Accotink Creek Watershed Management Plan

Watershed Advisory Group #2
March 12, 2009

Fairfax County Department of Public Works and Environmental Services
Presented by Watershed Planning & Assessment Branch, Stormwater Management

Welcome

Juliana Birkhoff, CBI

Today's Meeting Goals

- Discuss county goals and objectives
- Update on Accotink Creek modeling
- Review watershed restoration strategies
- Discuss applying strategies to Accotink Creek

Watershed Plan Goals and Objectives

Danielle Wynne, Fairfax County

Goals and Objectives

- Developed to improve efficiency of the Watershed Management Planning process
- Promote consistency in the watershed plans that are to be developed by the county's various consultants.
- Allow for a countywide evaluation that addresses stakeholder concerns while providing an efficient and effective means of assessment.

Terminology

- **Goals-** a general statement about the desired outcome of a watershed management strategy

- **Objectives-** more specific statements that define how the goals are accomplished
  - cannot be directly measured, so indicators that are directly linked to the objectives are needed

- **Indicators –**yardsticks for measuring how well the objectives are met (environmental conditions)
  - a quantifiable endpoint to measure the watershed conditions

The First Round

Initial set of six Watershed Management Plans

- Each plan had own goals and objectives
  - Developed independently, non-standard format, no indicators
- Issues from this approach
  - Implementation, tracking, inconsistency
  - Time Consuming Public Process
    - Less time devoted to project selection and evaluation

Lesson Learned

- The county needed consistent goals and objectives to develop a systematic approach for countywide watershed management

The Second Round

The final seven Watershed Management Plans

- Overarching goals and objectives
  - Consolidated from all first round plans
- Solutions for a range of problems
  - Implementation, tracking, inconsistency issues
- Streamlined Public Process
  - More time devoted to project selection and evaluation

Goals and Objectives

- **Countywide watershed planning goals**
  1. Improve and maintain watershed functions in Fairfax County, including water quality, habitat, and hydrology.
  2. Protect human health, safety, and property by reducing stormwater impacts.
  3. Involve stakeholders in the protection, maintenance and restoration of county watersheds.

- **Watershed Planning Objective Categories***
  1. Hydrology
  2. Habitat
  3. Stream Water Quality
  4. Drinking Water Quality
  5. Stewardship

*each category has one or more specific objectives associated with it

Objectives

Objective	Linked to Goal(s)
CATEGORY 1. HYDROLOGY	
1A. Minimize impacts of stormwater runoff on stream hydrology to promote stable stream morphology, protect habitat, and support biota.	1
1B. Minimize flooding to protect property, human health, and safety.	2
CATEGORY 2. HABITAT	
2A. Provide for healthy habitat through protecting, restoring, and maintaining riparian buffers, wetlands, and instream habitat.	1
2B. Improve and maintain diversity of native plants and animals in the county.	1
CATEGORY 3. STREAM WATER QUALITY	
3A. Minimize impacts to stream water quality from pollutants in stormwater runoff.	1, 2
CATEGORY 4. DRINKING WATER QUALITY	
4A. Minimize impacts to drinking water sources from pathogens, nutrients, and toxics in stormwater runoff.	2
4B. Minimize impacts to drinking water storage capacity from sediment in stormwater runoff.	2
CATEGORY 5 STEWARDSHIP	
5A. Encourage the public to participate in watershed stewardship.	3
5B. Coordinate with regional jurisdictions on watershed management and restoration efforts such as Chesapeake Bay initiatives.	3
5C. Improve watershed aesthetics in Fairfax County.	1, 3

Indicators

Watershed Impact Indicators
Benthic Communities
Road Hazards
Fish Communities
Building Hazards
Aquatic Habitat
Flood Complaints
Channel Morphology
In-stream Sediment
Hydrology
Nitrogen Loading
Phosphorous Loading
Headwater Riparian Habitat
Wetland Habitat
Sediment Loading

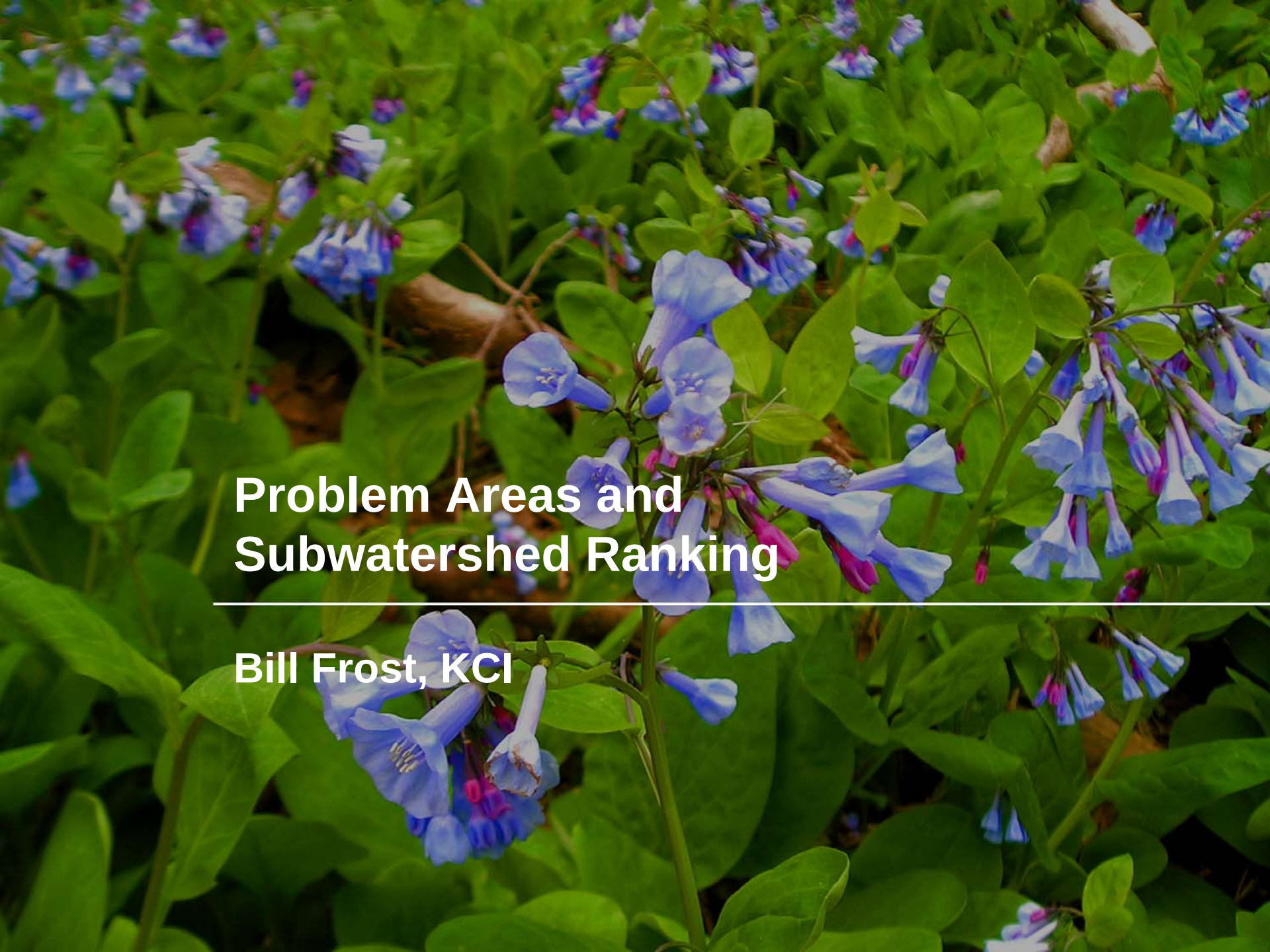
Source Indicators
Channelized/Piped Streams
Stream Buffer Deficiency
Impervious Area
Nutrient Loading
Stormwater Outfalls
Sediment Loading
Parcels served by septic
Urban Land Cover
Population density
VPDES Point Sources
Erosion and Sediment permits
Sanitary Sewer Crossings
Other Hot Spots

How does it work?

