

Killing Two Birds with One Stone

Building a local program to maintain your stormwater practices and prevent pollution from your municipal operations



December 6, 2006

Presented By:

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Protection**



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Special thanks to J. Zielinski, M. Novotney, D. Hirschman, J. Kosco, S. Sanghavi and Ablemarle County, VA

U.S. Environmental Protection Agency

Webcast Outline

- ▶ Introduction and Polling Questions
- ▶ Post Construction Stormwater Maintenance
 - Top Ten Maintenance Headaches
 - Scoping a Local Maintenance Program
 - Ten Tips for Building an Effective Maintenance Program
- ▶ Pollution Prevention for Municipal Maintenance Operations

Poll Question

I work for _____?

- ▶ Local government DPW or stormwater agency
- ▶ State or federal agency
- ▶ Local planning agency
- ▶ Engineering firm
- ▶ Other
- ▶ Peanuts

Phase II Minimum Control Measures

1. Public Education and Outreach
2. Public Participation / Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
- 5. Post Construction Runoff Control**
- 6. Pollution Prevention/Good Housekeeping**

What Are the Phase II Rules? *

- ▶ Post Construction Runoff Control
 - Adequate long term O&M of BMPs connected to the MS4 must be addressed
- ▶ Pollution Prevention/Good Housekeeping
 - Must develop and implement operational programs and employee training to prevent/reduce pollutant runoff from municipal operations

* in non-regulatory English

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Poll Question

How would you characterize your local stormwater maintenance program?

- ▶ Don't have a clue
- ▶ Getting started, but don't have a lot of BMPs yet
- ▶ Some experience, but lack staff for inspections
- ▶ Experienced, but have a lot of problem BMPs
- ▶ Very experienced, looking for a few new tips



Maintenance can be
depressing



Why Stormwater Maintenance?



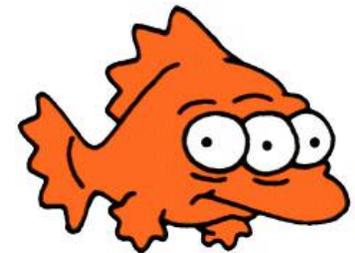
- ▶ Protects water quality
- ▶ Improves longevity of stormwater BMPs
- ▶ Maintains BMP pollutant removal rates over time
- ▶ Physically transfers trapped stormwater pollutants to safe upland areas
- ▶ Ensures facilities are safe, attractive and functional

Maintenance Headaches

- ▶ Ten reasons why it is important to carefully think through the maintenance program
- ▶ Ensure post-construction BMPs become a community amenity rather than a chronic problem
- ▶ Anticipate public concerns and misperceptions

1. Are Sediments Toxic?

- ▶ Research indicates they are not
- ▶ Sediments can be land applied or landfilled, depending on consistency
- ▶ Although sediments from certain stormwater hotspots may need to be tested prior to disposal



2. Trash and Debris



- ▶ Most BMPs do a great job at trapping litter, trash and debris
- ▶ The trapping is an important function in urban waterways
- ▶ The public expects that it will be promptly removed
- ▶ Performance of many BMPs declines if it is not removed

3. Mosquitoes & West Nile

- ▶ Major concern by citizens and local public health authorities
- ▶ Most well-designed BMPs are not major mosquito producers
- ▶ Poorly designed or maintained BMPs can create serious mosquito problems
 - unexpected ponding
 - unruly vegetation
- ▶ Maintenance can alleviate mosquito problems



4. Unruly Vegetation

- ▶ Growth happens
- ▶ Mowing greatest ongoing expense
- ▶ Design for vegetative succession



There used to be
a BMP in here
somewhere...



5. Access Denied



The design of many BMPS make it extremely hard or even impossible to perform simple maintenance tasks

- ▶ Steep side slopes
- ▶ Landlocked ponds
- ▶ No easements
- ▶ Underground BMPs
- ▶ No pretreatment cell



6. Homeowner Associations



Lack the knowledge, money and the motivation to maximize the functional performance of BMPs



SEA Streets - After Construction
2nd Ave NW - NW 117th St to NW 120th St

7. Individual Homeowner Maintenance

- ▶ Large number of BMPs
- ▶ Homeowners unfamiliar with maintenance needs
- ▶ Access and enforcement
- ▶ Landscaping changes

8. No Local Staff



TO DO:
Clean Catch Basins
Sweep Streets
Inspect BMPs
Maintain BMPs
Restore Streams



Who's gonna do all this work?

Local Stormwater Manager

9. Missing BMPs



40% of communities do not know where their BMPs are located

10. BMPs That Make the News



Questions?



Poll Question

How many people are participating in the webinar today at your location?

- ▶ Just me
- ▶ 2 to 5
- ▶ 6 to 10
- ▶ More than 10

Maintenance Scoping Questions

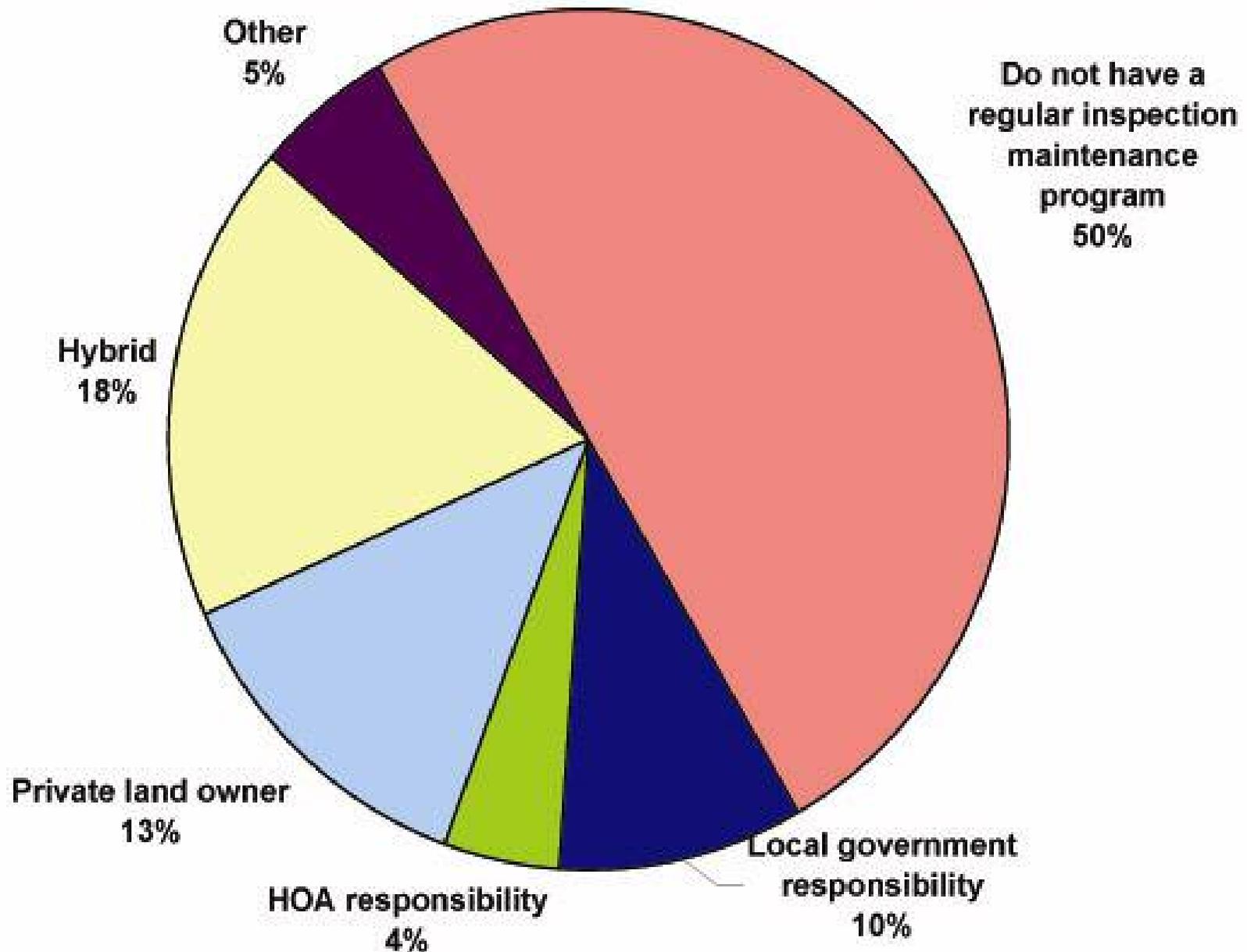
- ▶ What are your water quality goals?
- ▶ How many BMPs do you expect?
- ▶ Where will they be located?
- ▶ Public vs. private maintenance?
- ▶ Extent & level of service provided?
- ▶ How many existing BMPs already?

