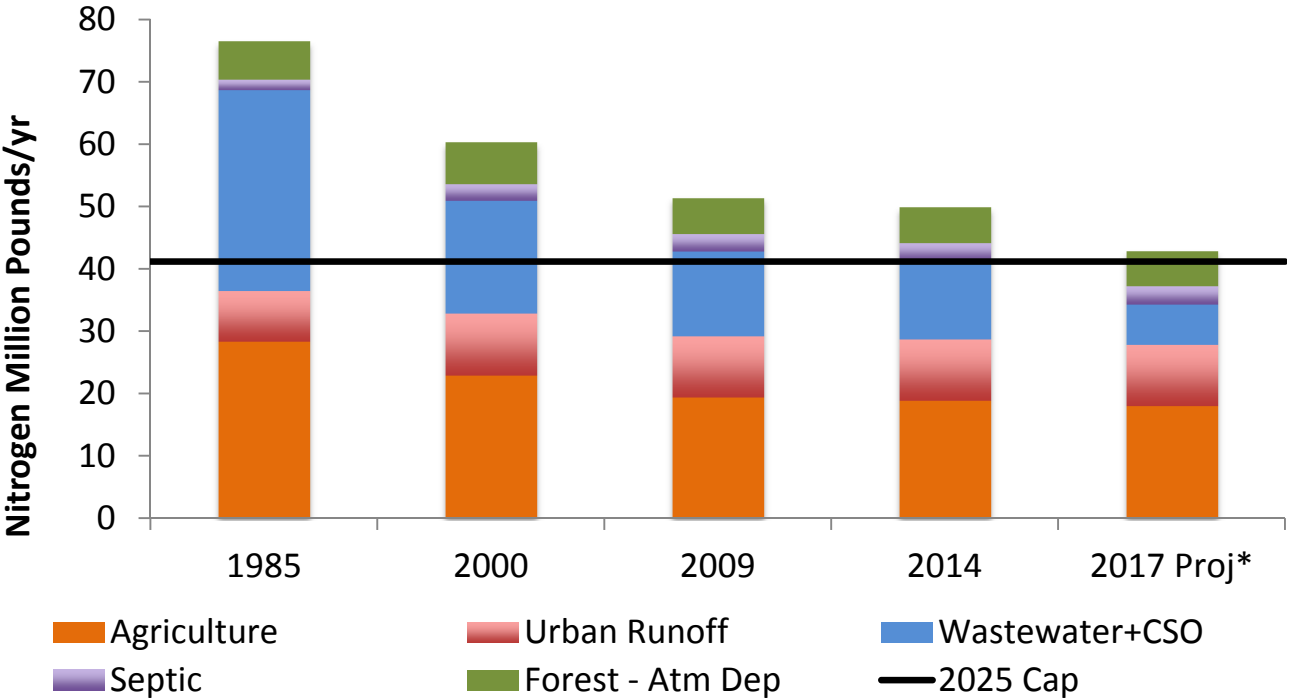


Time Magazine (1969)

