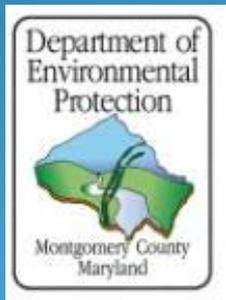
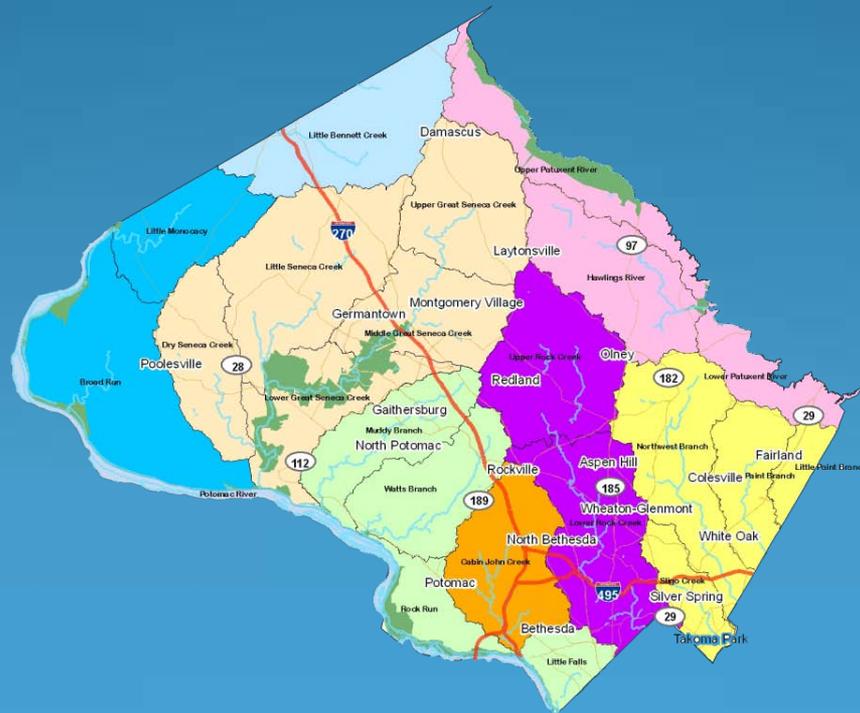


# Montgomery County DEP, Watershed Management Division Monitoring Projects



June 9, 2014

# County Monitoring Overview

- ❑ Countywide Stream Monitoring-  
Biology, Physical Water Chemistry, Habitat
- ❑ SPA Monitoring  
Biology, Physical Water Chemistry, Habitat, Geomorphology  
Best Management Practices (BMPs)  
Clarksburg Monitoring Cooperative
- ❑ Restoration Project Monitoring
- ❑ MS4 Permit Required Monitoring  
Watershed Restoration Assessment  
Stormwater Management Assessment  
Illicit Discharge Detection and Elimination (IDDE) Investigations
- ❑ Additional Monitoring  
USGS- Chemistry and Flow  
Trash Monitoring in the Anacostia

# Goals of County's Monitoring Programs

- Assess and track the health of the County's subwatersheds over time
- Identify stream segments that are severely impaired and need remediation for long-term watershed health
- Identify pollutants in target subwatersheds
- Prioritize watersheds for restoration by allowing DEP to assess and compare stream conditions across watersheds
- Assess effectiveness of stream restoration projects in meeting project goals
- Assess effectiveness of stormwater management retrofits to capture, slow down, and filter stormwater runoff (as mandated in the County's MS4 Stormwater Permit)
- Evaluate stream resource conditions and trends closely in Special Protection Areas (SPAs)
- Track progress in meeting the County's water quality goals and legally mandated water quality standards