Poll Question

Who has the primary maintenance responsibility in your community?

- ▶ Haven't figured it out yet
- ▶ Private landowner or homeowner association
- ▶ Public sector or local government
- ▶ Hybrid of private and public sector

Who is responsible for maintenance of post-construction stormwater facilities? (# of responses = 94)

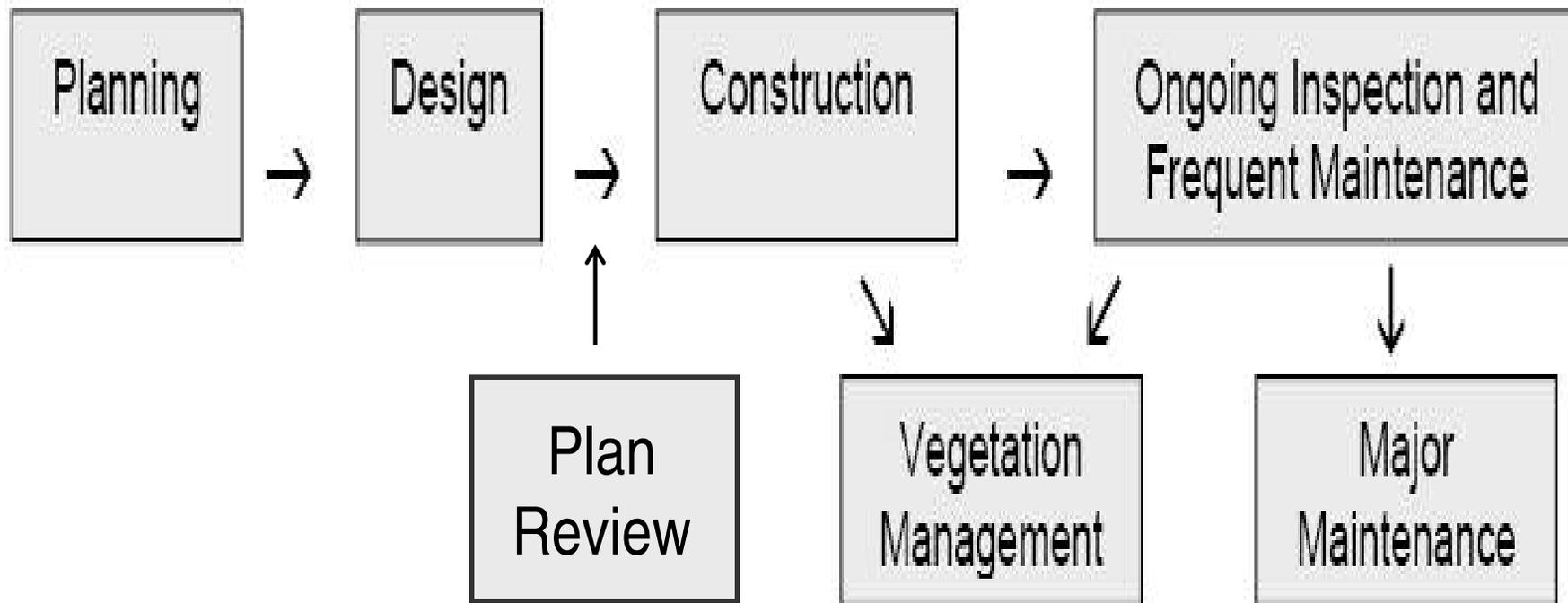


QUIZ: Which shocking statements are not supported in a survey of Phase II communities?

- (A) 50% lack a maintenance program
- (B) 58% lack legally binding maintenance agreements
- (C) Most are doing “pretty good”
- (D) 77% report they inspect BMPs during construction

Source: CWP, 2006: Survey of Post Construction Programs and Practices in 94 MS4 Communities

The Life Cycle Approach to Stormwater Maintenance



Unified View of Stormwater Infrastructure





Level of Service:

- ▶ Complaint-Driven / Political
- ▶ Schedule
- ▶ Inspection Reports
- ▶ Public vs. Private Maintenance
- ▶ Hybrid

Maintenance Program Option 1

Municipality responsible for public facilities;
homeowners or businesses have
responsibility for private facilities

- ▶ Reduces costs
- ▶ Good option for small communities with limited staff
- ▶ Community still responsible for education, tracking, and enforcement (e.g., regular inspections)

Maintenance Program Option 2

Municipality has full responsibility

- ▶ Uncommon due to expense
- ▶ Avoids legal proceedings
- ▶ Better control
- ▶ Requires dedicated staff and funding



Maintenance Program Option 3

Community has responsibility for public facilities and private facilities that discharge into public facilities

- ▶ Better control
- ▶ Requires dedicated staff and funding
- ▶ Hybrid of Options 1 and 2

Budgeting for Local Maintenance Program

- ▶ In-House vs. Contracted Services
- ▶ Staff
- ▶ Equipment
- ▶ Administration
- ▶ Tracking/GIS
- ▶ Other



Building Better Stormwater Maintenance Programs

- ▶ Most local programs exist on a shoestring
- ▶ Some very small early investments can yield major reductions in long-term maintenance costs for the community as a whole
- ▶ 13 tips that have worked in small communities



ADD 25% TO YOUR BUDGET

Maintenance

GET JACKED

HOW FAST CAN YOU
SEE RESULTS IN
15 DAYS?

BMPs

FOODS,
MOVES
& TIPS

Vegetation management

**SEDIMENT
CLEANOUTS**

**5 SECRETS TO LOSE
YOUR GUT FOR GOOD**

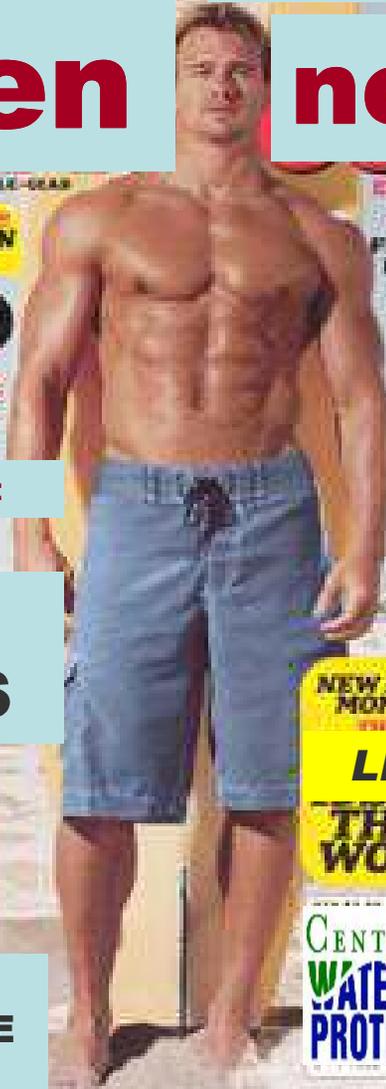
849

**WAYS TO REDUCE
YOUR MAINTENANCE
BURDEN in 6 WEEKS**

NEW EVERY
MONTH!

**LID
THAT
WORK**

CENTER FOR
**WATERSHED
PROTECTION**



Tip 1

Include Maintenance in Local Ordinance

- ▶ Identify specific entity responsible for long-term, routine maintenance
- ▶ Reference design guidelines to ease the maintenance burden
- ▶ Specify regular inspection visits
- ▶ Require inspection access and/or easements
- ▶ Include special provisions to handle emergency maintenance
- ▶ Escalating levels of enforcement

Model maintenance ordinance can be found in Resource 1

Stormwater Operation and Maintenance Model Ordinance

U²⁸ *This Operation and Maintenance ordinance language is not "stand-alone." Operation and maintenance language would be a part of a more comprehensive stormwater ordinance.*

Definitions

Best Management Practice (BMP) - Device, measure, facility or activity that helps to achieve stormwater management objectives at a designated site.