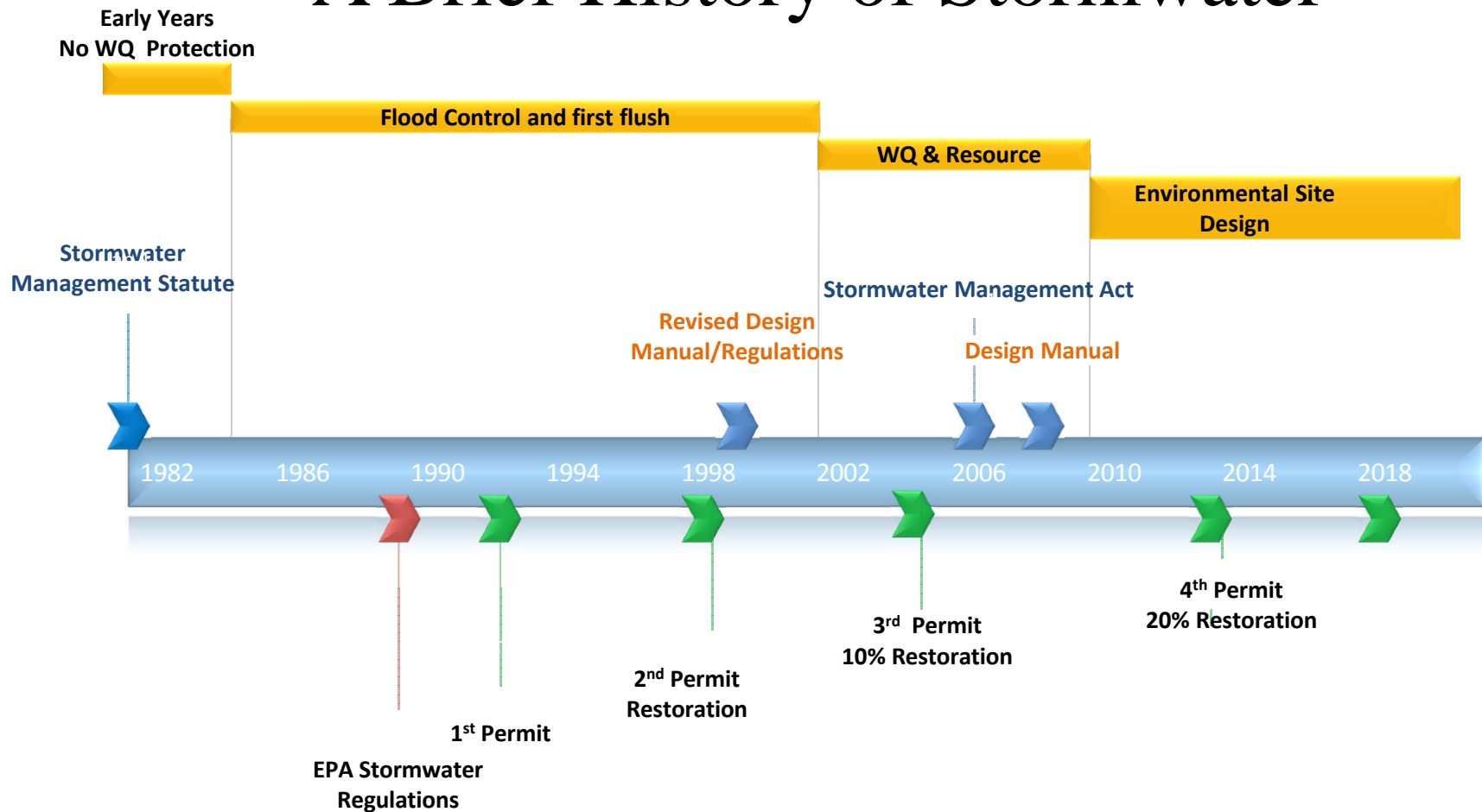
# Topics

- Stormwater Runoff in Maryland
- Lessons Learned Lead to Better Solutions
- Looking Forward

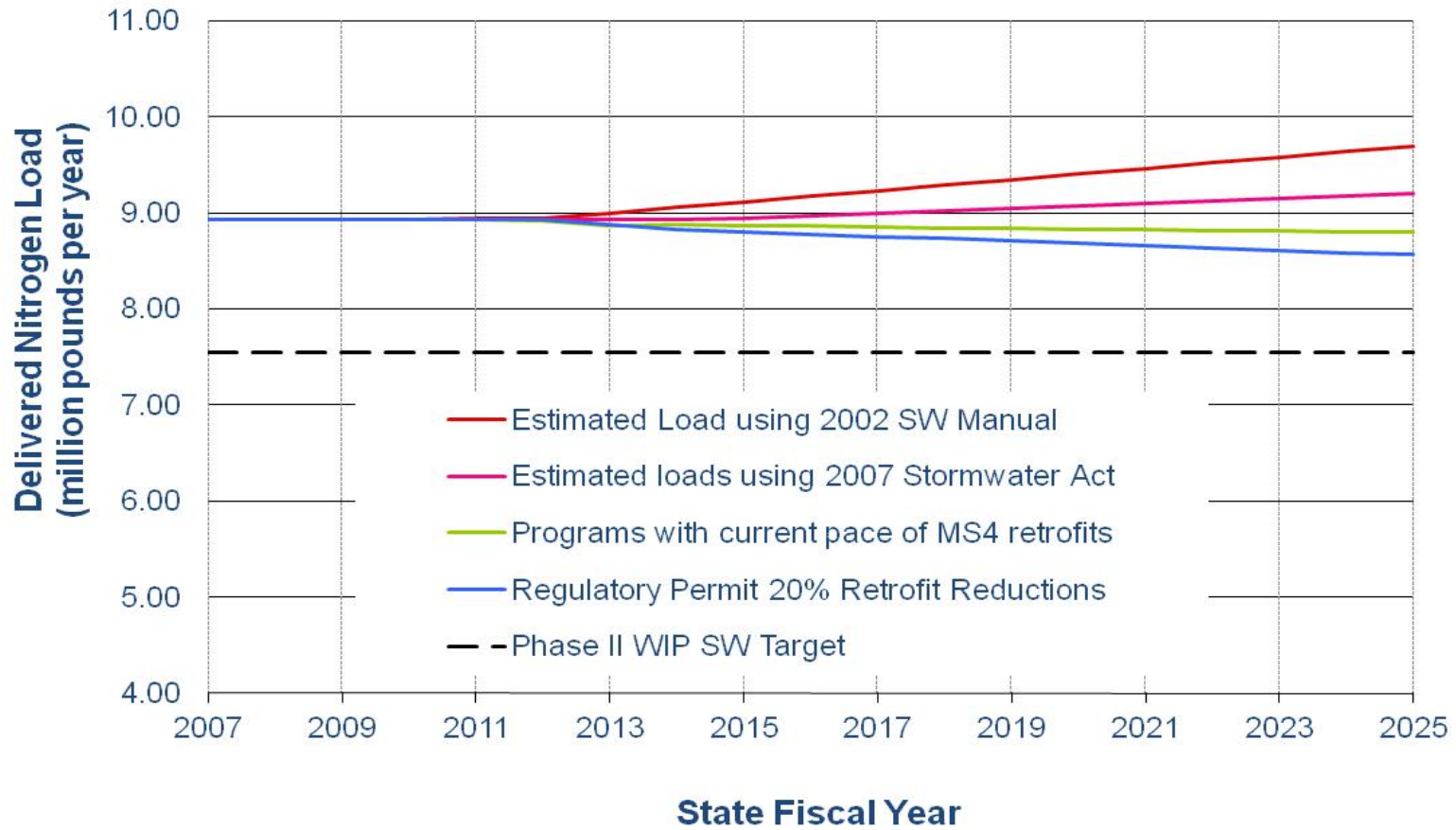
# Maryland Nitrogen Loads from 1985 - 2009