- **Goal-** Improve and maintain watershed functions in Fairfax County, including water quality, habitat and hydrology
  - **Objective-** Minimize impacts to stream water quality from pollutants in STW runoff
    - **Indicators-** Fish Community Rating, Nutrient Loads, Habitat Quality, Sediment, etc.

Expectations

- Extensive work was done in developing goals and objectives during 1st Round
- We are open to new ideas on watershed specific goals & objectives not yet considered
- WAG time is to be primarily devoted to assisting with project identification and selection
- WAG members are encouraged to help generate community support for the plan



Problem Areas and Subwatershed Ranking

Bill Frost, KCI

Subwatershed Characterization

Countywide Goals

1. ***Improve and maintain watershed functions in Fairfax County, including water quality, habitat, and hydrology***
2. ***Protect human health, safety, and property by reducing stormwater impacts***
3. ***Involve stakeholders in the protection, maintenance and restoration of county watersheds***

Hydrology - 1 & 2

Habitat - 1

Stream Water Quality – 1 & 2

Drinking Water Quality - 2

Stewardship - 3

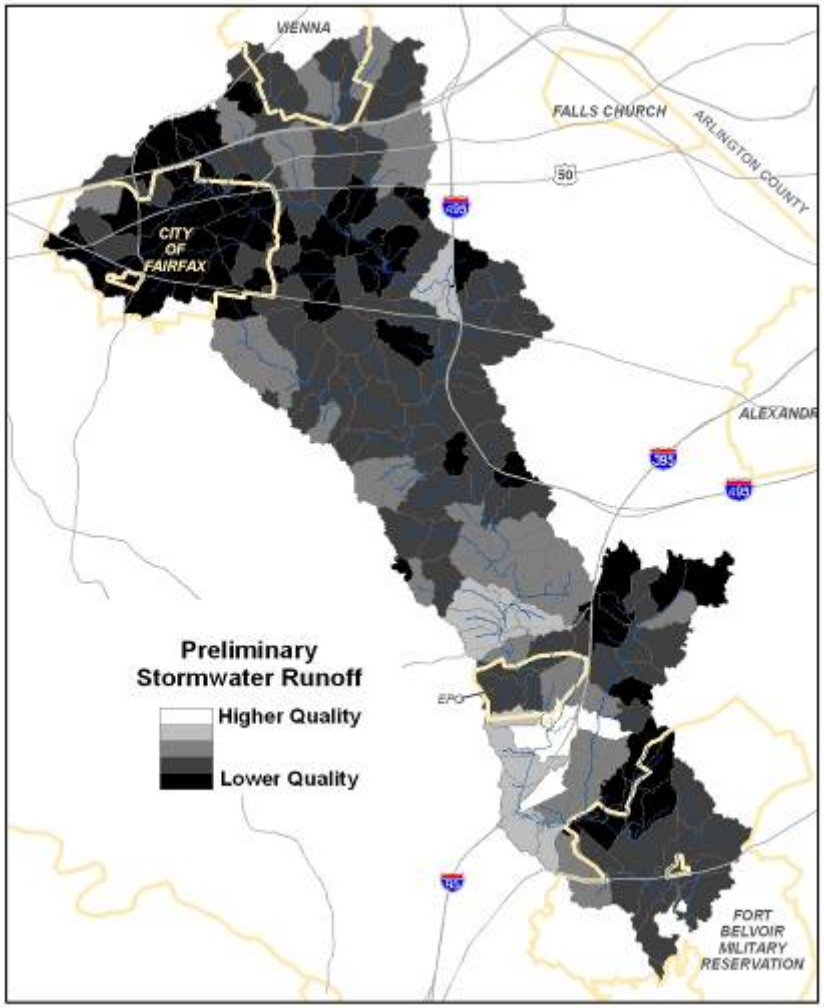
Watershed Impact Indicators

- Benthic Communities
- Fish Communities
- Aquatic Habitat
- Channel Morphology
- Hydrology
- RPA Riparian Habitat
- Headwater Riparian Habitat
- Wetland Habitat
- Road Hazards
- Building Hazards
- Flood Complaints
- In-stream Sediment
- Nitrogen Loading
- Phosphorous Loading
- Sediment Loading

Source Indicators

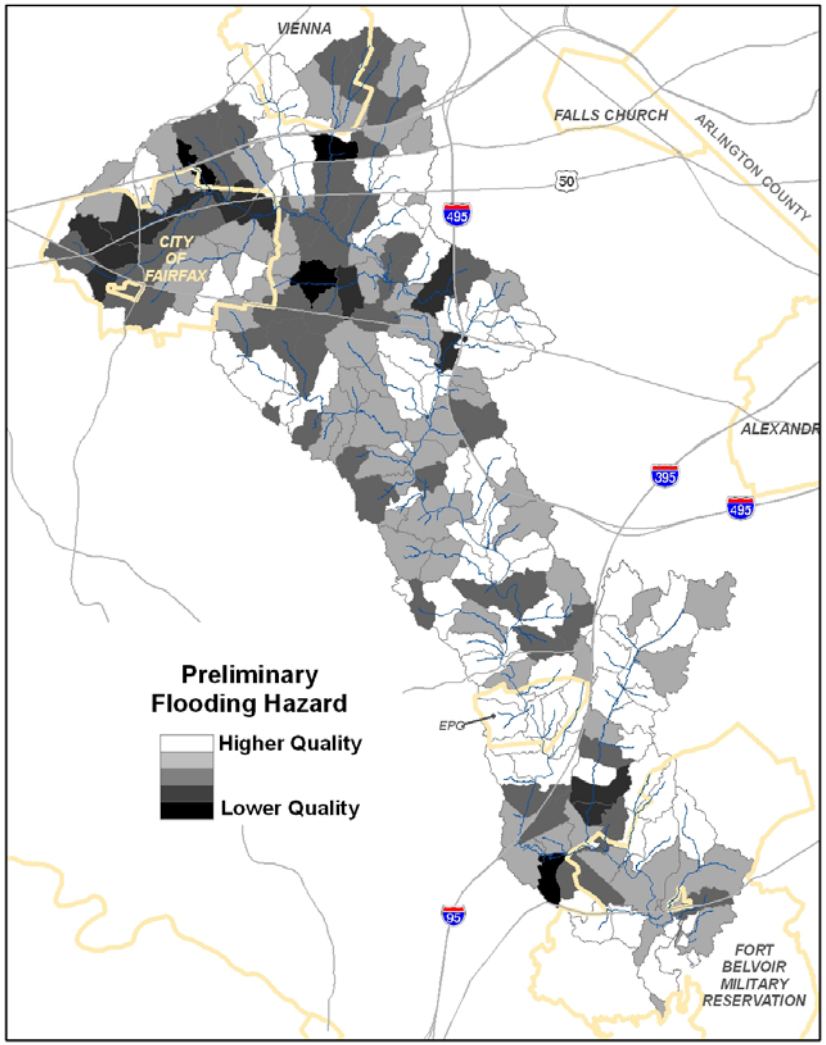
- Channelized/Piped Streams
- Impervious Area
- Stormwater Outfalls
- Parcels served by septic
- Population density
- Erosion and Sediment permits
- Sanitary Sewer Crossings
- Stream Buffer Deficiency
- Nutrient Loading
- Sediment Loading
- Urban Land Cover
- VPDES Point Sources
- Other Hot Spots