Non-Routine Maintenance - Maintenance activities that are expensive but infrequent, such as pond dredging or major repairs to stormwater structures.

Plan - A document approved at the site design phase that outlines the measures and practices used to control stormwater runoff at a site.

Stormwater Treatment Practice (STP) - A structural or non-structural Best Management Practice (BMP) specifically designed to remove pollutants in rainfall runoff from developed areas.

Section I. Design

A. All STPs shall be designed in a manner to minimize the need for maintenance, and reduce the chances of failure. Design guidelines are outlined in the most recent version of _____ (Local or State Stormwater Manual).

U²⁹ *Rather than incorporate specific stormwater design or maintenance standards into the ordinance itself, it is best to reference "the most recent edition" of a stormwater manual. In this way, technical information can remain up to date without making legal changes to the ordinance.*

U³⁰ *The Maryland Stormwater Design Manual, is one example of an up-to-date stormwater design manual that explicitly defines design and regular maintenance measures. For more information, go to www.mde.state.md.us. Under topics, choose "Stormwater Design Manual."*

B. Stormwater easements and covenants shall be provided by the property owner for access for facility inspections and maintenance. Easements and covenants shall be recorded with _____ (Stormwater Agency) prior to the issuance of a permit.

U³¹ *For an example of a stormwater easement, see [Maintenance Easements](#).*

C. Final design shall be approved by _____ (Stormwater Agency)

U³² *_____ shall be maintained according to the measures outlined in the most recent*

Tip 2

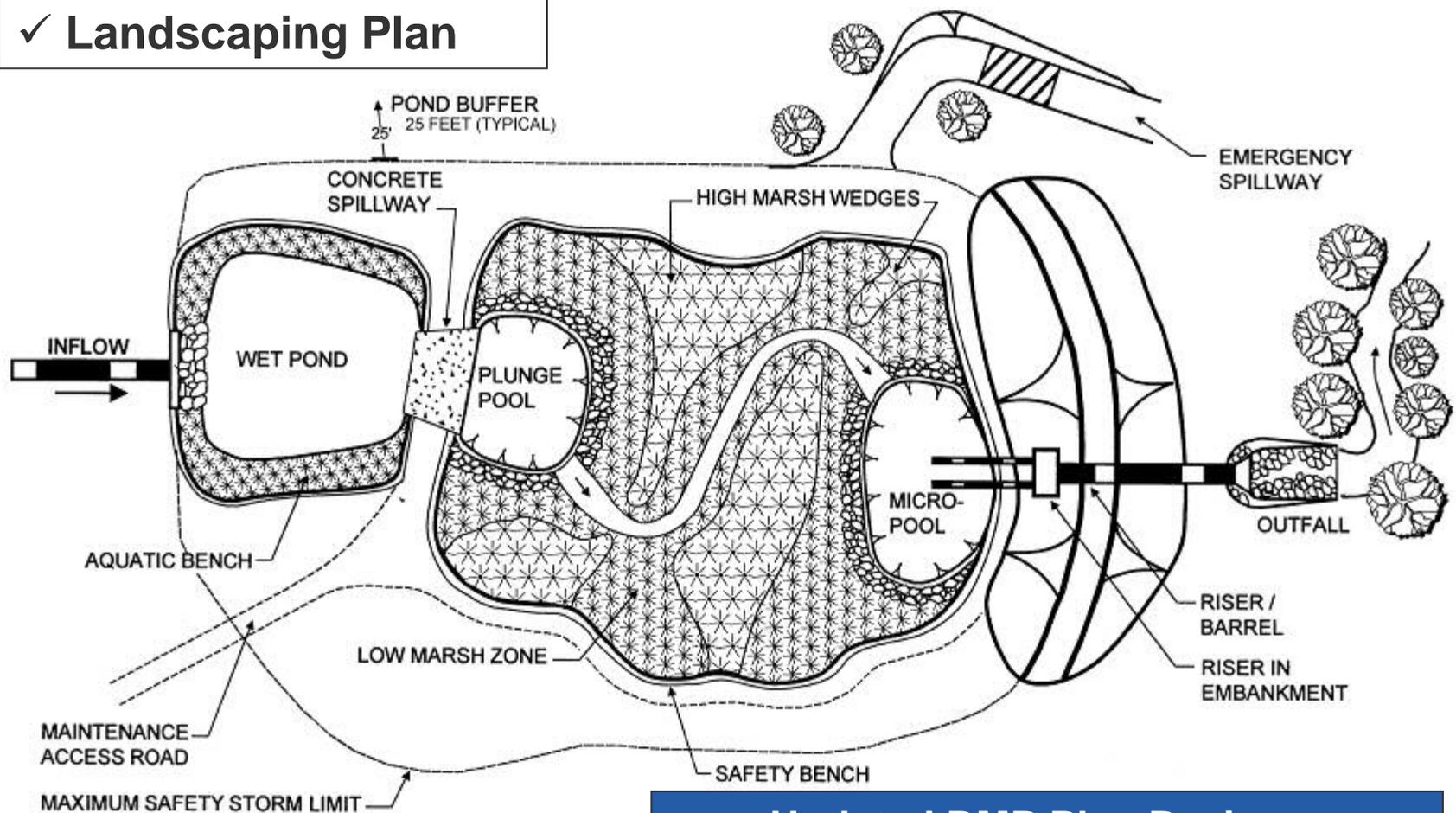
Reduce Maintenance Burden Before Construction

- ▶ Reduce maintenance headaches with tough design standards...if you don't ask for it, you won't get it!
- ▶ Thorough plan review ensures design standards are properly implemented
- ▶ Review the plan as if you were the maintenance crews
- ▶ Get standards off the books and onto site plans

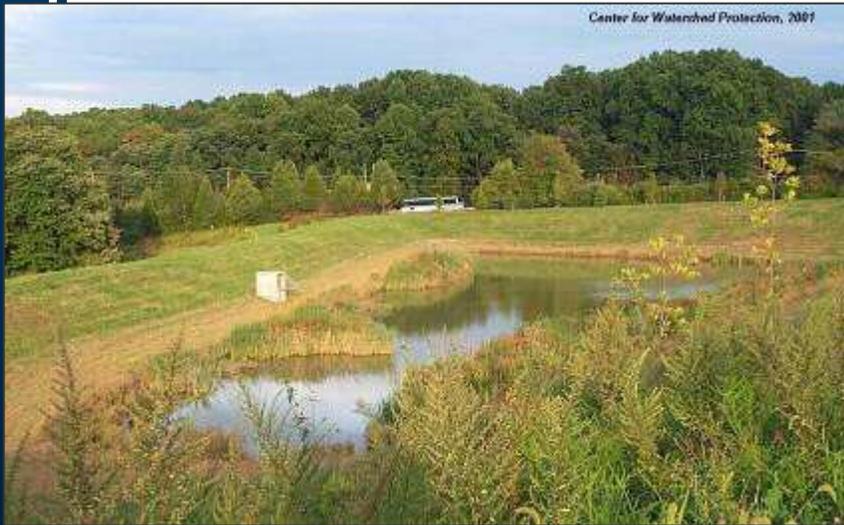
Good examples of BMP design standards to reduce maintenance burden can be found in Resource 2

Plan Review Checklist

- ✓ Pretreatment
- ✓ Access
- ✓ Landscaping Plan



Updated BMP Plan Review
Checklists can be found in Resource 3



- ▶ Require pretreatment
- ▶ Make sediment removal operations quick, easy and cheap
- ▶ Ensure easy access to perform maintenance
- ▶ Control side slopes
- ▶ Long-term vegetation management plan
- ▶ Design for trees
- ▶ Require detailed maintenance plan/schedule



Understand Maintenance Tasks

- ▶ Common problems
- ▶ Unit costs for tasks
- ▶ Recommended schedules

Resource 4 provides link to maintenance guidance documents that contain this information

Tip 3

Get Ironclad Easements



- ▶ Access Easements
- ▶ Drainage Easements (conveyance)

Decisions:

- ▶ Dedicated to Public?
- ▶ Deeds?