# A Brief History of Stormwater

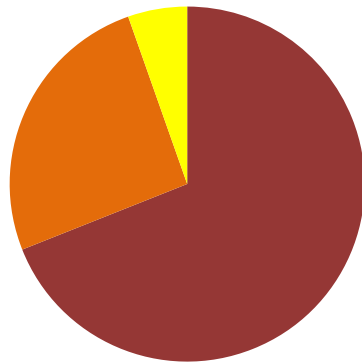


## Maryland Stormwater Loads with SW Laws and with Reduction from NPDES MS4 Permit

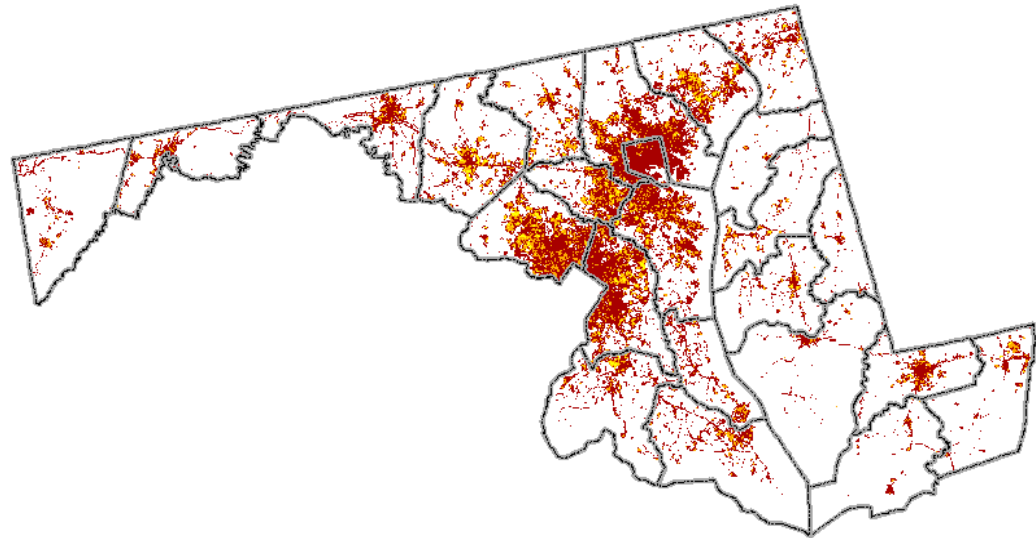


Source: MDE 2013, Phase II WIP

Urban stormwater runoff from older areas is perhaps one of our most significant challenges

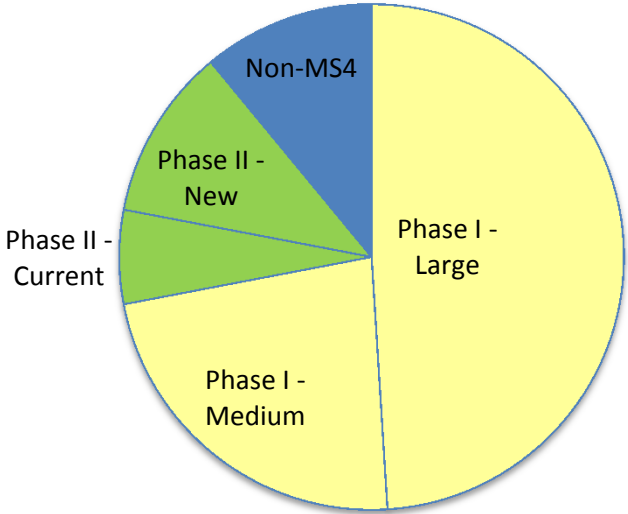
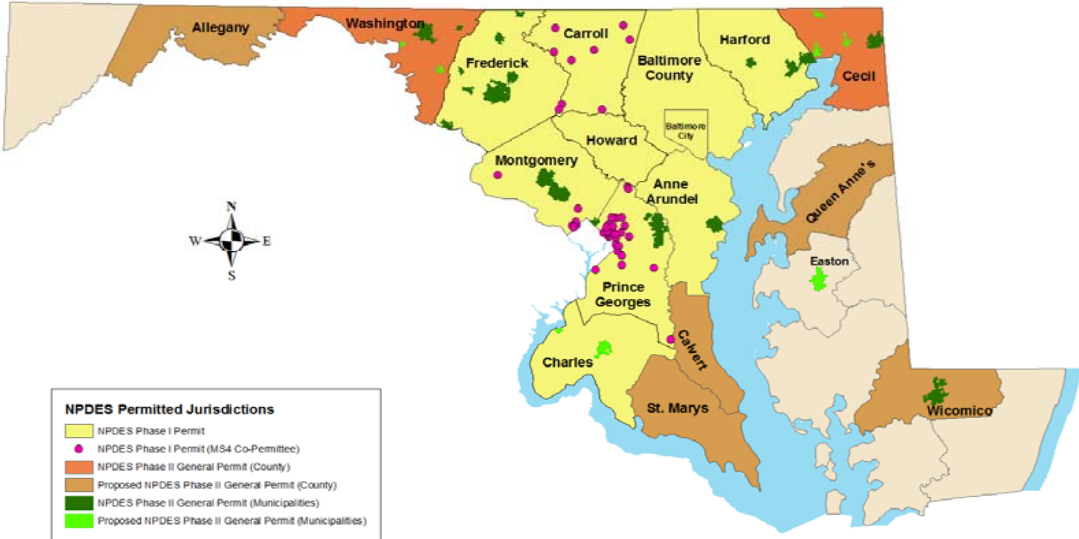