# Stream Monitoring

Started in 1994

Fish

Aquatic Insects

Amphibians

DO

Conductivity

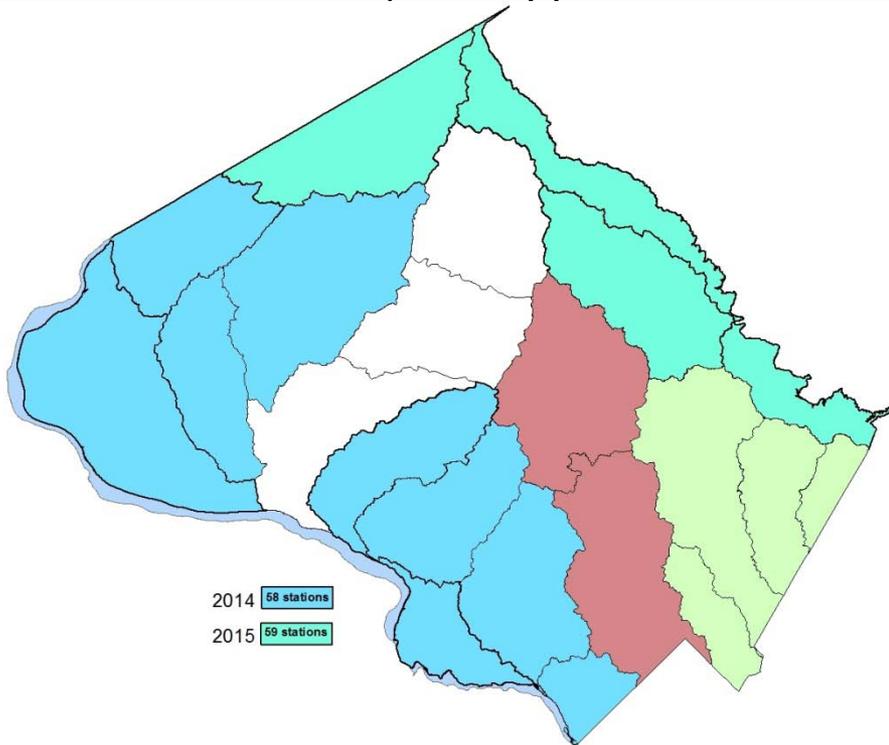
Habitat Measures



# Stream Monitoring

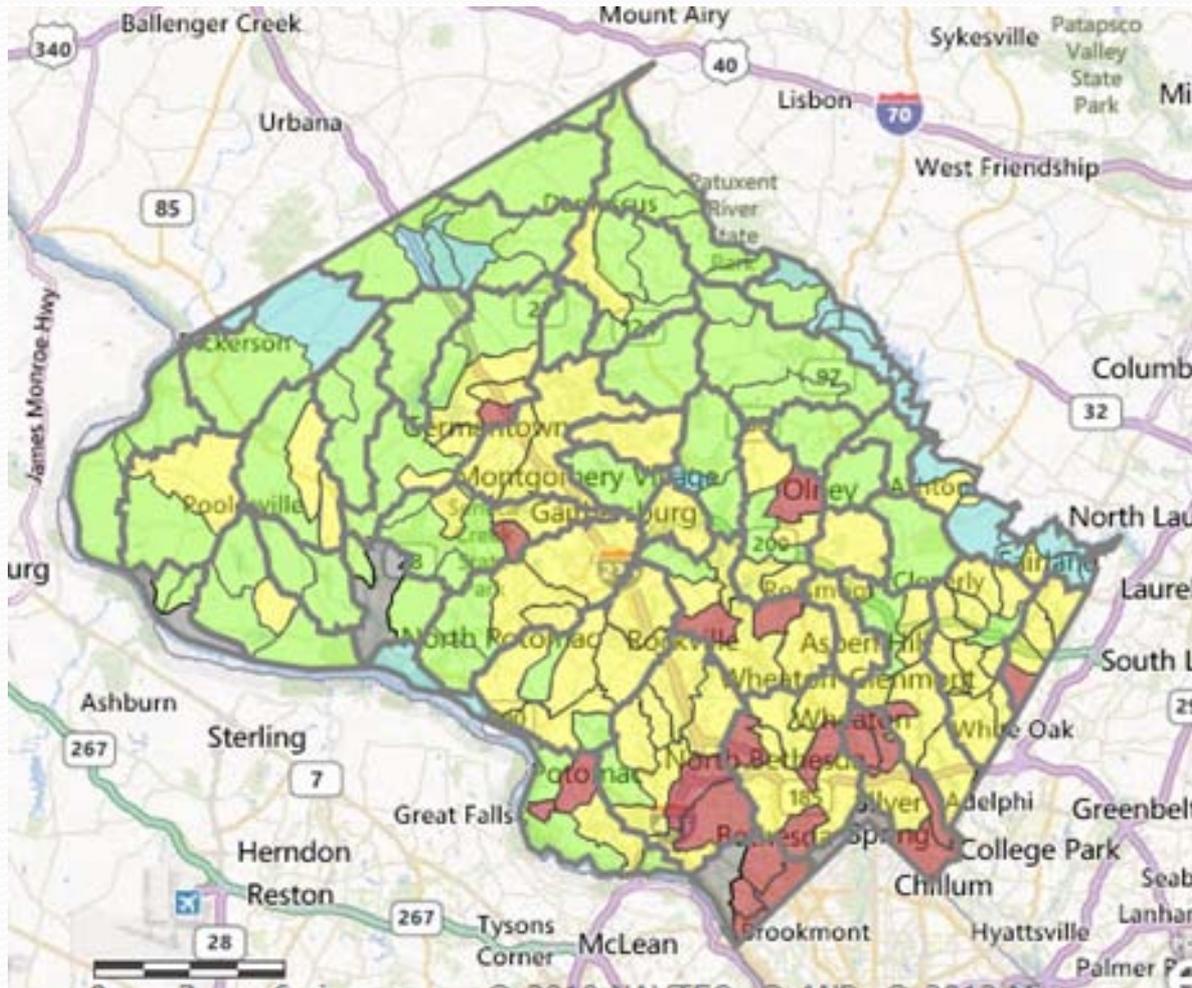
## Biological Monitoring and Stream Habitat Condition

- Entire county on a 5 year cycle, over 250 stations, **coordinated with MBSS schedule to the extent possible**
- Every year at about 50 SPA stations in Clarksburg, Piney Branch, Upper Paint Branch, and Upper Rock Creek



- Data used to develop fish and benthic organism Index of Biologic Integrity (IBI's). Used to define the biologic narrative categories, "good" "fair" "poor"
- Habitat data also used to develop narrative categories
- Data is compared to previous monitoring cycles

# Latest Stream Conditions are now Shared via Internet



<http://www6.montgomerycountymd.gov/dectmpl.asp?url=/Content/dep/maps/introwqm.asp>

# What is a Special Protection Area?

Water resources or other environmental features that are of high quality or are unusually sensitive and would be impacted by development.