**Links to Model Stormwater Easements
can be found in Resource 5**

Tip 4

Tough Construction Inspections Before Acceptance



**Updated Construction Inspection
Checklists can be found in Resource 6**

Tip 5

Use Maintenance Agreements & Bonds

- ▶ Agreements in property deed
- ▶ Construction Bond
- ▶ Maintenance Bond
- ▶ Maintenance Plan based on type of BMP



**Model Maintenance Agreements and
Performance Bond Estimator in Resource 7**

Tip 6

Routine and Thorough Inspections

- ▶ Annual Inspections
- ▶ Detailed Checklists
- ▶ Third party inspections
- ▶ Measure where possible
- ▶ Spray paint problems
- ▶ Issue direct work orders for problem BMPs
- ▶ 1 FTE: 250 to 500 BMPs



**Model Maintenance Inspection Forms
Can be Found in Resource 8**

Inspection Checklists

- ▶ Be quantitative, so that maintenance can easily be prioritized (e.g., "0-4" system)
- ▶ Be very specific about possible problems to reduce subjectivity – and clearly ID needed actions
- ▶ Limit the use of text, particularly when used with a database
- ▶ Track the function of the BMP over time for future research (e.g., wetland vegetation)

Tip 7

Progressive Enforcement and Corrections

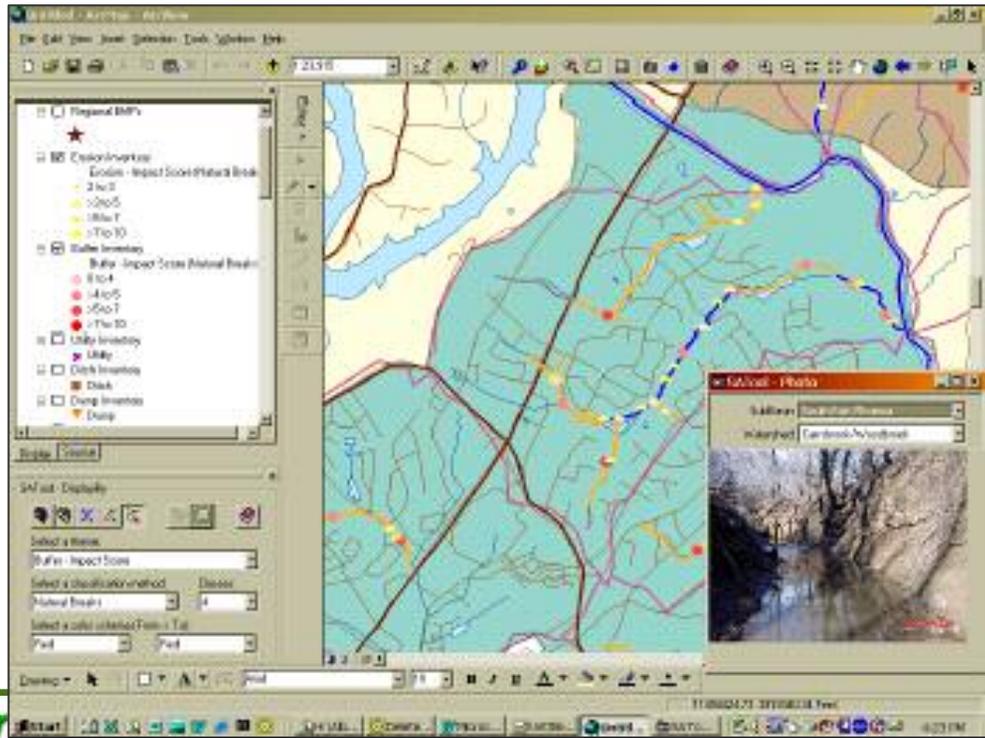
- ▶ Education first
- ▶ Stages of enforcement
- ▶ When/How to pursue corrective actions
- ▶ Remedies to collect maintenance costs



**Enforcement Tools
Can be Found in Resource 9**

Tip 8

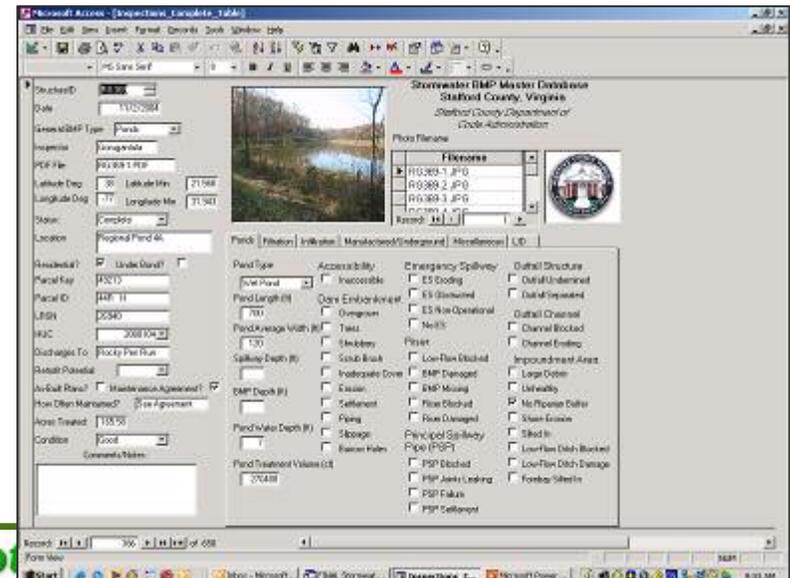
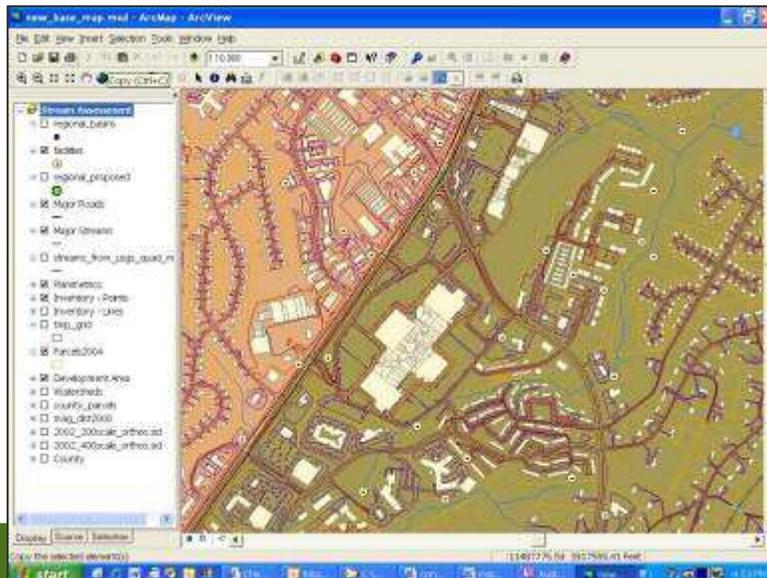
Synchronize field and office data



Tip 9

BMP Tracking & Documentation

- ▶ Inventory existing BMPs
- ▶ Track maintenance and inspection reports
- ▶ Schedule inspections and work orders
- ▶ Provide documentation for legal action
- ▶ Relate design traits to practice performance
- ▶ Identify future retrofit opportunities



Albemarle County Stormwater Management Database

Project Basic

Project Name Lookup

Project Name	<input type="text" value="Crozet Convergence Center"/>	Fee Collected Amount	<input type="text" value="\$0.00"/>
Project Type	<input type="text" value="Commercial"/>	Fee Collected Date	<input type="text"/>
Project ID	<input type="text" value="108"/>	Number of Facilities	<input type="text" value="1"/>
Project File	<input type="text"/>		