- pre-1985
- 1985-2002
- 2002-2013



# MS4 Permits Cover the Majority of MD's Urban Runoff

NPDES Permitted Jurisdictions





# MS4 Permit Approach To Achieving Clean Water Goals

- Source identification
- Specific management programs
  - SWM, E&SC, Trash and litter, education, Illicit Discharge
- Restoration plans and TMDLs
  - Baselines, prioritization and progress
- Assessment of controls
- Funding
- Chesapeake Bay Nutrient and sediment goals

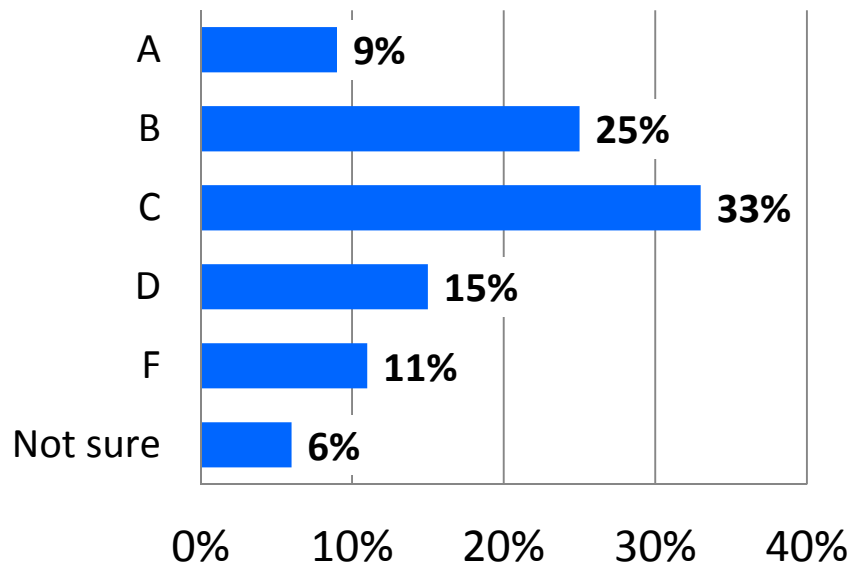


# Lessons Learned Lead to Better Solutions

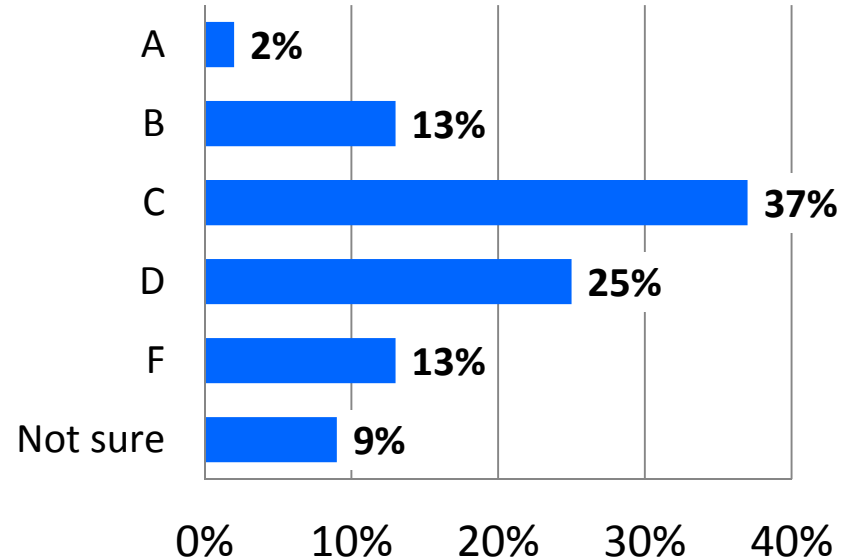
- Public education is essential
- Clear restoration goals
- A focus on funding, financing and efficiencies
- Measure for Results
- Foster innovation and collaboration