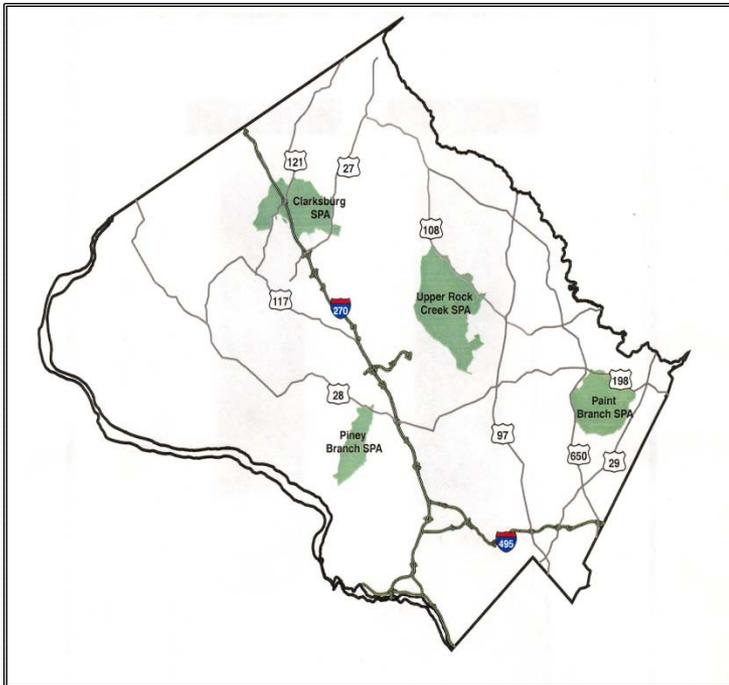
Special environmental protection measures:

- Limiting imperviousness
- Protecting natural features
- Minimizing and phasing of grading
- Promoting groundwater recharge
- Using innovative and redundant stormwater control structures

*Executive Regulation 29-95: Water Quality Review for Development in Designated Special Protection Areas*

# SPA Monitoring

About 50 SPA stations monitored annually in Clarksburg, Piney Branch, Upper Paint Branch, and Upper Rock Creek



**(OLD) Developer/Consultant Monitoring** (within the property)

“Stream-specific” water quality parameters

Structural monitoring (E&SC and SWM BMPs)

Expedited Bill 1-13 now requires Developers to pay fee to DEP for monitoring instead of being directly responsible for the monitoring

**DEP Monitoring** (upstream and downstream of the development and throughout the watersheds)

Biological monitoring: benthic macroinvertebrates, fish, herpetofauna

Rapid Habitat Assessment

*In situ* water chemistry sampling. Continuous stream temperature monitoring

# Restoration Monitoring

- **Monitor Watershed Restoration Projects- Design Depends on Goals of the Project**

Short term monitoring to assess whether project goals and/or objectives were met.

Long term monitoring to measure improvements to the ecological condition

Cooperative Studies with UMD to analyze performance of individual BMPs

# WATERSHED RESTORATION in Montgomery County

## Capital Improvement Program and RainScapes Rewards



Stormwater Management Pond



Stream Restoration



Low Impact Development (LID)

**Capital Improvement Program (CIP)** projects contribute to watershed restoration with **stormwater ponds** that control and treat large quantities of stormwater runoff, **stream restorations** that improve and create aquatic and riparian habitat and stabilize eroding streambanks, and **Low Impact Development (LID)** practices like bioretention and rain gardens to control and treat smaller quantities of stormwater runoff close to the source.

Visit [www.montgomerycountymd.gov/restoration/projects](http://www.montgomerycountymd.gov/restoration/projects) for more project-specific information.

The County's **RainScapes Rewards** program promotes and implements projects on residential, institutional, and commercial properties to reduce stormwater pollution. The County offers technical and financial assistance to encourage property owners to implement eligible RainScapes techniques, such as rain gardens, conservation landscaping, pervious pavers, or rain barrels on their property.

Visit [www.rainscapes.org](http://www.rainscapes.org) for more information and to apply online.



Rain Garden



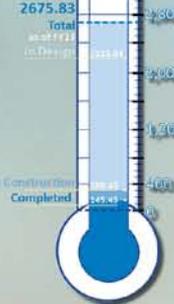
Rain Barrel



Pervious Pavers

### Impervious Treatment Goal

4,292 acres



- CAPITAL IMPROVEMENTS PROGRAM (CIP)**
- Stormwater Pond MEP Verification, in design
  - Stormwater Pond MEP Verification, in construction
  - Low Impact Development, Complete
  - Low Impact Development, In construction
  - NEW Stormwater Pond, Complete
  - NEW Stormwater Pond, in construction
  - NEW Stormwater Pond, in design
  - Stormwater Pond retrofit, Complete
  - Stormwater Pond retrofit, In construction
  - Stormwater Pond retrofit, in design
  - Stream restoration, Complete
  - Stream restoration, in construction
  - Stream restoration, in design
  - Completed Stream Restoration

### RAINSCAPES REWARDS

- Cistern
- Dry Well
- Permeable Paver Retrofit
- Pavement Removal
- Rain Barrel
- Green Roof
- Conservation Landscaping
- Rain Garden
- Tree Canopy

### Impervious Treatment Summary

Project Status	FY10 - FY13 (June 2013)	
	Number of Projects	Impervious Area Controlled (Acres)
Completed	87	1,104.40
In Construction	29	306.45
In Design	155	2,229.99
RainScapes Rewards Completed Projects	537	13,346*
RainScapes Neighborhoods Completed Projects	70	2,421**
Annual Street Sweeping	n/a	10.3***
<b>Total</b>	<b>857</b>	<b>20,753.83</b>

\*Excludes Conservation Landscaping - Credit will be taken in future MS4 Annual Report  
 \*\* Includes projects that will be installed before end of FY13, including Conservation Landscaping Projects  
 \*\*\* Estimate based on FY10-FY12 reporting

### WATERSHEDS

- Lower Monocacy
- Seneca Creek
- Upper Potomac Direct
- Cabin John Creek
- Pattuxent
- Lower - Potomac Direct
- Anacostia
- Rock Creek