Project Location | Maintenance / Easement | Owner / Responsible Party | Facility

Facility ID

Facility Information

SWM Plan Acceptance Date	Type of Facility	Active E / S Bond?	Drainage Area (acres)	Impervious Area (acres)
<input type="text" value="8/3/2000"/>	<input type="text" value="Vault Sand Filter"/>	<input type="checkbox"/>	<input type="text" value="1"/>	<input type="text" value="1"/>
<input type="checkbox"/> Aquatic Bench <input type="checkbox"/> Extended Detention <input type="checkbox"/> Forebay <input type="checkbox"/> Regional <input type="checkbox"/> Wetland Zones				

Design Storm

- 10-year
- 2-year
- Water Quality
- Other

Outflow Structure

Comments

Inspection Information

Inspection Date	Performed By	Inspection Status	Action Status	Show Form	Show Report
<input type="text" value="2/4/2003"/>	<input type="text" value="Dan Fowley"/>	<input type="text" value="Annual"/>	<input type="text" value="None"/>	<input type="button" value="+"/>	<input type="button" value="+"/>
<input type="text" value="4/6/2005"/>	<input type="text" value="Greg Harper"/>	<input type="text" value="Annual"/>	<input type="text" value="Repairs Needed"/>	<input type="button" value="+"/>	<input type="button" value="+"/>

Record: of 1

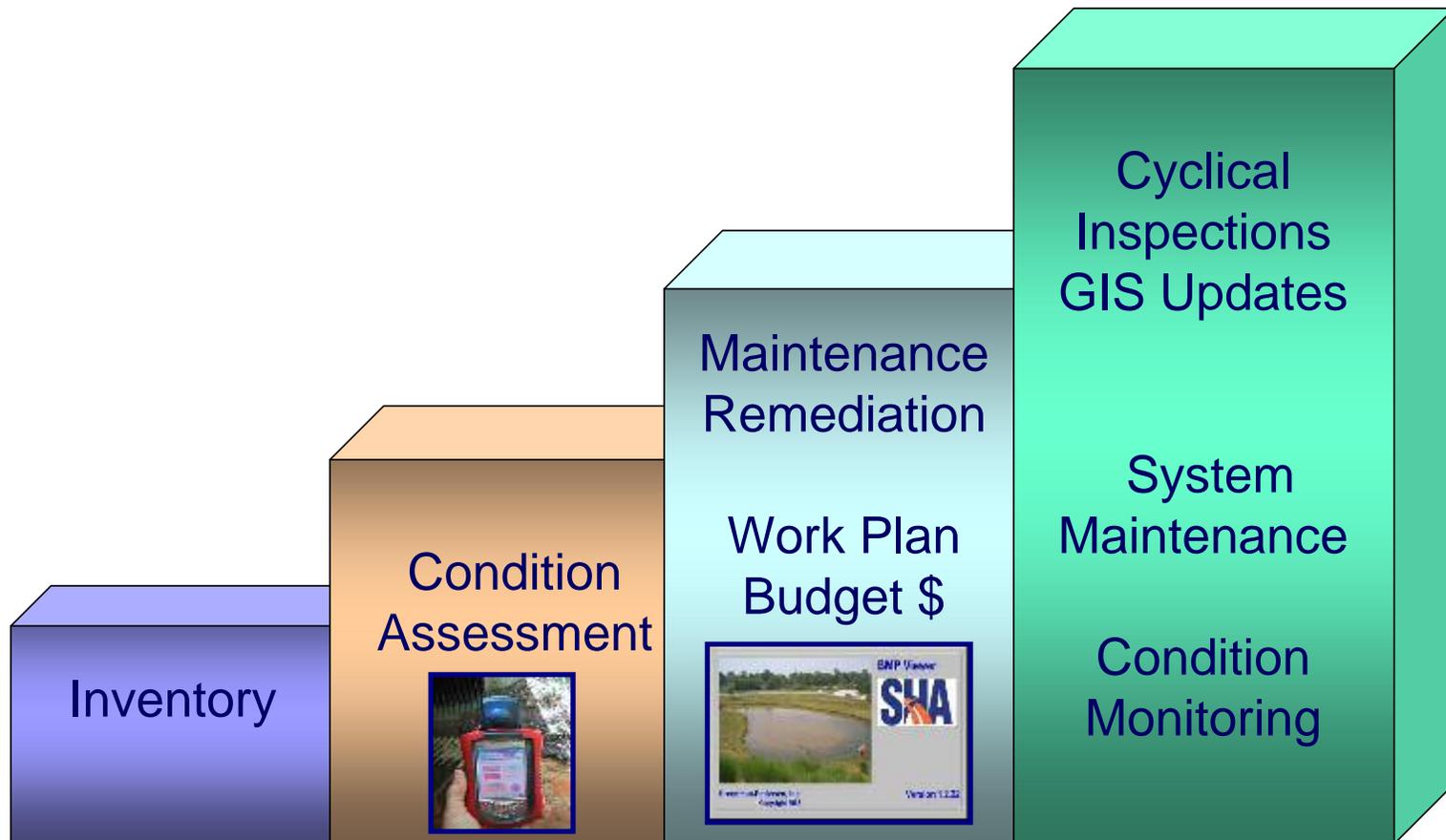
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Ready

NUM

**BMP Tracking Guidance
Can be Found in Resource 10**

Tracking to Manage Stormwater Assets



Tip 10

Establish BMP Triage System

**Condition 2:
Major Repair/Functional
Enhancement**



**Condition 3:
Notify Owner to Perform
Routine Maintenance**



Triage Condition 1: Reconstructive BMP Surgery



Failed infiltration basin to Wet Swale

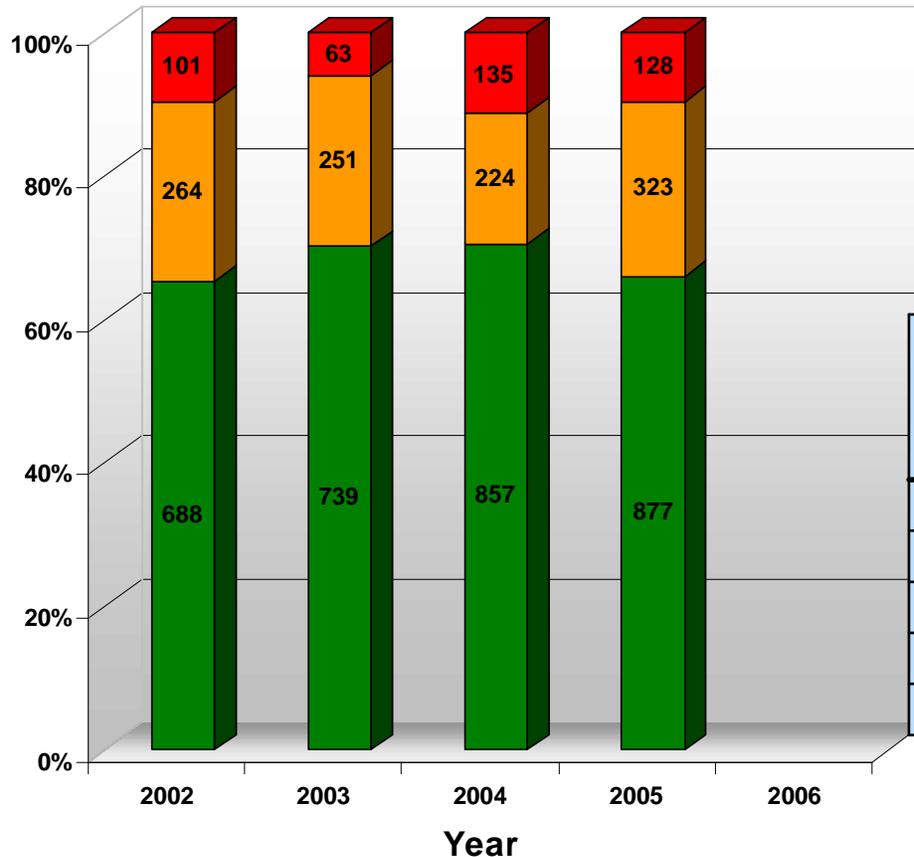


Failed infiltration basin to Extended Detention with Micro-pools

Tip 11

Track Functional Performance of Stormwater BMPs

By 2010, maintain functional adequacy of stormwater facilities at 90%.