# Public Perception of MD Waters

## Streams and Rivers



## Chesapeake Bay

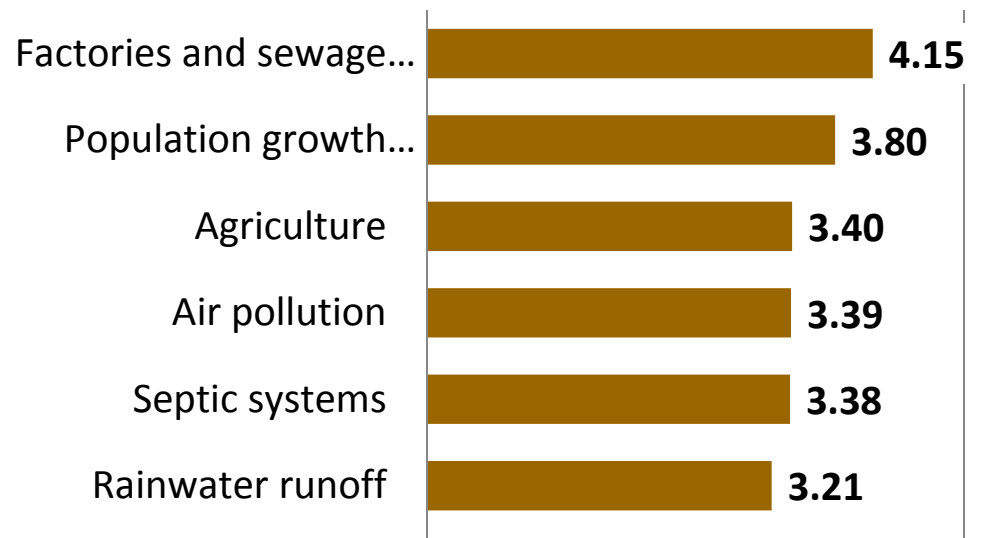


Source: Opinion Works (2016)



# Water Protection Ranks High but...

- More than 80% as a moderate to high priority
- Only 26% believe they are contributing meaningfully to water pollution
- Most people think rainwater runoff is less of concern than other issues



Source: Opinion Works (2016)

# Education is Essential

- 91% believe water pollution can be fixed
- 62% believe their own action would make a difference
- Learning about progress is encouraging



**HARFORD COUNTY**

## Rain Garden, Bioswale, Micro-Bioretenion

**What are rain gardens, bioswales, and micro-bioretenion facilities?**

Rain gardens, bioswales, and micro-bioretenion areas are functional landscaping features that filter rainwater and improve water quality.

Micro-bioretenion areas are typically planted with native plants and have three layers: mulch, a layer of soil, sand and organic material mixture, and a stone layer. A perforated pipe within the stone layer collects and directs the filtered rainwater from large storms to a storm drain system so the facility drains within 2 days. Micro-bioretenion areas are often located in parking lot islands, cul-de-sacs islands, or along roads.

Rain gardens are very similar to micro-bioretenion. They collect rainwater from roof gutters, driveways, and sidewalks. Rain gardens are common around homes and townhomes.

A bioswale is similar to a micro-bioretenion area in the way it is designed with layers of vegetation, soil, and a perforated pipe within the bottom stone layer. Bioswales typically are located along a roadway or walkway.

**Who is responsible for the maintenance?**

As the property owner, you are responsible for all maintenance of your rain garden, bioswale, or micro-bioretenion facility.

**Basic Maintenance ...**

- ✓ Regularly inspect for signs of erosion, obstructions, or unhealthy vegetation.
- ✓ Remove weeds and invasive plantings.
- ✓ Remove any trash in the bioretention area or the inlet channels or pipes.
- ✓ Check the facility 48 hours after a rain storm to make sure there is no standing water.

**Seasonal Maintenance ...**

- ✓ Cut back dead stems from herbaceous plantings in the beginning of the spring season.
- ✓ Water new plantings frequently to promote plant growth and also during extreme droughts.
- ✓ Replenish and distribute mulch to a depth of 3 inches.
- ✓ Remove fallen leaves in the fall season.
- ✓ Replant/replace dead plants (best time in the fall).