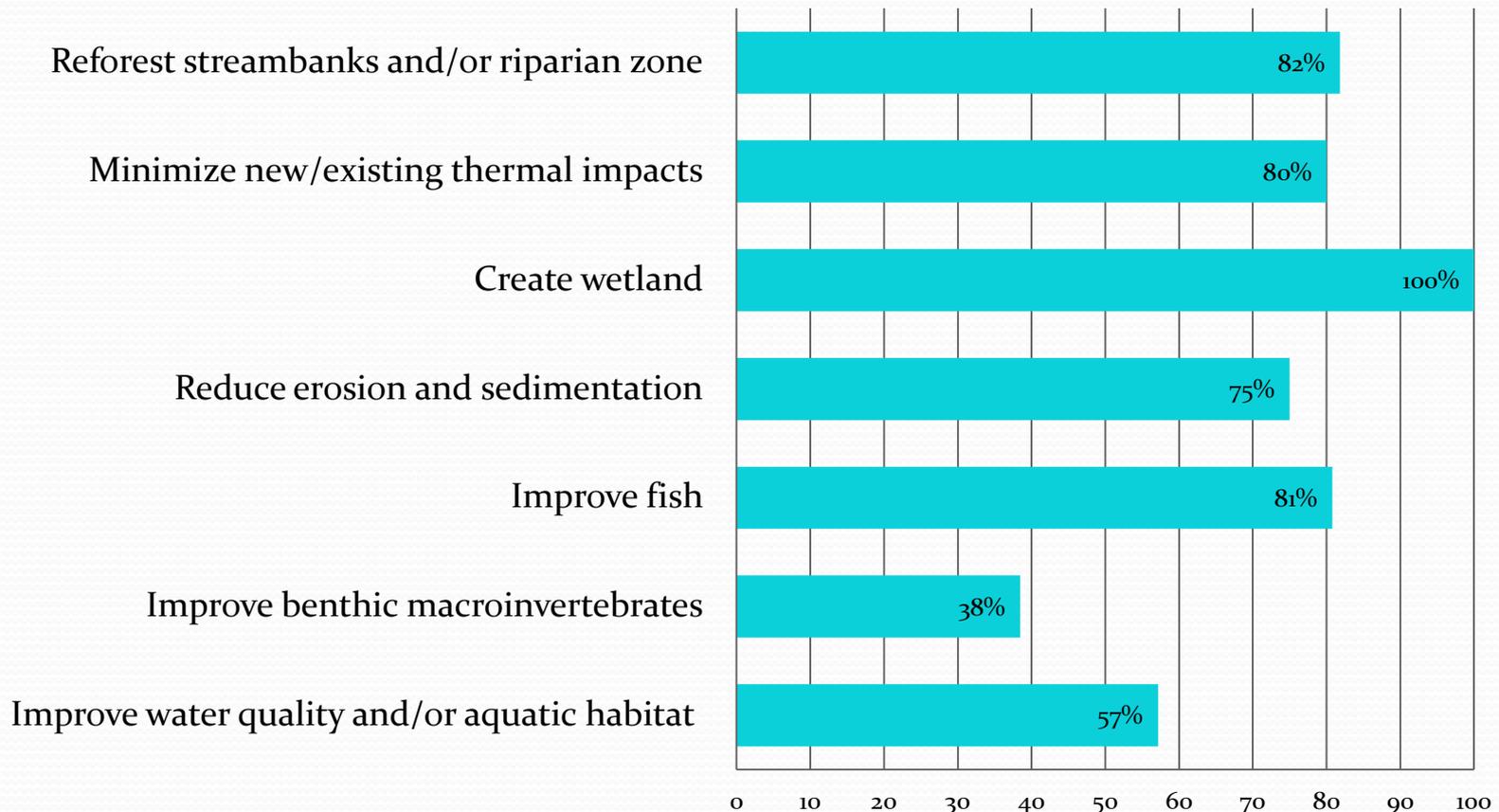
- Subwatersheds Municipalities and Urban Centers



Watershed Management Division  
 Department of Environmental Protection  
 Montgomery County, Maryland  
[www.montgomerycountymd.gov/dep](http://www.montgomerycountymd.gov/dep)

# Achieving Restoration Goals (FY13 Annual Report)

## Watershed Restoration - Overall Goal Success Rates



# MS4 Required Monitoring

## **Section III. H. Assessment of Controls**

### H.1. Watershed Restoration Assessment-

Monitor a small watershed where cumulative effects of watershed restoration can be assessed. Breewood Tributary

### H.2. Stormwater Management Assessment-

Monitor the Clarksburg SPA to determine effectiveness of stormwater management practices for stream channel protection.

## **Section III.E.5 Illicit Discharge Detection and Elimination**

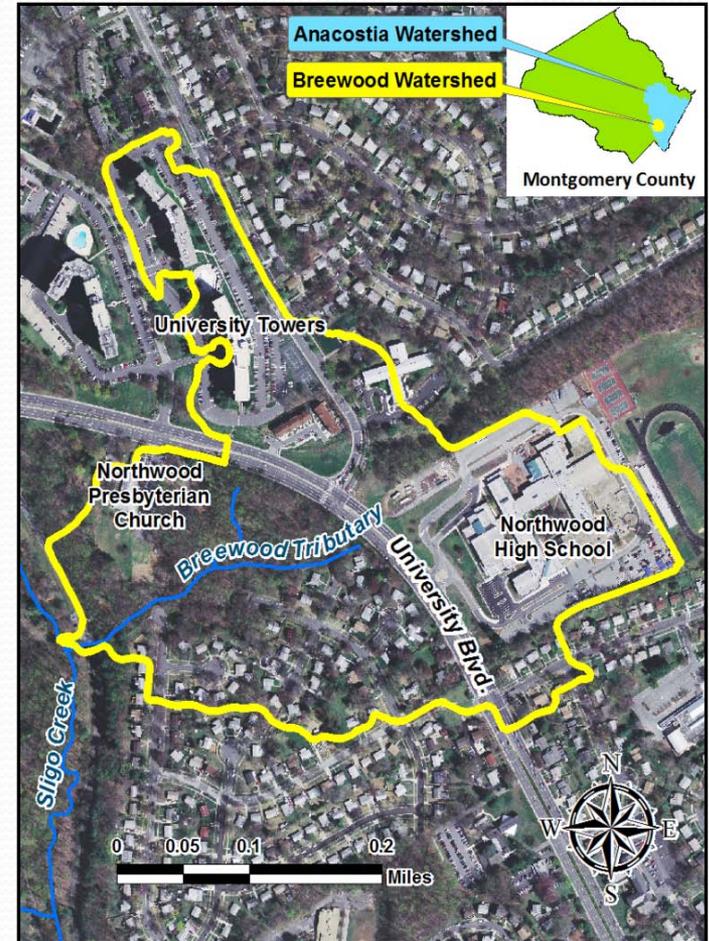
# Watershed Restoration Assessment- Breewood Tributary