- Retrofit Design / Functional Enhancement
- Major Maintenance Repair
- Functioning as Designed

YEAR	Functioning as Designed	Major Maintenance Repair	Retrofit Design / Functional Enhancement	TOTAL
2002	688	264	101	1053
2003	739	251	63	1053
2004	857	224	135	1216
2005	877	323	128	1328
2006				

ADOPT-A-POND PROGRAM DOCUMENT

March 2003 draft



Created by the
Center for Watershed Protection
8191 Main Street
Ellicott City, MD 21043



And the
Herring Run Watershed Association
4337 Maryland Rd.
Baltimore, MD 21214



For the
Baltimore County Department of Environmental
Protection and Resource Management (DEPRM)



**Adopt-a-Pond Guidance
Can be Found in Resource 11**

Tip 12 Educate & Involve the Maintainers

- ▶ Adopt-A-Pond
- ▶ Volunteer Clean-Ups
- ▶ Publications, Mailings

PROTECTING RESOURCES
PRIDE
IN DELICATE ENVIRONMENTS

Home

Watershed 101

Watershed Tour

What Can I Do?

Online Resources

BMP Guide

RPA Guide

Turf Love

Rain Gardens

Rain Gardens/Barrels

News & Projects

Mini-Grant Program

PRIDE Team

Watershed
Education
Program.

BMP GUIDE ABOUT BMPs RATING BMPs MAINTENANCE PRIDE DESIGNATION SEARCH THE RATINGS

How Neighborhoods Obtain "PRIDE" Designation

For a stormwater management/BMP facility in James City County, there are two paths available to achieve "PRIDE" status (receive a neighborhood sign).

1. Achieve and maintain a BMP Rating of 5 based upon inspection by County Environmental Division staff. A rating of 5 is the best achievable under the County BMP Inventory/Inspection program;

2. Perform a watershed protection project at the BMP or in the neighborhood which enhances, retrofits or improves the water quality treatment function of the BMP or any of its components. Some ideas include: establishing vegetative pond buffers, installing forebays, installing a micropool, planting shallow marsh or fringe wetland plants, shoreline erosion protection, invasive species removal or an organized clean-up day, etc.

County staff will determine if a stormwater management/BMP facility qualifies for PRIDE designation using the following criteria:

- ▶ The BMP must be located in James City County.



U.S. En

Tip 13

Co-Inspections

- ▶ Owner interaction critical
 - notification of program reinstatement
 - “owner’s manual” (shown)
 - invited to accompany inspections
 - workshops
 - provide maintenance plans

**Maintenance Education Materials
Can be Found in Resource 12**

Stormwater Matters

*A guide to help owners
understand their
stormwater facility
maintenance
responsibilities*



Biofilter, Monticello High School



Questions?



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Poll Question

Where is your community at with the municipal good housekeeping minimum measure?

- ▶ First I've ever heard about it
- ▶ Bought our subscription in the last year
- ▶ Just getting started
- ▶ Some experience, but not sure about scope
- ▶ Doing well, in fact, I should be teaching this webcast



**20 MUNICIPAL HOTSPOTS
You can Inspect!**

FROM CLASSICS TO LOW-CAL
(you can't taste the difference!)

**SWEEP THE STREETS
IN ONE DAY!**
Time-saving shortcuts

**STORM DRAIN
CLEANOUTS**

\$8 - \$50
PLUS what tweens
& teens want most

**Recipes
You Really Want**

- Winter sanding
- Roadside spraying
- Pollution hotlines

**GRAB A BOX OF TISSUES!
5 Inspiring stories of**

Employee training

**KELLY
RIPA**
her holiday traditions,
funniest disasters - and her
grandma's cookie recipe



Municipal Operations Analysis (MOA)

- ▶ Do a quick eight step checkup to review how well your ongoing municipal operations are aligned with stormwater quality

**Look for New CWP Manual
on Municipal Good Housekeeping Practices
in 2007 !**

QUIZ: Which statements about municipal pollution prevention are not true?

- (A) 37% promote innovative stormwater practices in municipal construction projects
- (B) 35% ID and map stormwater hotspots
- (C) 59% claim to train their municipal employees
- (D) 98% respond to pollution hotline calls within 24 hours
- (E) 100% claim to be fully compliant with minimum management measures

Source: CWP, 2006:
Smart Watershed Benchmarking Tool

MOA #1

Sweep Streets for Water Quality

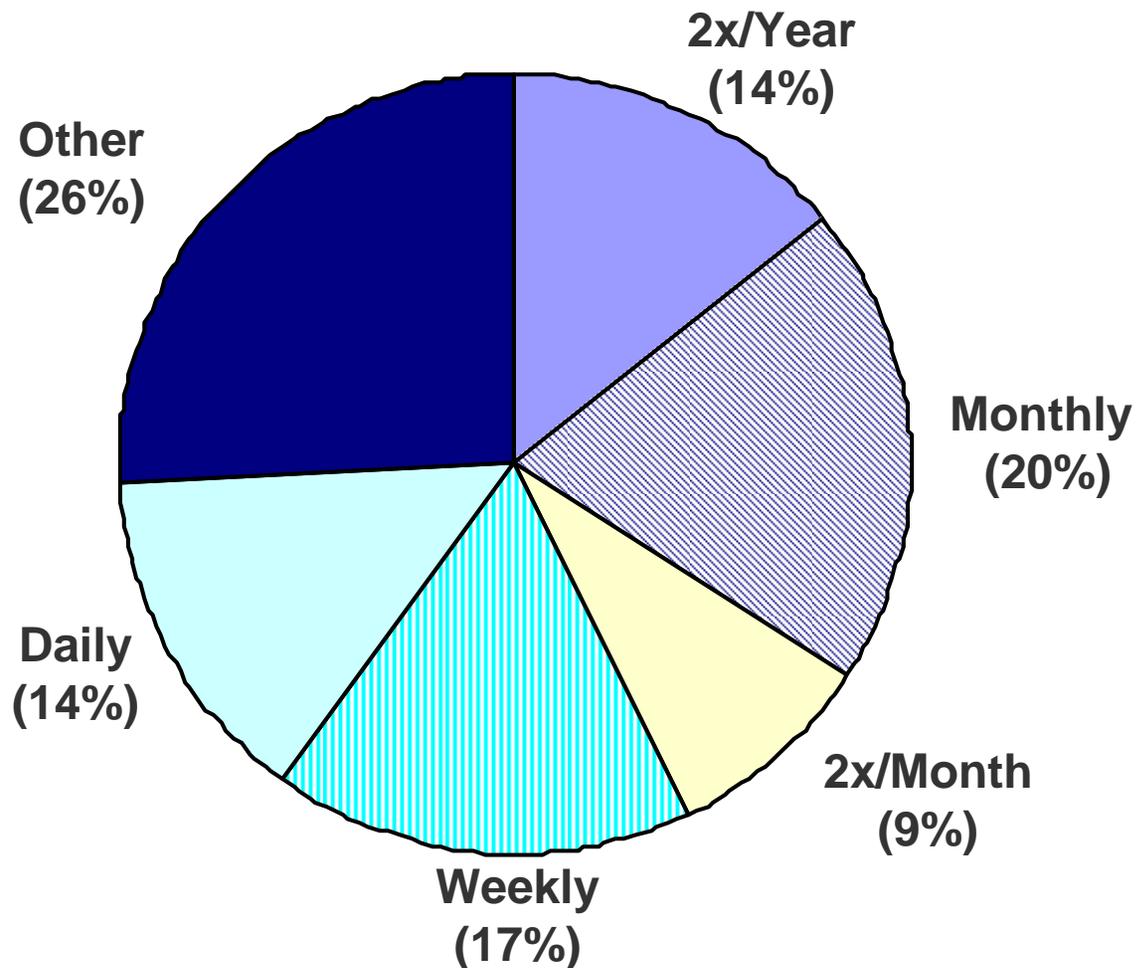
- ▶ We sweep a lot, but not very wisely
- ▶ Over \$13 million spent on sweeping in the Chesapeake Bay Basin alone
- ▶ Get water quality improvement by targeting
 - Focus on the dirtiest streets
 - Select most effective sweepers
 - Determine optimal sweeping routes and schedules

QUIZ: What is the least frequently cited reason why communities sweep their streets?