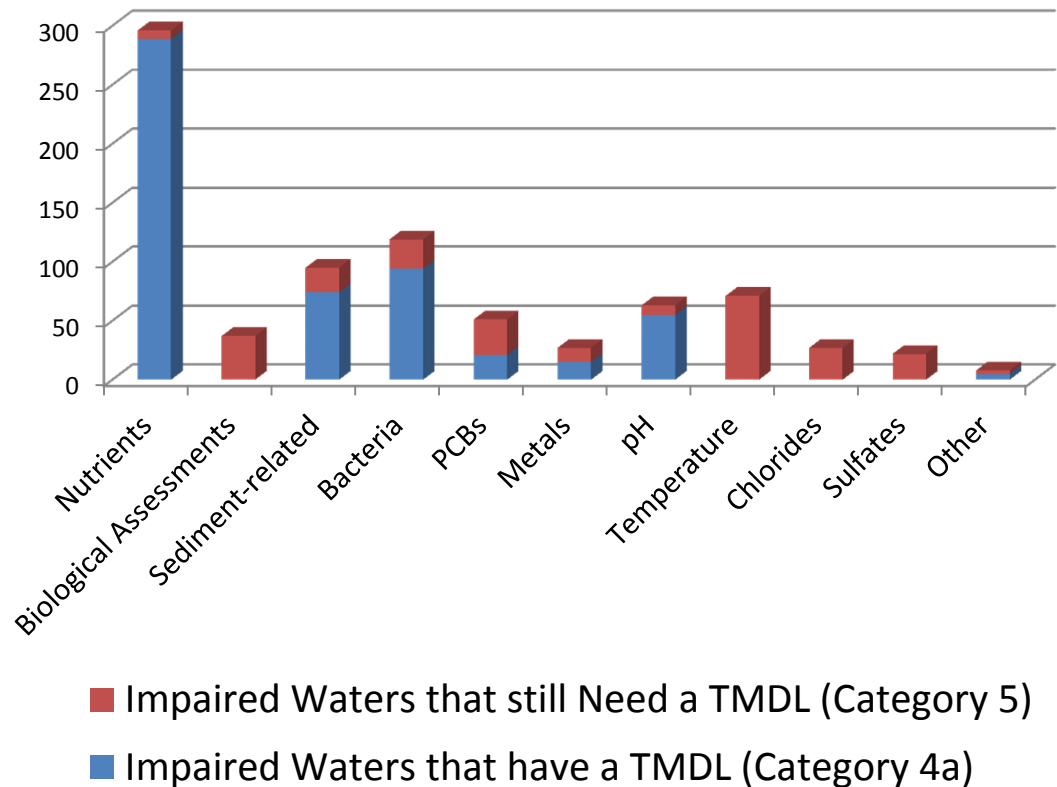
**As a reminder...**

- ✗ Do not apply excess salt and sand around the facility in the winter season.
- ✗ Do not store snow and leaves on top of the bioretention area.
- ✗ Do not remove or place fill in the facility.



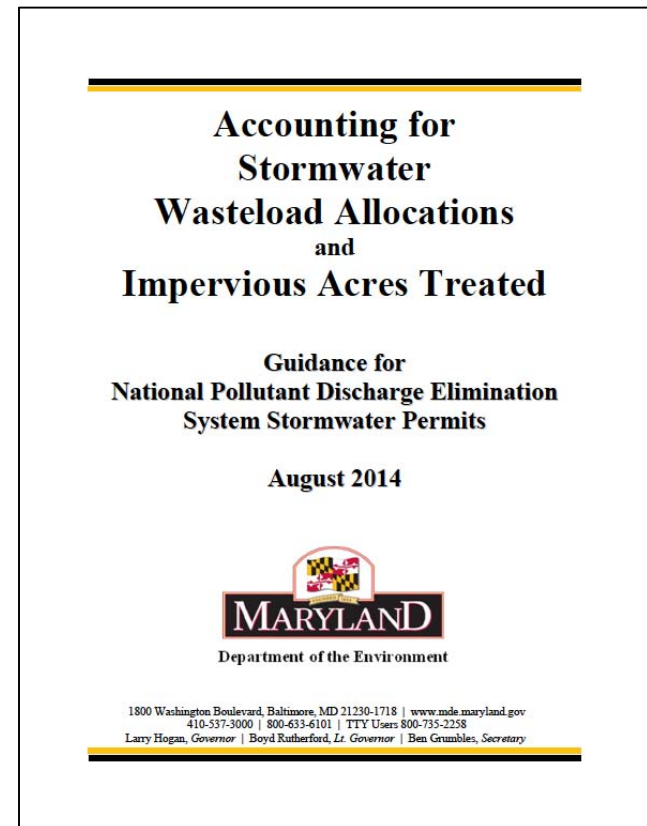
# Restoration Goals: TMDLs by the Numbers

- Phase I MS4s jurisdictions– 279 TMDLs
- Progress reporting
- Programmatic actions
- Emerging issues