Stormwater Runoff



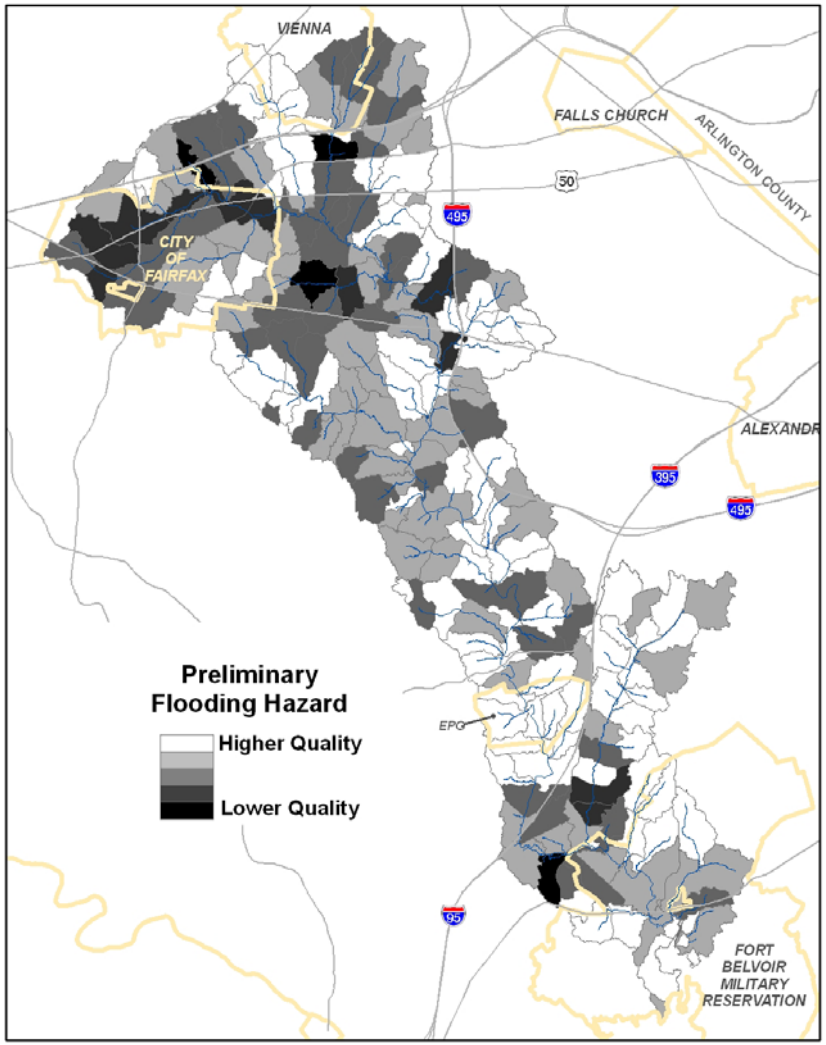
- Benthic Communities
- Fish Communities
- Aquatic Habitat
- Channel Morphology
- Instream Sediment
- Hydrology (modeled stormwater flows)

Flooding Hazards (DRAFT)



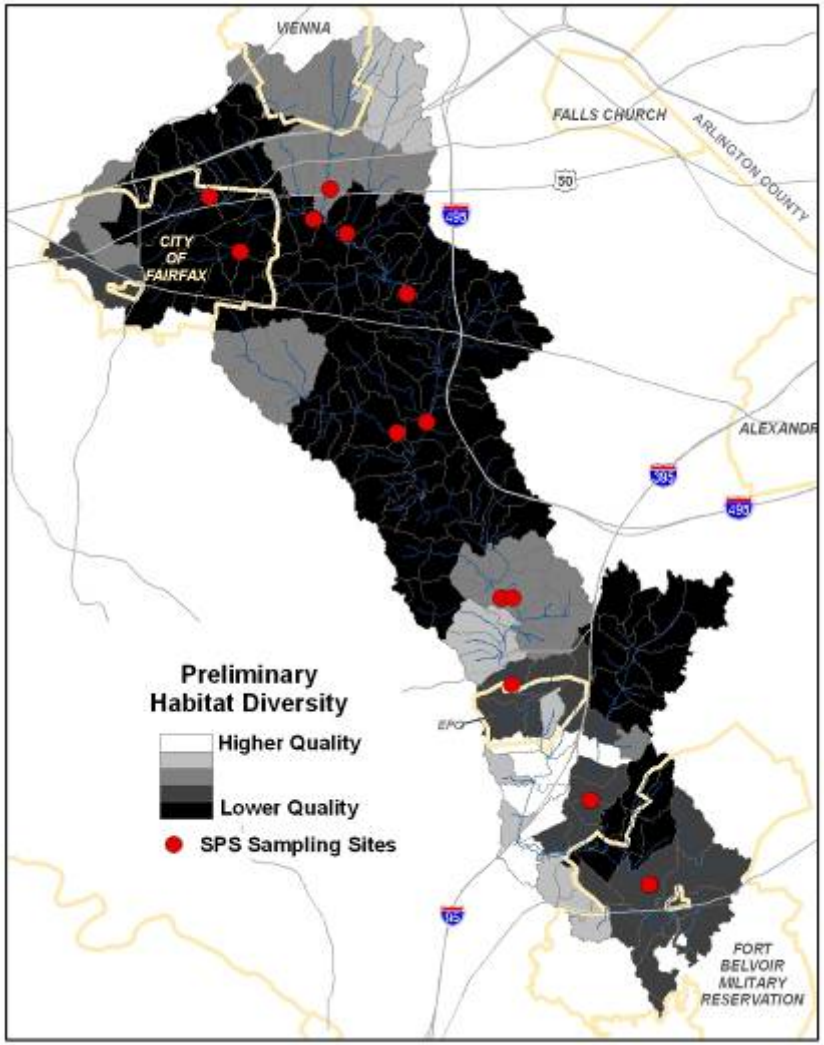
- Number of Overtopped Roads
- Magnitude of Overtopped Roads
- Number of Residential Buildings in the Floodplain
- Number of Non-Residential Buildings in the Floodplain
- Citizen Flood Complaints