- (A) Aesthetics
- (B) Public complaints
- (C) Keep storm drains clear
- (D) Street safety
- (E) Improve water quality

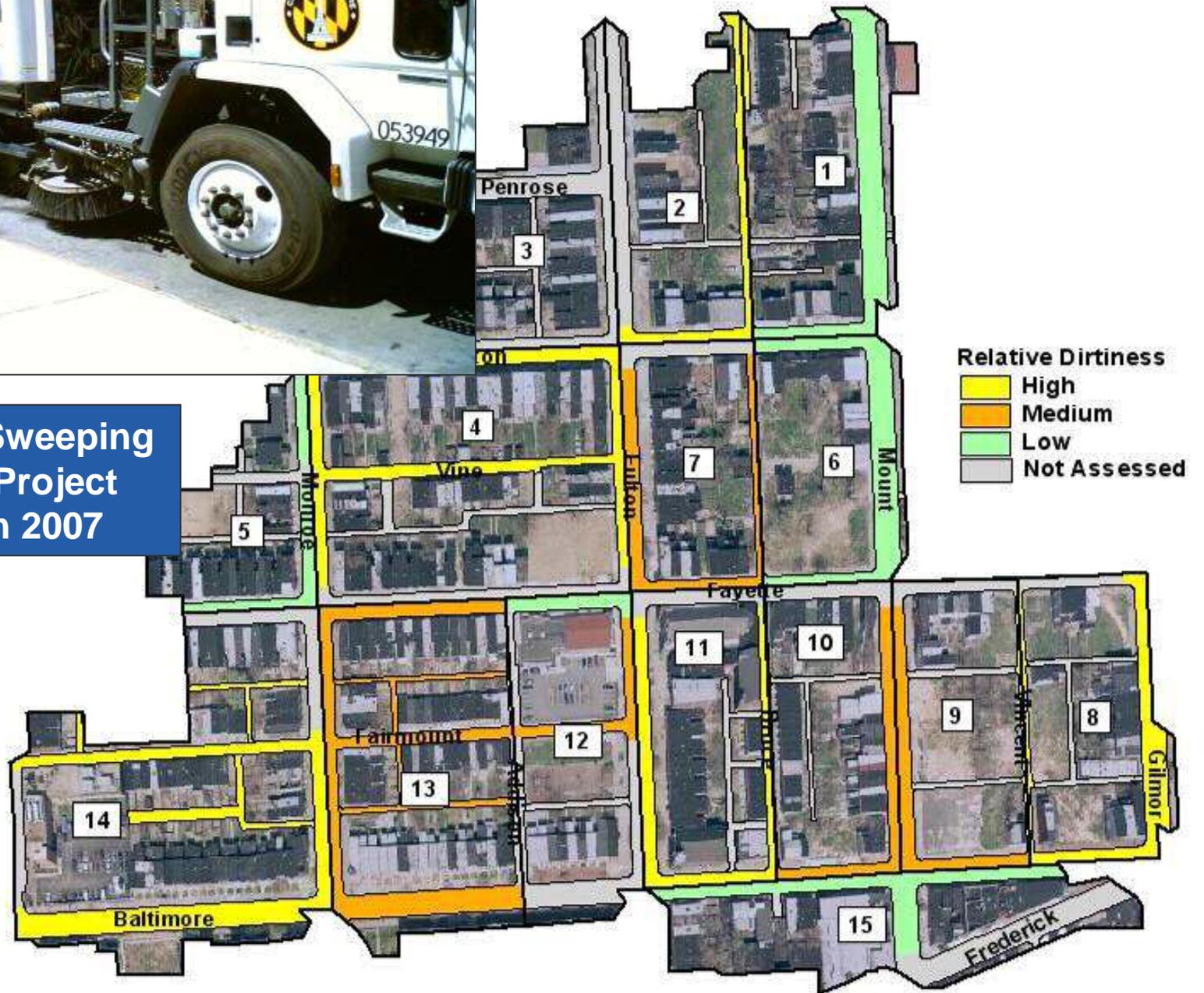
Source: Law, 2006: Survey of Chesapeake Bay Street Sweeping/Storm drain cleanout practice

Percentage of communities that report sweeping some streets more frequently than 1x/year





**CWP Street Sweeping
Research Project
Due out in 2007**



MOA #2

Clean Out Targeted Catch Basins

- ▶ No two catch basins are the same
- ▶ Measure pollutant accumulation using the Streets and Storm Drain (SSD) survey and GPS the system
- ▶ Train crews to understand stormwater quality and find illicit discharges
- ▶ Target problem catch basins for intensive cleaning (2 to 4X/year)

**SSD Survey outlined in Resource 13
USSR Users Guide USRM Manual 11**

Storm Drain Inlet Conditions



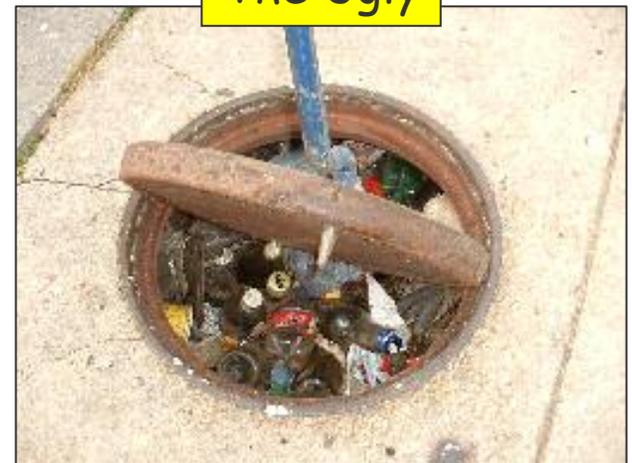
The Good



The Bad



The Ugly



QUIZ: Which statements are not true about municipal storm drain cleanout efforts?

- (A) All communities clean out their storm drains
- (B) 60% only clean them out in response to citizen complaints
- (C) 6% cleanout their storm drains at least once a year
- (D) 50% know where their storm drain inlets are
- (E) 64% clean out storm drains to improve water quality

Source: Law, 2006: Survey of Chesapeake Bay Street Sweeping/Storm drain cleanout practice

Review of Catch Basin Studies

- ▶ Only a **handful of studies** monitored the pollutant reduction and the optimal frequencies for cleanouts at a catchment scale.
- ▶ Cleanouts may reduce pollutants by **5 to 25%** depending on catchment conditions, cleaning frequency and type of pollutant.
- ▶ Pollutant removal capability of catch basins is **constrained by their design**

Law, 2006: Literature Review of Pollutant Removal
Performance of Street Sweeping/Catch Basin
Cleanouts

MOA #3

Inspect Every Municipal Hotspot

- ▶ Fleet storage/maintenance
- ▶ School bus depots
- ▶ Landfills/solid waste facilities
- ▶ Public works yards
- ▶ Municipal parking lots
- ▶ Maintenance depots
- ▶ Wastewater treatment plants
- ▶ Aviation facilities



Physician, heal thyself

QUIZ: A stormwater hotspot is defined as:

- (A) An activity that increases water temperature in streams
- (B) The point in a channel with maximum runoff velocity
- (C) A watering hole for stormwater geeks
- (D) An operation or activity that generates higher concentrations of stormwater pollutants and/or presents a high risk of spills, leaks or illicit discharges.