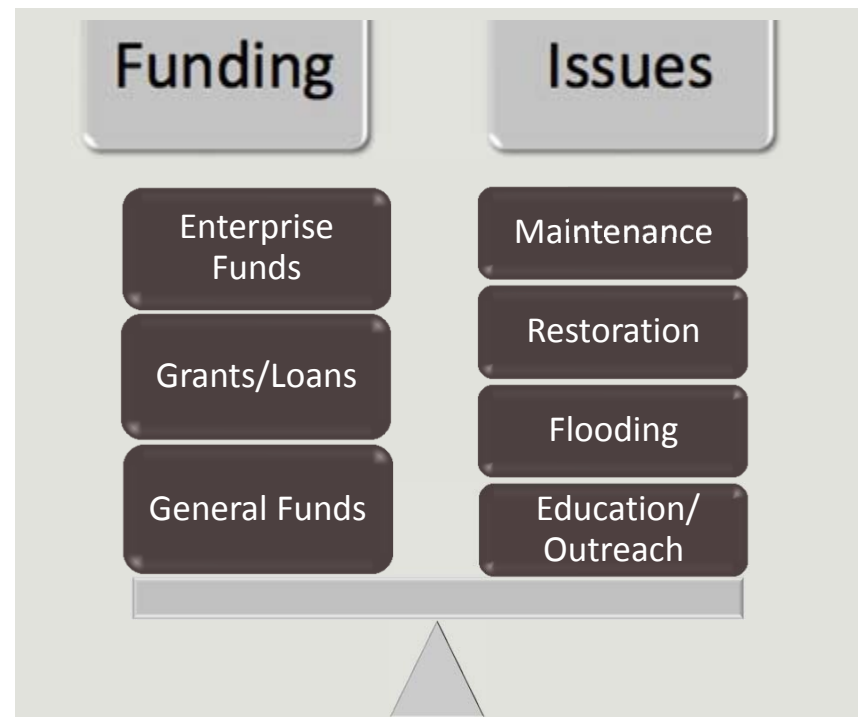
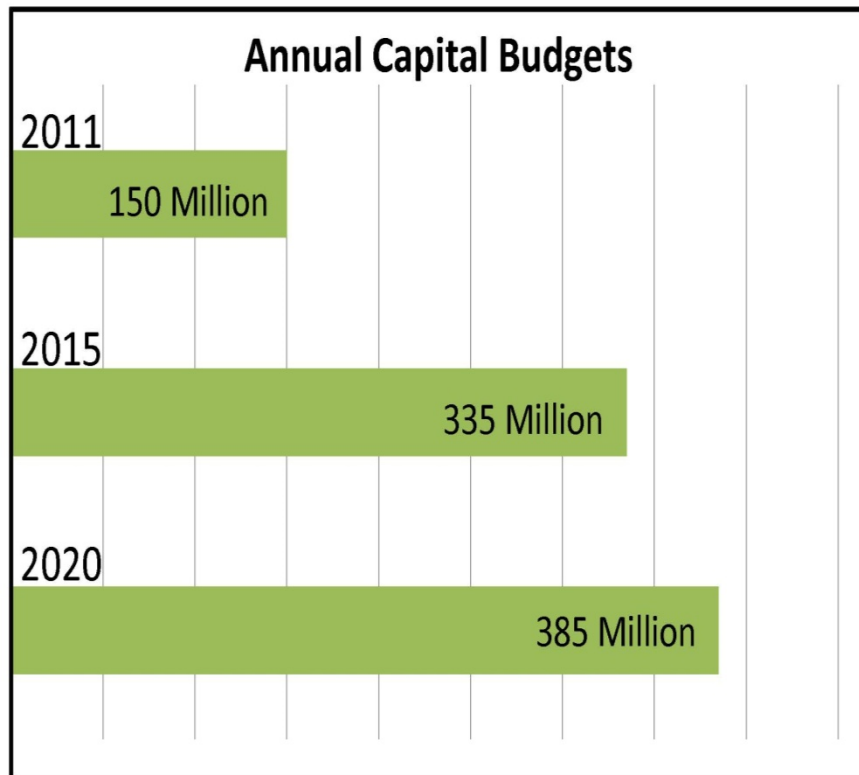


## A Metric to Drive Restoration Impervious Acres Treated

- Clear and straight forward permit goal
- A pragmatic solution to addressing multiple TMDLs
- Science based
- Successfully defended through highest MD court
- Considers equity across jurisdictions
- Recognizes each jurisdiction faces unique challenges and provides flexibility