Habitat Health



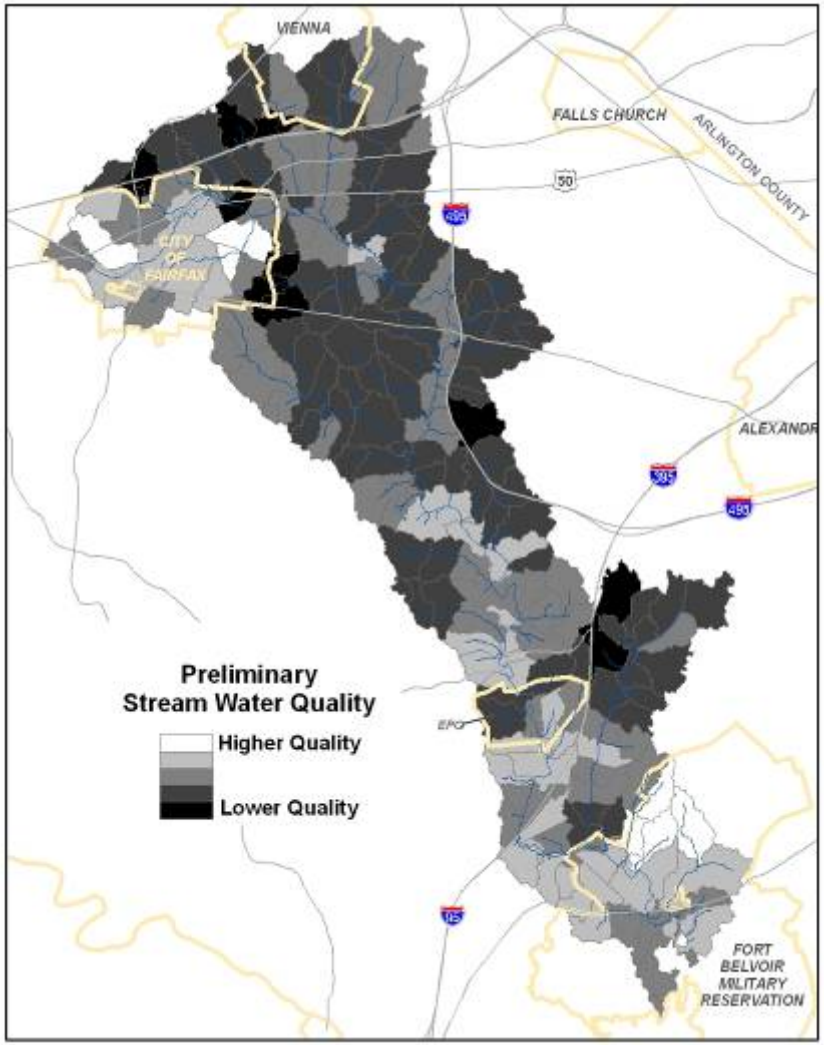
- Aquatic Habitat
- Riparian Habitat (perennial streams)
- Riparian Habitat (headwater/ non-perennial streams)
- Terrestrial Wetland Habitat
- Terrestrial Forested Habitat

Habitat Diversity



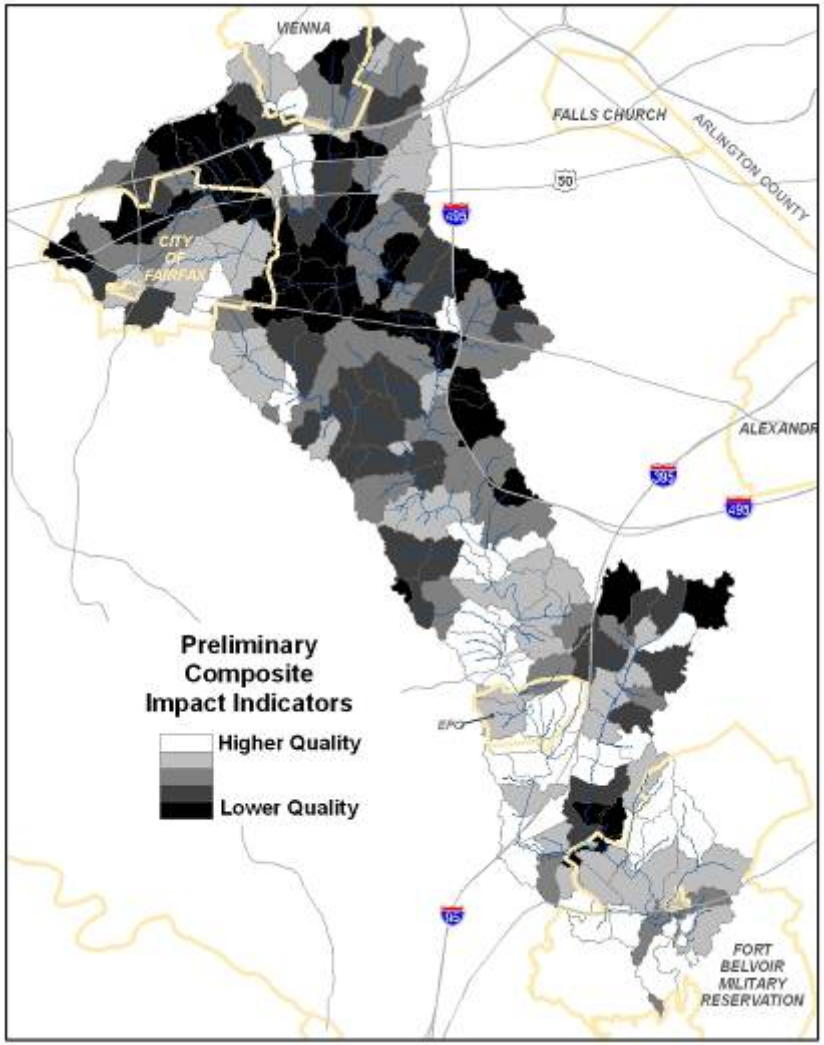
- Benthic Communities
- Fish Communities

Stream Water Quality



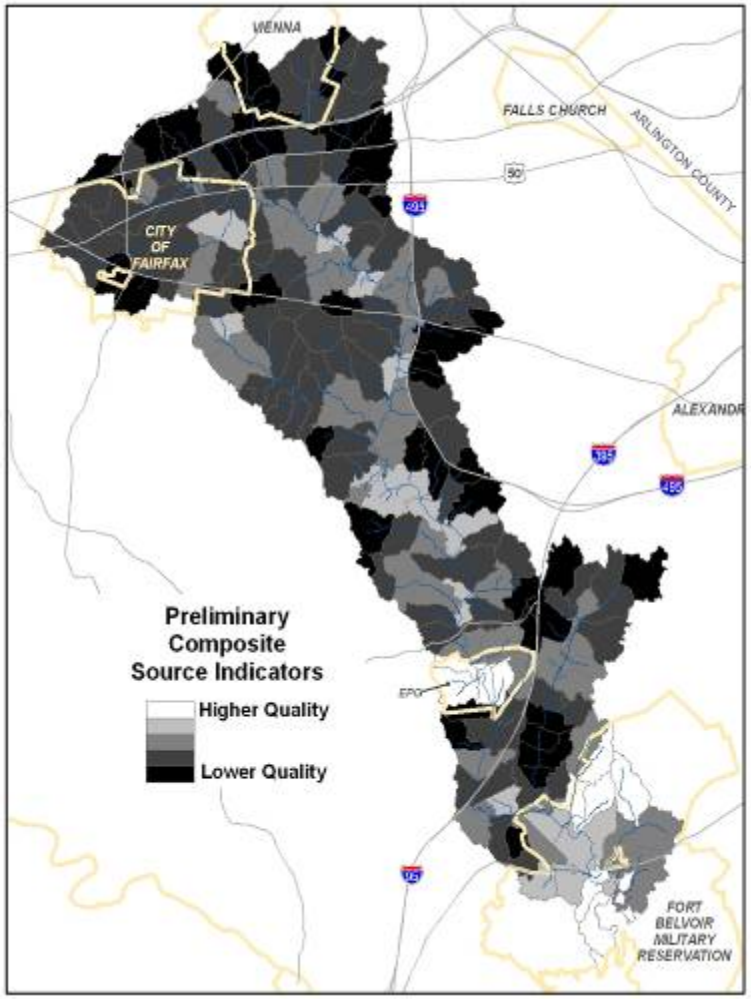
- Benthic Communities
- Fish Communities
- Instream Sediment
- Upland Sediment (modeled)
- Nitrogen (modeled)
- Phosphorus (modeled)
- *E. coli* concentration