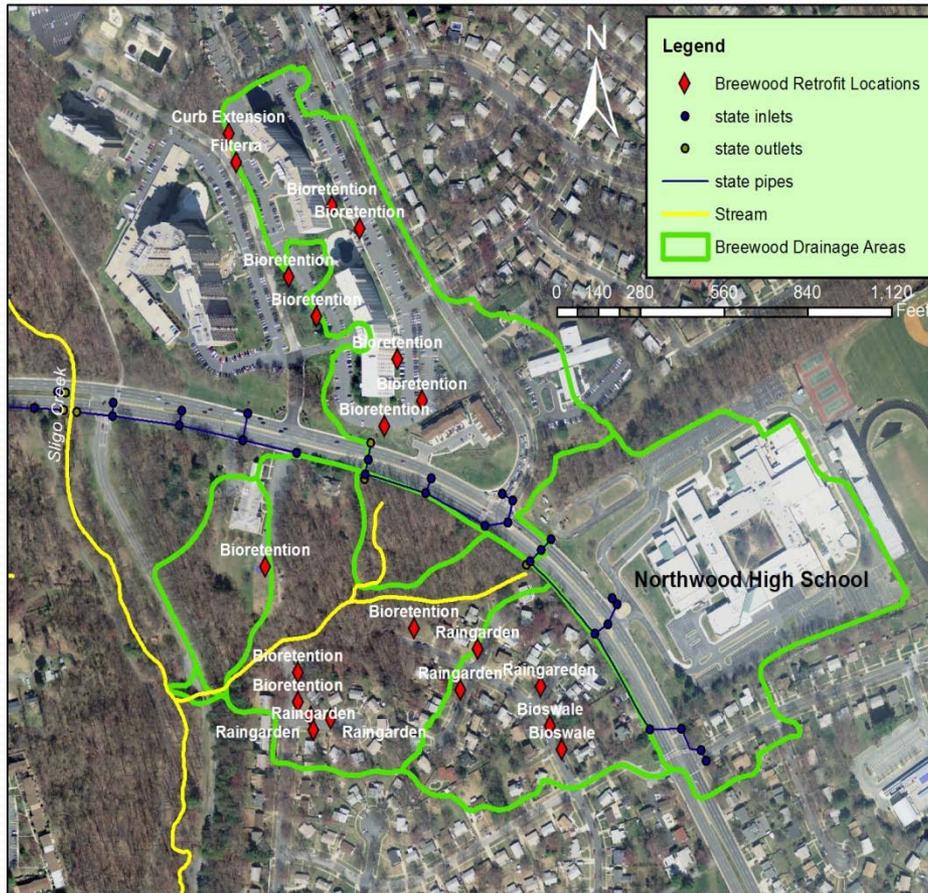
Stream Channel at University Boulevard



- Eroding stream banks
- Exposed sewer lines
- Large amount of untreated impervious area
- Land uses associated with pollutant issues
- Fish blockages and other habitat limitations