Hotspot Site Investigation

See
**USRM Manuals
8 and 11**

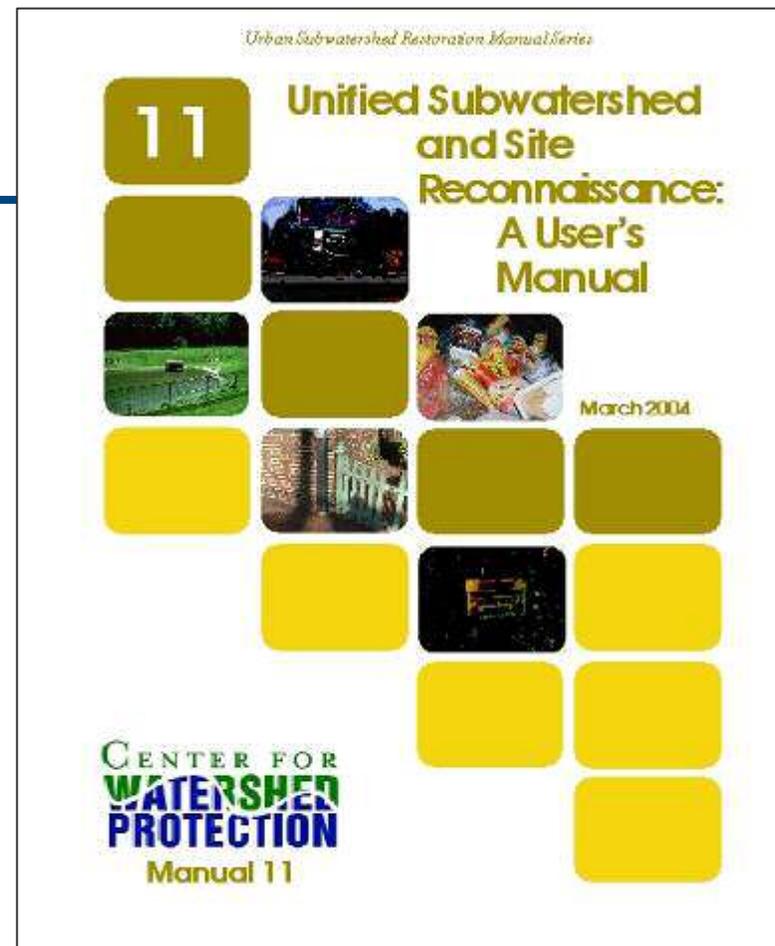
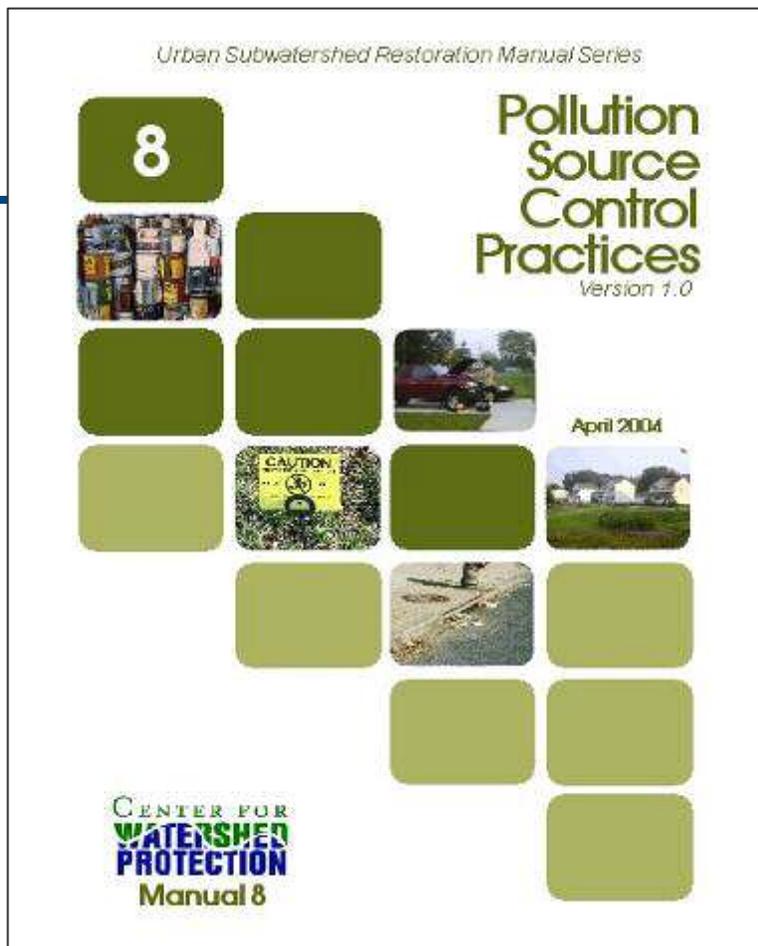
Bioretention

Loading Docks

Trash Location Sites

- ▶ Vehicle Operations
- ▶ Outdoor Material
- ▶ Waste Management
- ▶ Physical Plant
- ▶ Turf / Landscaping Areas
- ▶ Unique Operations

Land
Reclamation



Resource 14 These two manuals are indispensable and can be ordered from www.cwp.org

What Works at Municipal Hotspots?

Pollution Prevention Plans that . . .

- ▶ Involve and list all responsible departments
- ▶ Focus on specific activities and include achievable BMPs
- ▶ Focus on maintenance of controls
- ▶ Clearly show link between pollutants and storm drains
- ▶ Address pollutants of concern
- ▶ Consider seasonal variations
- ▶ Reflect staff input and ideas

MOA #4

Maintain Roads for Water Quality

- ▶ Review current sanding/salting practices
- ▶ Check pesticide application in road right of way
- ▶ Change truck washout procedures
- ▶ Keep sawcut slurry out of storm drain
- ▶ Road crew training



Don't Forget Other Infrastructure

DOT

**Sewer
Utility**

21 2:19PM



MOA #5

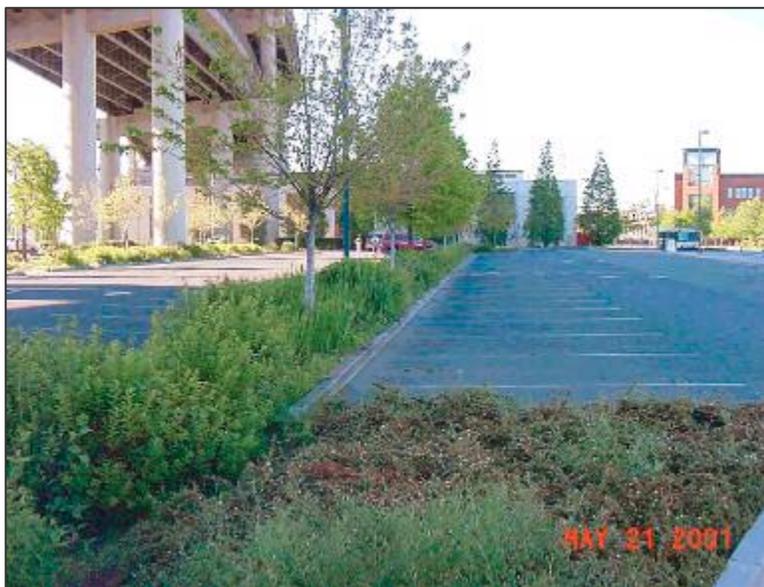
Green Practices for Landscaping/ Recreational Areas

- ▶ Survey parks, public golf courses, sports fields and waterfront/greenways to:
 - Minimize Use of Fertilizer/Pesticide
 - Manage Landscape Waste
 - Use Native Vegetation
 - Prevent Municipal Swimming Pool Discharge
 - Manage Trash and Pet Wastes

MOA #6

BMPs in New Public Construction

- ▶ Exceed the minimum required for the private sector
- ▶ Demonstrate innovative stormwater practices
 - Green roofs, bioretention, water harvesting, etc.
- ▶ Utilize projects for stormwater education



MOA #7

Train Municipal Employees & Contractors

- ▶ Provide general and activity specific training
- ▶ General awareness training for all city employees (impact on water quality, pollution prevention, discharge identification and response)
- ▶ Regular and targeted training for employees based on the activities they perform



Training for Municipal Staff

- ▶ Teach employees that their actions have an impact on water quality and they are examples for the community
- ▶ Link your employee training with your public education message
- ▶ Create recognizable links between pollutants of concern and uses they enjoy/value

Training for Municipal Staff

- ▶ Additional Forms of Training
 - New employee orientation
 - Paychecks or other routinely distributed materials
 - Signage in the workplace and a place/number to report issues
 - Frequent tailgate sessions

MOA #8

Establish Pollution Hotline and Respond

Single phone number or website where citizens can easily report illicit discharges and pollution concerns

- ▶ Cross-trained staff
- ▶ Response within 24 hours
- ▶ Try to “address” watersheds





Questions and Wrap-up