Overall Watershed Impact

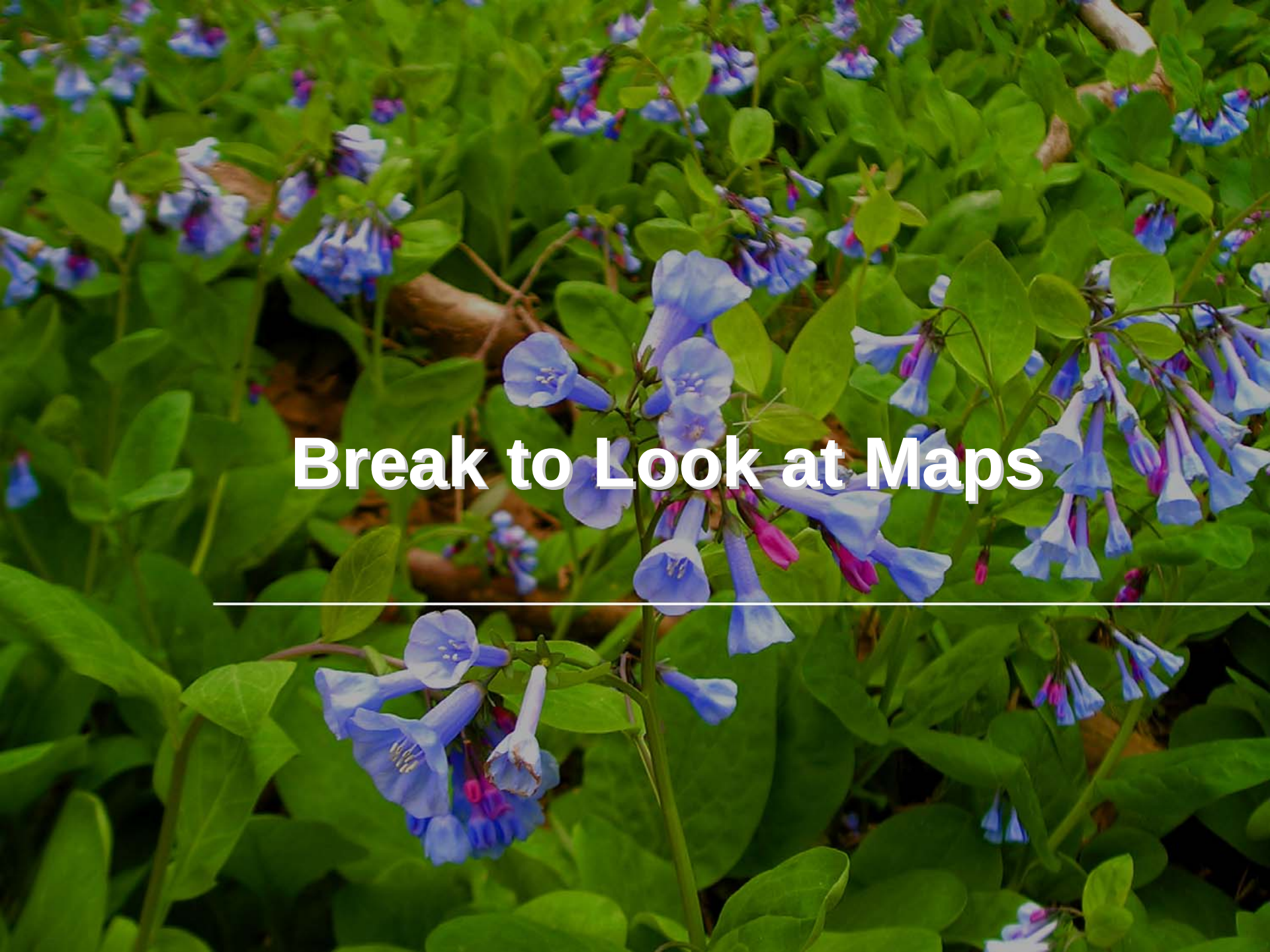


- Summary of Composite Scores
  - Stormwater Runoff
  - Flooding Hazards
  - Habitat Health
  - Habitat Diversity
  - Stream Water Quality

Overall Source Composite



- Channelized Streams
- Impervious Area
- Stormwater Outfalls
- Onsite Sewage Disposal
- Streambank Buffer Deficiency
- Sediment & Nutrient Runoff
- Percent Urban Landcover
- Industrial Discharges



Break to Look at Maps

Restoration Approaches

Bill Frost, KCI

Subwatershed Restoration Approach

Investigation
(~300 sites)

Identify types of retrofits which Fairfax County can implement in the watershed

Desktop analysis to identify potential sites for each type

Field reconnaissance to assess constraints and feasibility

Completed

Evaluation
(~200 sites)

Evaluate potential retrofits based on ranking procedure

Obtain WAG input to identify priority sites

March - April

Concept Design
(~100 Sites)

Field visit to collect concept-level design information

Develop cost estimates

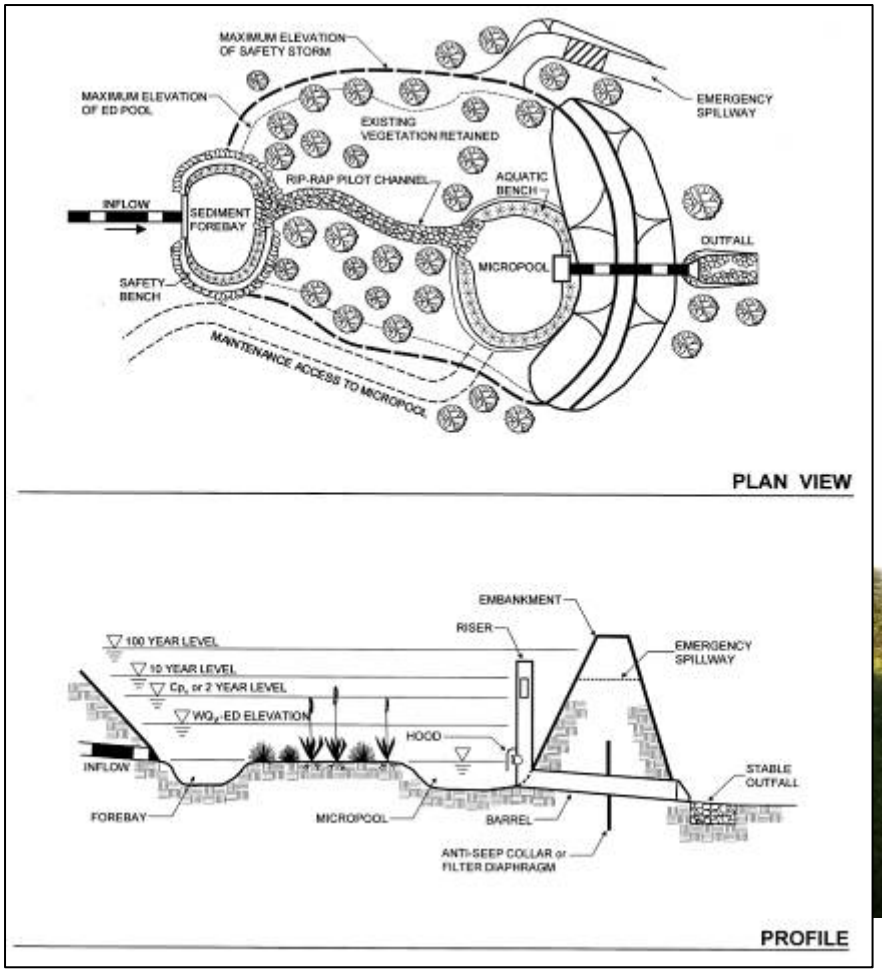
Estimate pollutant load and runoff reduction benefits