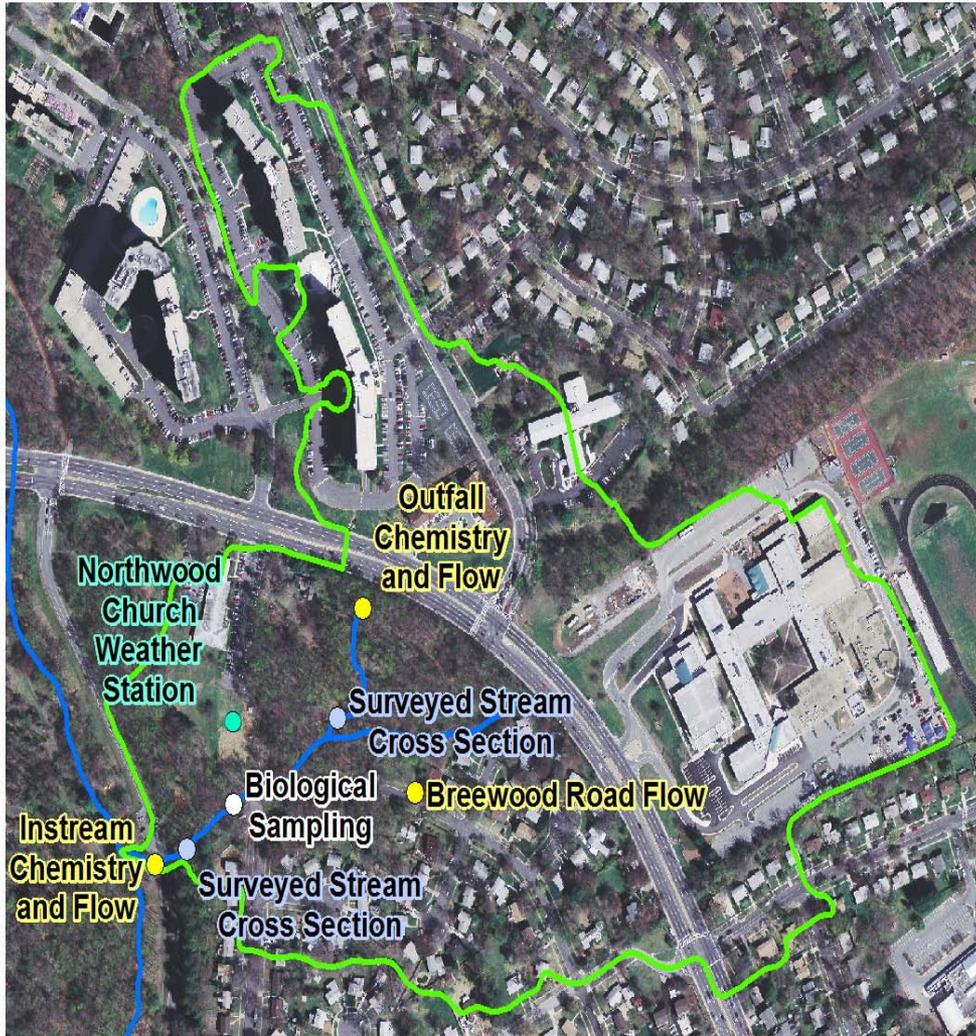


# Breewood Tributary Restoration



- Approximately 60 acres
- 33% imperviousness
- Mixed Use – Single Family Homes and High Rise Apartments
- Retrofits
  - Green Streets Stormwater Retrofits
  - RainScapes Neighborhood
  - Parking lot and tree box retrofits
  - Stormwater Wetland Retrofit-OF
- Stream Restoration
- Environmental Outreach and Litter Reduction
- Local Park Improvement – Weed Warriors

# Breewood Tributary Monitoring



One outfall and instream monitoring station- water chemistry and flow

Two stream geomorphology stations

One biological monitoring station

Weather station (rainfall)

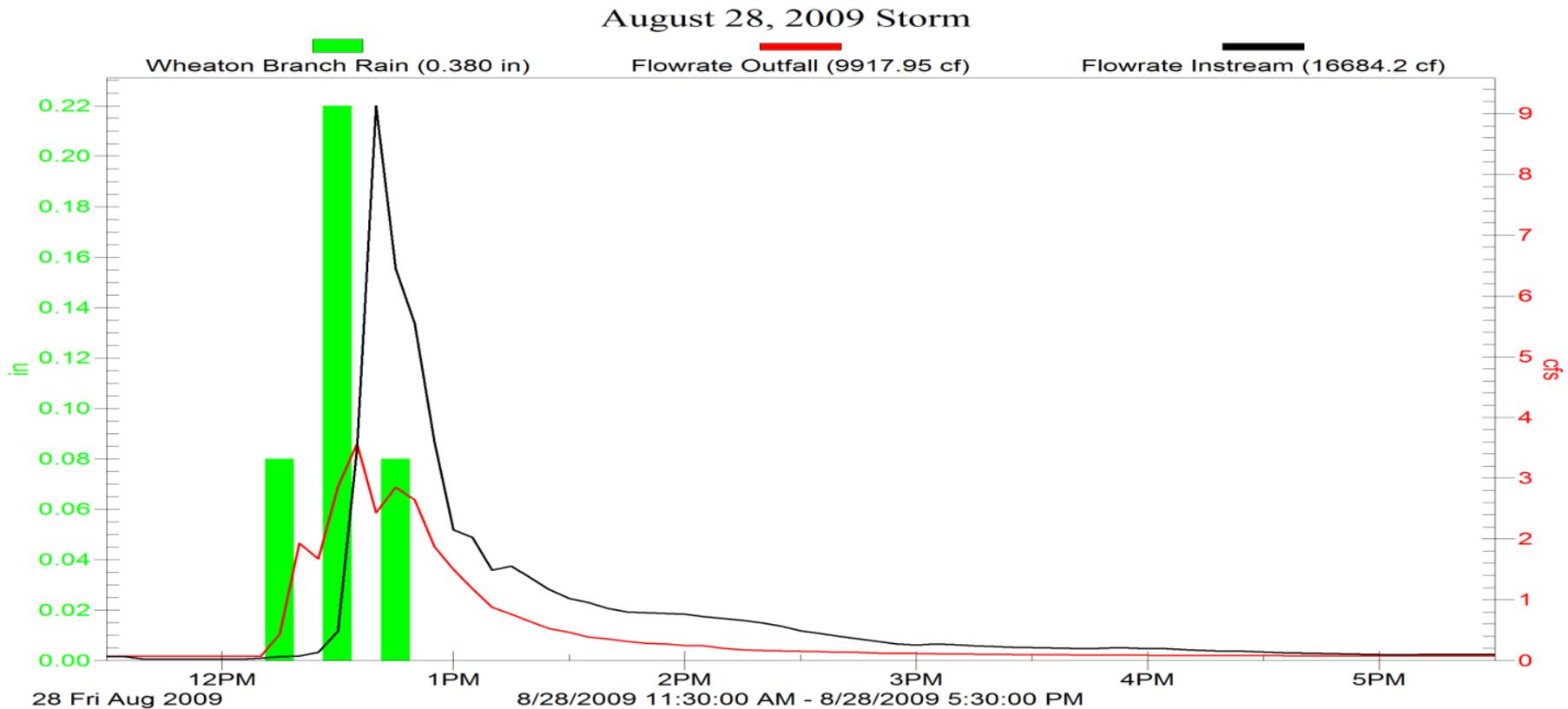
Continuous physical water chemistry monitoring (new)

Two additional stations to monitor pre and post retrofit (RainScapes Neighborhoods) water quality and flow.