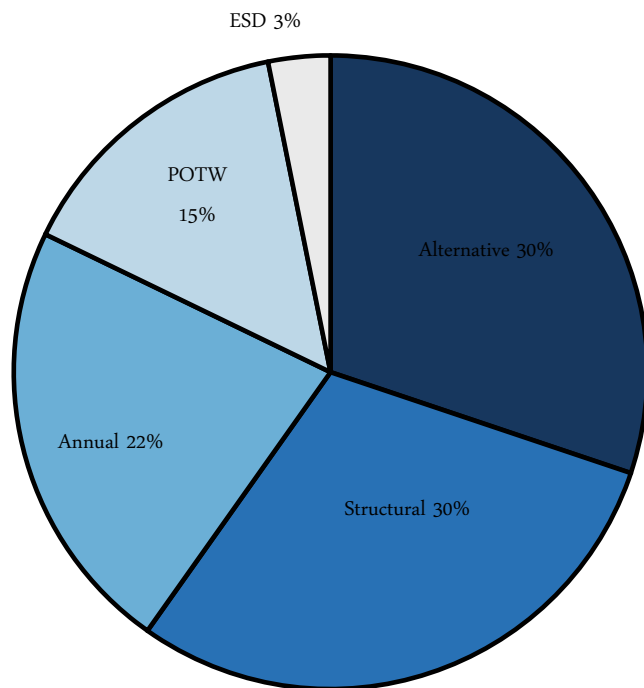


# A focus on funding, financing and efficiencies





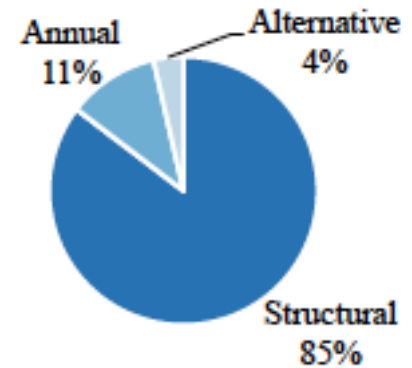
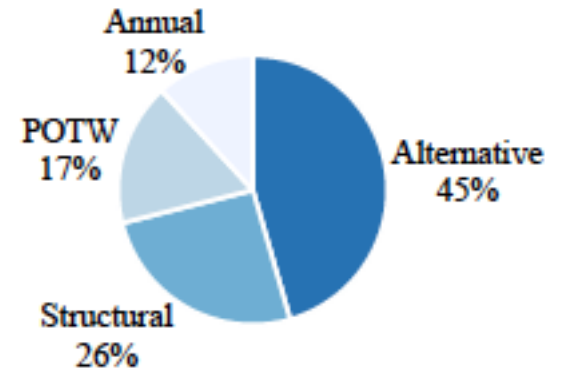
# Environmental Financial Planning



- Diverse practices used
- In total, 26% ISR complete at a cost of about \$19,000 per acre
- All jurisdictions showed they had budgets to fund 75% ISR
- A projected 102% over full permit at a cost of about \$30k per acre
- Wide disparity in costs
- Funding gap is decreasing
- About a \$1.1 billion investment at about \$30k per acre

*Annual Report on Financial Assurance Plans and the Watershed Protection and Restoration Program, Maryland Department of the Environment, October 2016,*

# Flexibility Leading to Meaningful Local Benefits



# Innovative Finance, P3 and Pay for Performance



clean  
**HOWARD**  
Howard County Stormwater Solutions

- Increase project competitiveness
  - Phasing
  - Scale
  - Leveraging
- P3 Solutions
  - Incentives
  - Pay for performance
  - Procurement



Double Pipe Creek Tree Planting

# Markets: Water Quality Trading

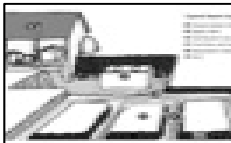
Wastewater



Agriculture



Septic Systems



\$400/lb TN

\$200/lb TN

\$3,200/lb TN

Funding \$\$

Credits

Stormwater



\$3,800/lb TN

- Advisory Committee
- Draft manual
- Regulations proposed summer 2017

# Improving Program Efficiencies

## Better Tools

- Online reporting database
- Better landuse
- Online watershed model
- Cost and optimization
- Expanded list of BMPs

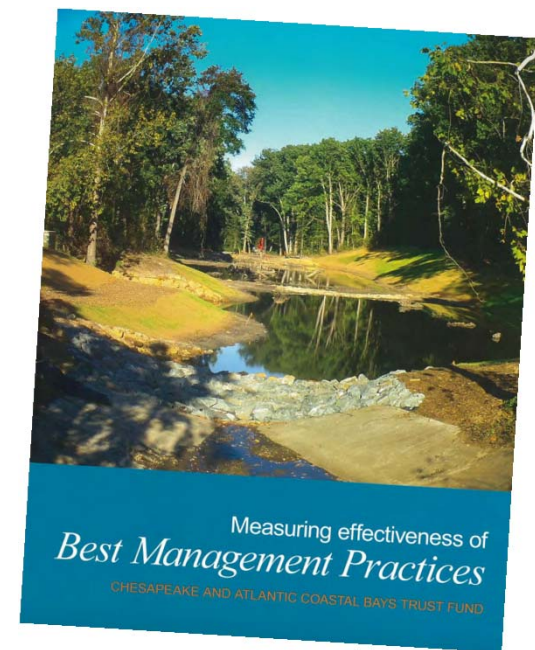
## Efficient Restoration Permitting

- A separate path for restoration project permitting
- Dedicated staff to review restorative projects
- Online collaboration
- Faster permit turnaround time for most projects
- Improved customer service



# Measuring for Results

- Measure
  - Effectiveness of restoration programs
  - Effectiveness of practices at the project scale
  - Trade-offs in resource improvements
- Pooled monitoring
  - Collaboration to answer critical questions
- Assist regulators, practitioners and funders
- Foster innovation



# Foster Innovation and Collaboration



"This really is an innovative approach, but I'm afraid we can't consider it. It's never been done before."

## Lessons Learned in Restoration & Program Implementation: From Program Startup to Innovation in BMP Design

May 18, 2017  
8:30 AM to 4:00 PM  
Maritime Institute of Technology (MITAGS), Linticum, MD



### CWEA Stormwater Committee 2017 Spring Seminar

#### Who should attend?

MS4 program compliance managers, watershed planners, water quality specialists, and environmental consultants

\$80 CWEA Members/\$90 Non-members  
\$30 Government and Student Rate (w/ID)

After May 5: \$95 Members /\$105 Non-members

PDHs will be awarded

Register Online:

[http://www.memberloop.com/members/evrbag\\_event.php?org\\_code=CWEA.&evr=9003375](http://www.memberloop.com/members/evrbag_event.php?org_code=CWEA.&evr=9003375)

# Looking Forward

- Finalizing Phase II MS4
- Bay TMDL Phase III WIP
- Developing next Phase I MS4
- Next round of FAPs
- Completing current Phase I





# Thank You!

D. Lee Currey

Acting Director, Water Management

[Lee.currey@maryland.gov](mailto:Lee.currey@maryland.gov)