May - July

Restoration Opportunities

Type	Description
Source Control	Pollution prevention and non-stormwater discharge control programs
Land Use	Land conservation and site design measures
New Pond Culvert Retrofit	Wet ponds, wetlands, extended detention storage
Pond Retrofit	Conversion of existing quantity controls to water quality treatment
LID Retrofit	Systems designed to reduce stormwater impact at the local level. Includes bioretention, filters, swales
Outfall Retrofit	Outfall reconstruction, energy dissipation, and bank stabilization
Stream Restoration	Reconstruct the stream to a stable state in which it neither significantly erodes or fills with sediment and has improved habitat conditions
Stream Stabilization	Local improvements to create a more stable cross-section or armor-in-place to reduce erosion
Buffer Restoration	Replant and protect forested riparian buffer

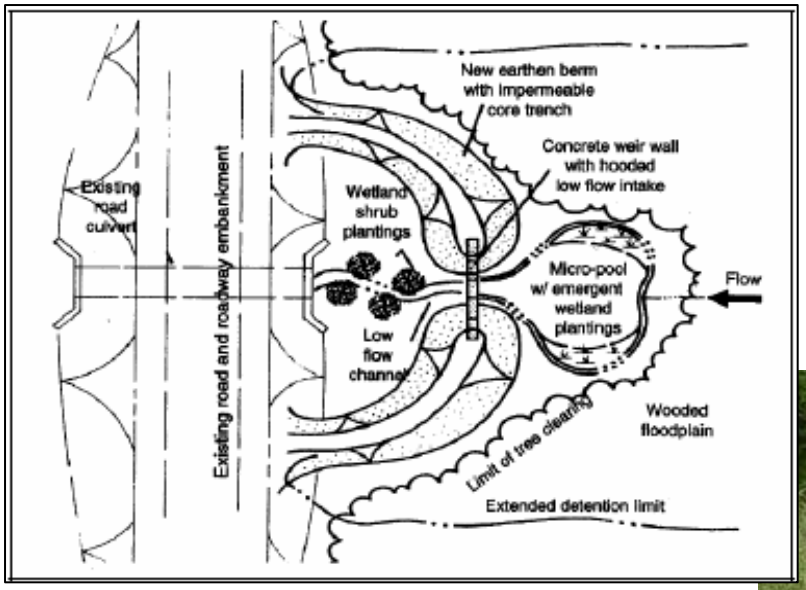
New Ponds and Pond Retrofits



Benefits

Flow Control	Water Quality	Aquatic Habitat	Channel Stability
1	2	3	

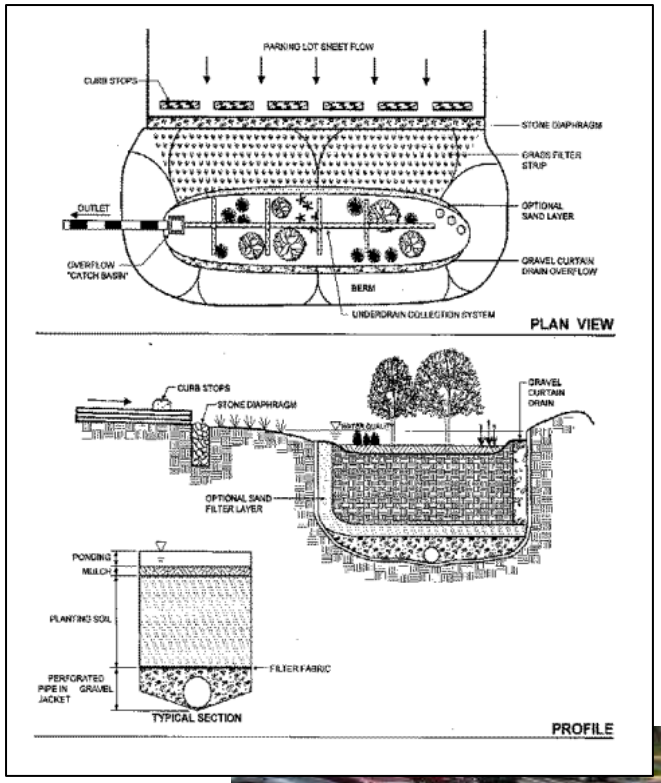
Culvert Retrofits



Benefits

Flow Control	Water Quality	Aquatic Habitat	Channel Stability
2	1		

LID Retrofits



Benefits

Flow Control	Water Quality	Aquatic Habitat	Channel Stability
2	1		

Outfall Retrofit

Benefits

Flow Control	Water Quality	Aquatic Habitat	Channel Stability
	2	3	1

Stream Restoration Approach

Investigation
(~60 sites)

Review stream assessment data identify areas with problems:

- habitat rating
- channel condition
- active erosion
- bank stability
- deficient buffers
- concrete channel

Review field photos to check assessment

Completed

Evaluation
(~40 sites)

Field visit to assess constraints and feasibility

Evaluate potential retrofits based on professional judgment

Obtain WAG input to identify priority sites

March - April

Concept Design
(~20 Sites)