# Watershed Restoration Assessment

- Chemical Monitoring required for MS4 Permit-
  - Instream and Outfall Station
  - 12 Storm events- automated composite samples
  - Baseflow-grab samples monthly
  - Samples analyzed for water chemistry (metals, nutrients, TPH, TSS), and physical water chemistry (pH, specific conductivity, temperature, dissolved oxygen)
  - Continuous flow
  - Continuous rainfall
- **New for FY14- Continuous DO, turbidity, conductivity, pH and temperature, instream station**

# Breewood Tributary Hydrograph Example



# Watershed Restoration Assessment

- Biological Monitoring-
  - Benthic Macroinvertebrates
  - Spring
- Physical Monitoring
  - Geomorphologic stream assessment
  - Two Stations
  - Annual comparison of permanently monumented stream channel cross sections and stream horizontal profile
  - Stream habitat assessment
  - Hydrologic model to analyze effects of rainfall, discharge rates, stage and flow on channel geometry

# Expected Outcomes

Pre and Post Construction Monitoring

Effect of Restoration on

Water chemistry

Flow regime

Biological and physical habitat

Breewood RainScapes Neighborhoods

First flush nutrients and sediment and flow.

# Stormwater Management Assessment



## Permit Requires:

Physical stream monitoring to determine effectiveness of stormwater management practices for stream channel protection

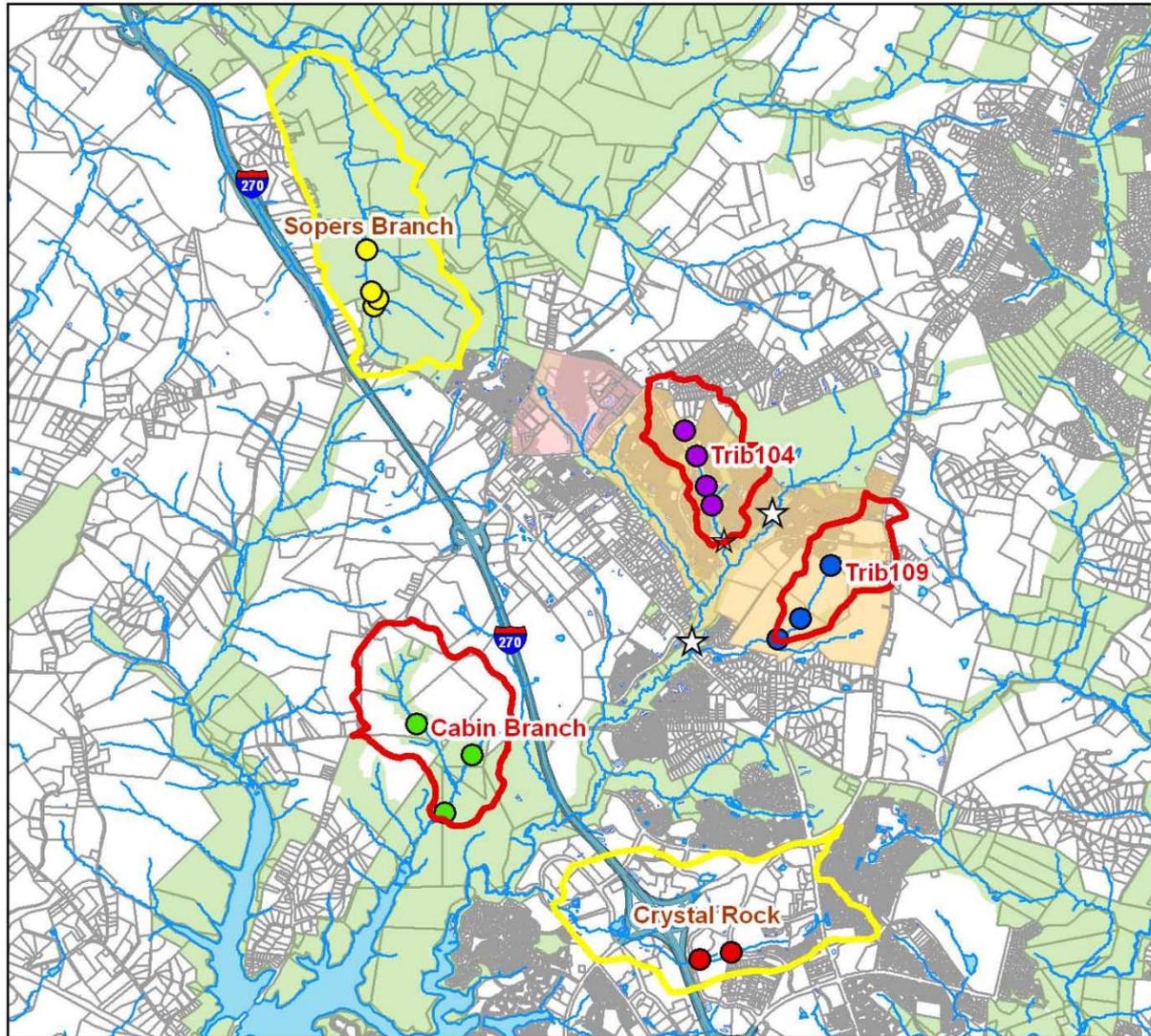
Annual stream profile and survey of monumented cross sections in Little Seneca Creek tributary to evaluate channel stability in conjunction with Clarksburg development

Comparison with baseline conditions

Hydrologic and/or hydraulic model to analyze effects of rainfall, discharge rates, stage, and continuous flow on channel geometry.

# Clarksburg – Integrated Monitoring Program

## Clarksburg Study Areas, Biomonitoring, & Geomorphology Stations



### Clarksburg Study Areas

- Test Areas
- Control Areas
- Clarksburg Town Center
- Newcut Road Neighborhoods

### ☆ Biomonitoring Sites

### Geomorphology Survey Areas

- Little Seneca 104 Tributary
- Little Seneca 109 Tributary
- Little Bennett Sopers Branch
- Cabin Branch
- Crystal Rock



0 0.250.5 1 1.5 2 Kilometers

0 0.2 0.4 0.8 1.2 1.6 Miles



Location



# Collaborators in Clarksburg BMP Effectiveness Monitoring

- 3 Montgomery County Departments: Environmental Protection, Permitting Services, Parks and Planning
- Univ. of MD College Park (NCER Sustainability Grant - EPA National Center for Ecological Research)
- USGS Water Resources Division, Baltimore MD
- USEPA Branches
  - Landscape Ecology Branch, Reston VA
  - Ecological Risk Assessment Branch, Washington DC
  - Environmental Science Center, Ft. Meade, MD
- 4 participating Environmental Engineering consultants conducting BMP monitoring for land development firms in Clarksburg

# Illicit Discharge Detection and Elimination (IDDE)

- MS4 Permit requires field screening of 150 outfalls
- Subwatershed based approach
- Sample dry weather flows for indicators
- Track and eliminate sources



# Additional Monitoring

Seven County funded USGS flow gauges throughout County to evaluate long-term trends in flow amount and pattern

- Two on tributaries that were previously monitored to meet MS4 Permit Watershed Restoration requirements
  - 1 in Good Hope Tributary of Paint Branch
  - 1 station in Turkey Branch of Rock Creek
- 5 in Clarksburg Area
  - 1 Reference in Little Bennett (no development)
  - 3 on tributaries of Little Seneca (development ongoing)
  - 1 on Cabin Branch (development soon)

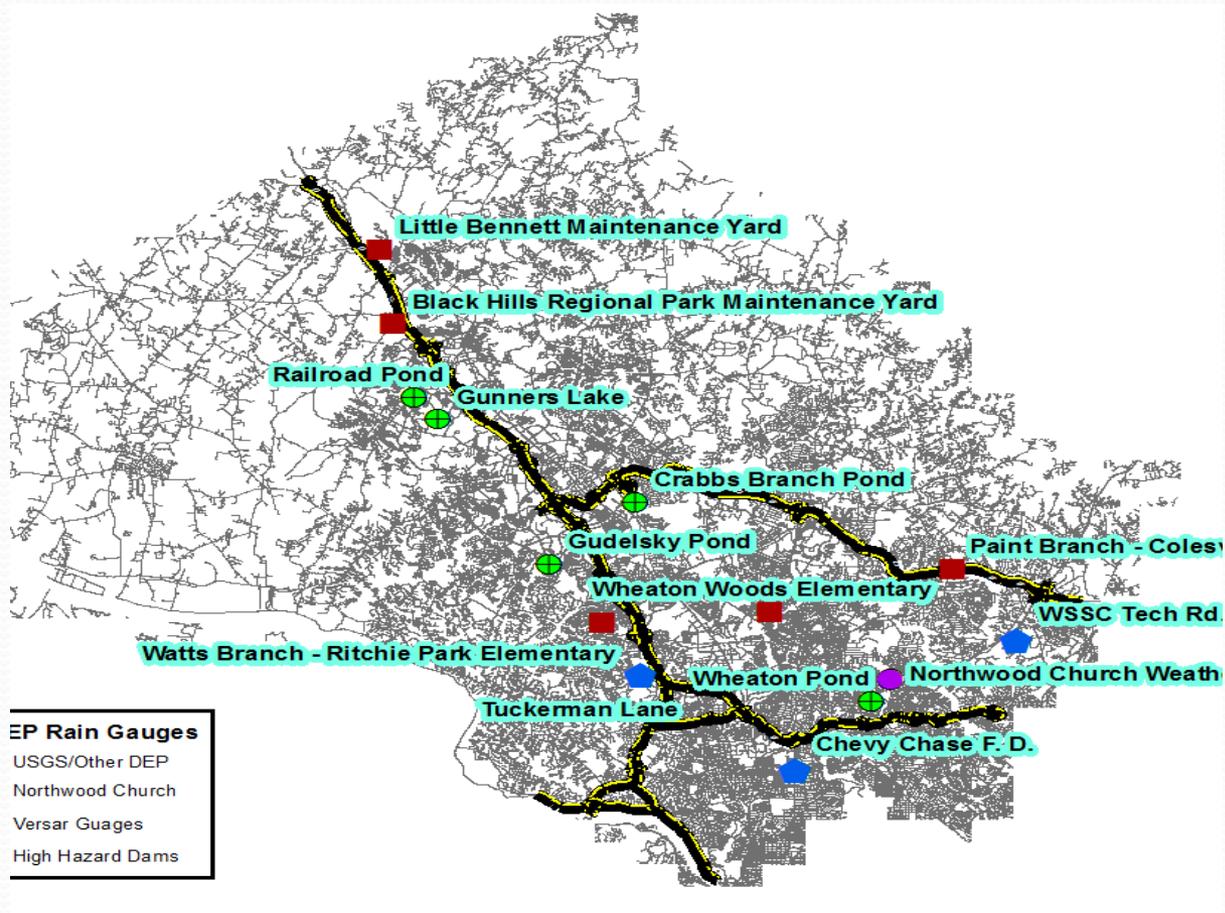
# Additional Monitoring

## Three Flow and Water Chemistry Stations- Cost Share with USGS

- Sligo Creek mainstem (Takoma Park)
- Lower Paint Branch mainstem
- Lower Rock Creek mainstem (DC)
- Baseflow and stormflow samples
- Nutrients, suspended sediment, E.coli bacteria
- Continuous flow, temperature, specific conductance, pH, DO, turbidity.
- Results online:

<http://waterdata.usgs.gov/md/nwis/rt>

# Rain Gauges



# Additional Monitoring

## Anacostia Trash TMDL monitoring

- 15 stations for amount and type
- 5 with removal to evaluate accumulation rate