Field visit to collect concept-level design information

Develop cost estimates

Estimate benefits

May - July

Stream Restoration

Before

During Construction

One Year Later

Benefits

Flow Control	Water Quality	Aquatic Habitat	Channel Stability
	3	2	1

Stream Stabilization

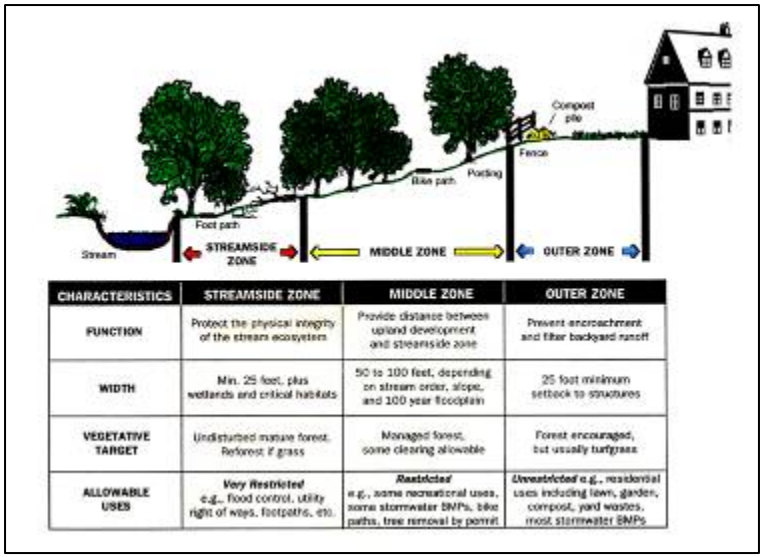
Imbricated Rip Rap

Benefits

Flow Control	Water Quality	Aquatic Habitat	Channel Stability
	3	2	1

Branch Layering

Buffer Restoration



CHARACTERISTICS	STREAMSIDE ZONE	MIDDLE ZONE	OUTER ZONE
FUNCTION	Protect the physical integrity of the stream ecosystem	Provide distance between upland development and streamside zone	Prevent encroachment and filter backyard runoff
WIDTH	Min. 25 feet, plus wetlands and critical habitats	50 to 100 feet, depending on stream order, slope, and 100 year floodplain	25 foot minimum setback to structures
VEGETATIVE TARGET	Undisturbed mature forest. Reforest if grass	Managed forest, some clearing allowable	Forest encouraged, but usually turfgrass
ALLOWABLE USES	***Very Restricted*** e.g., flood control, utility right of ways, footpaths, etc.	***Restricted*** e.g., some recreational uses, some stormwater BMPs, bike paths, tree removal by permit	***Unrestricted*** e.g., residential uses including lawn, garden, compost, yard wastes, most stormwater BMPs

Benefits

Flow Control	Water Quality	Aquatic Habitat	Channel Stability
	3	1	2

Next: Evaluate Priority Sites

- Considerations for Selection
  - Performance - address the impairments
  - Physical - land available, site feasible
  - Environmental - no permit issues
  - Construction - site is feasible
  - Community - acceptance, cost effectiveness
- Preferences
  - Address upstream issues first
  - Alternatives located in headwaters
  - Maximize benefits
  - Develop "treatment train"

Examples of Restoration Opportunities

Greg Hoffman, CWP

Desktop Site Analysis

- Initial selection of 400 potential treatment sites:

Type of Site	Strategy	Purpose
Dry and wet stormwater ponds	Add or change storage characteristics. Update internal geometry and landscaping	Improve water quality treatment, add stream protection
Outfalls greater than 36”	Redesign to increase energy dissipation and stabilization, add storage if feasible	Reduce impacts of stormwater on streams
Culverts	Add storage for peak flow control in headwaters storage	Water quality or stream protection
Large concentrations of untreated impervious area	Retrofit onsite LID treatment to add storage, infiltration, evapotranspiration, and pollutant removal	Improve water quality from untreated areas
Schools and churches	Retrofit small storage, or onsite LID treatment to increase storage, infiltration, evapotranspiration, and pollutant removal	Water quality or stream protection
Publicly-owned properties	Retrofit ponds, LID, green roofs, or any other feasible strategy	Water quality or stream protection, community benefits

Field Reconnaissance

- Reduced the 400 potential treatment sites down to approximately 300 for field reconnaissance, based on:
  - Date of construction
  - Drainage area
  - Location in the watershed
  - Other factors
- Assessed constraints, opportunities, feasibility

Opportunity:
Dry and Wet Stormwater Ponds

Why?

- Existing concentration of stormwater.
- Land area is dedicated to stormwater management.

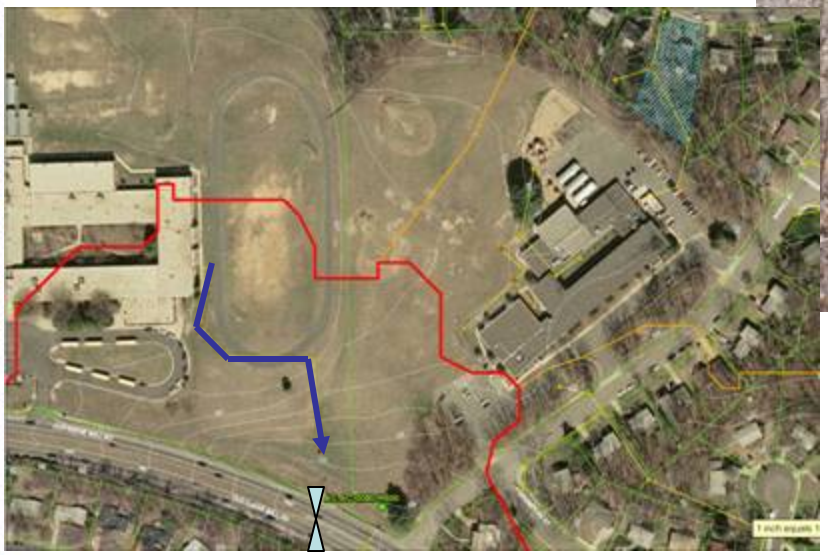
Opportunities
- Excavate pond bottom
- Raise the embankment
- Modify the outlet
- Trade storage
- Improve flow paths

Opportunity: Culverts

Why?

•“Free” storage in existing channel.

• Stormwater easement or public land.



Opportunities

•Create embankment immediately upstream of culvert that restricts flood flows.

Opportunity:
Untreated Impervious Areas

Why?
- Significant source of both runoff and pollutants.

Opportunities
- Downstream storage.
- Perimeter or island bioretention.

Opportunity:
Schools and Churches

Why?
- Semi-public land.
- Large sites, single owner.
- Unused pervious area often available.
- Educational opportunities.

Opportunities
- Bioretention
- Downspout disconnection
- Almost anything

Opportunity:
Publicly-Owned Properties

Why?
- Public land.
- Large sites.
- Unused pervious area often available.
- Educational opportunities.

Opportunities
- Bioretention
- Downspout disconnection
- Almost anything

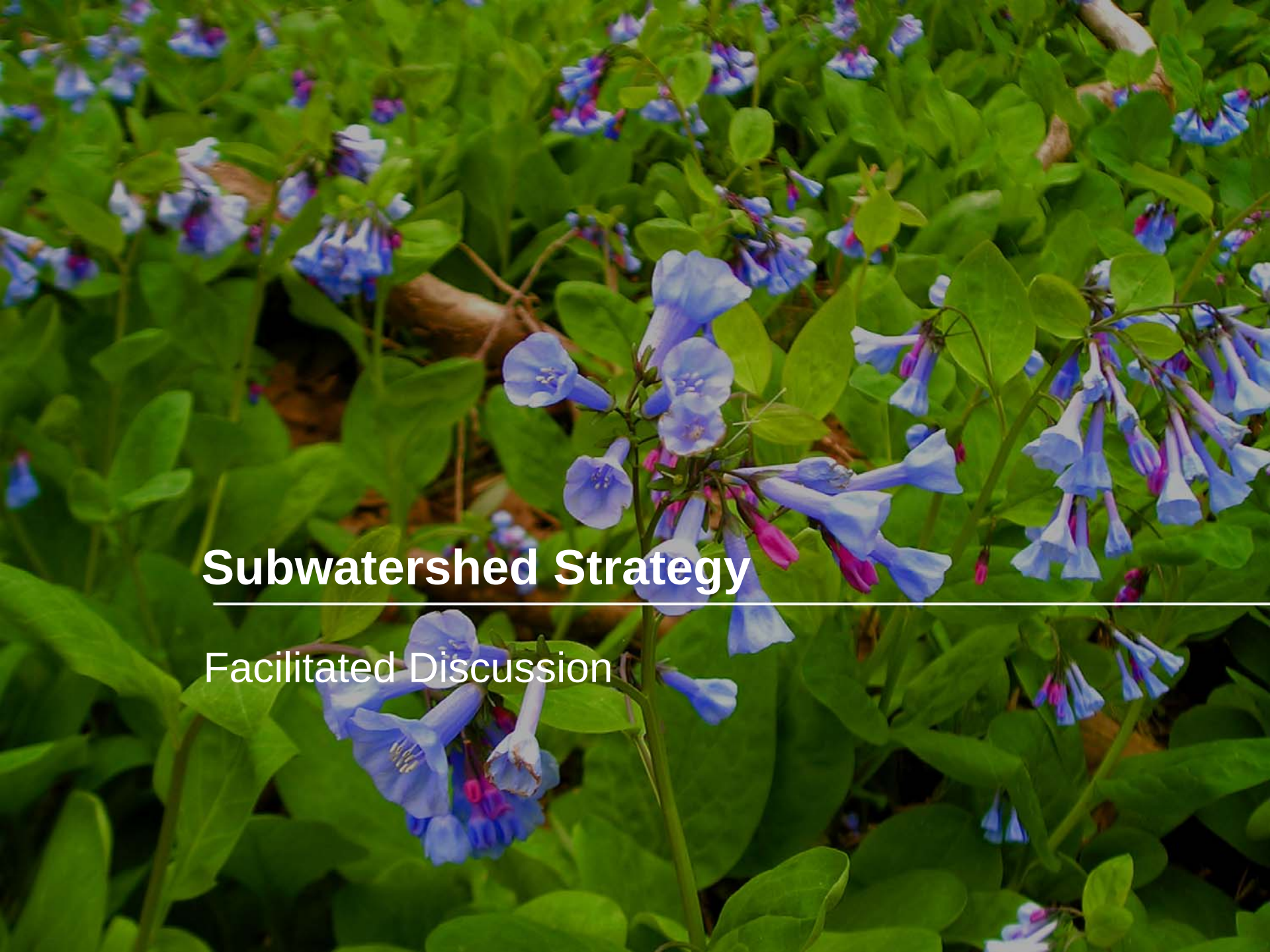
Opportunity:
Outfalls Greater than 36”

Why?

- Existing concentration of stormwater.
- Stormwater easement or public land.
- Last chance before the stream.

Opportunities

- Divert or intercept stormwater with treatment area



Subwatershed Strategy

Facilitated Discussion

Subwatershed Strategy

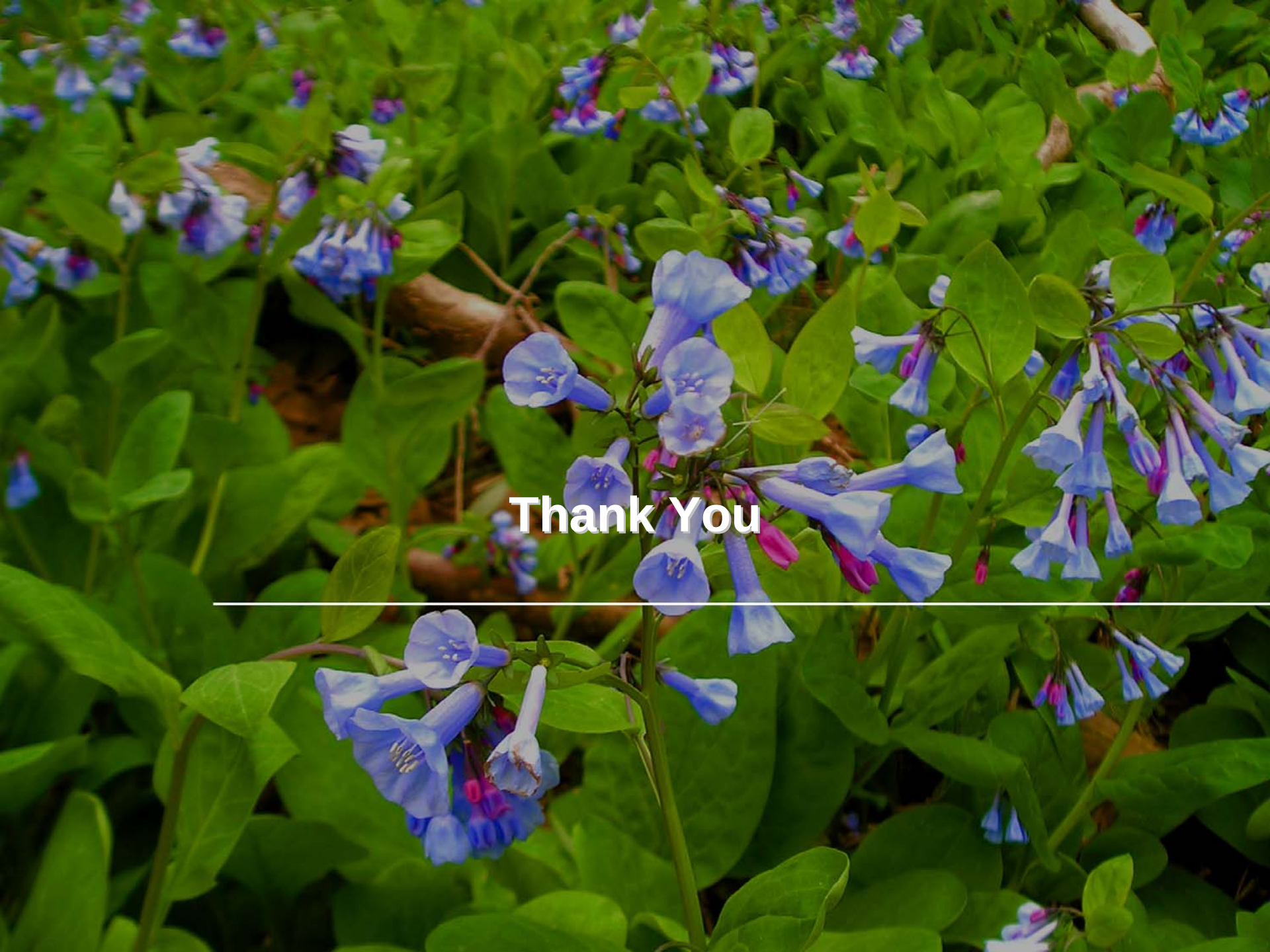
- Priority site determination scheme
  - Subwatersheds with improvement potential
  - Retrofit sites with highest feasibility
  - WMAs with best turnaround

Next Steps

Juliana Birkhoff, CBI

Next Steps

- Identify specific projects based on subwatershed ranking, field reconnaissance and public input
- Provide WAG members with “homework” regarding possible project sites for feedback prior to third meeting
- Next meeting in mid-April to discuss the proposed solutions


Thank You