Coalition for Smarter Growth Stream Tour

Guided by Fairfax County Stormwater Management

& Stella Koch of the Audubon Naturalist Society

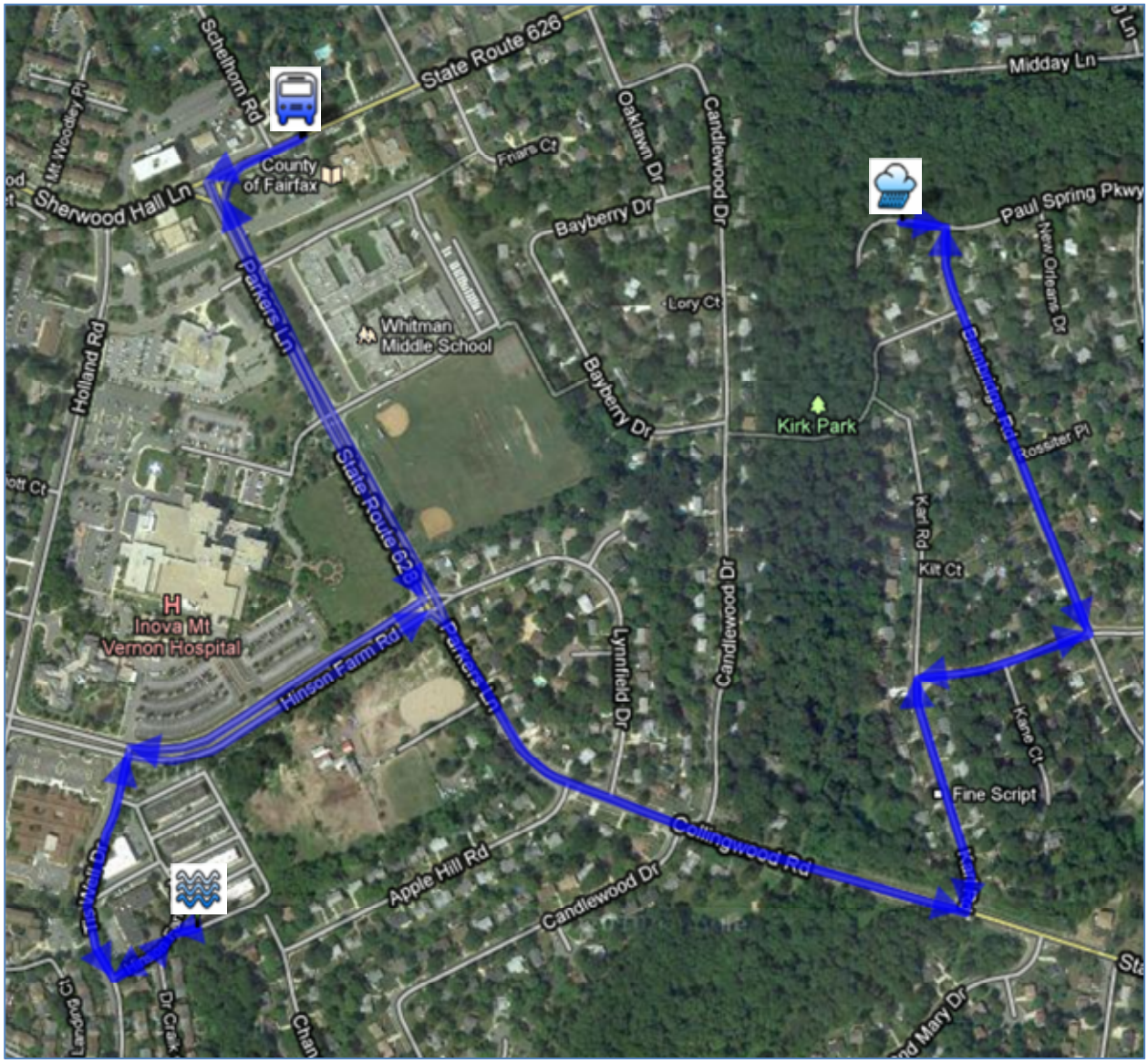
June 4, 2011; 10 AM – 12PM

Start - Sherwood Hall Library

Site 2 - Hinson Farm Road
Degraded Outfall and Adjoining Stream Channel

Site 3 - Paul Springs Branch
Degraded Reach of Stream

Finish - Sherwood Hall Library
Parking Lot Stormwater Management



***Directions to each site on reverse of this page**

Start - Sherwood Hall Library

	1. Head **southwest** on **Sherwood Hall Ln/State Route 626** toward **Schelhorn Rd**	go 351 ft total 351 ft
	2. Turn left onto **Parkers Ln/State Route 628** About 1 min	go 0.3 mi total 0.4 mi
	3. Turn right onto **Hinson Farm Rd**	go 0.2 mi total 0.6 mi
	4. Turn left onto **Tis Well Dr**	go 0.2 mi total 0.7 mi
	5. Take the 3rd left onto **Hinson Farm Rd**	go 256 ft total 0.8 mi
	6. Take the 2nd right to stay on **Hinson Farm Rd**	go 82 ft total 0.8 mi

Total: **0.8 mi** – about **3 mins**

Site 2 - Hinson Farm Road
Degraded Outfall and Adjoining Stream Channel

	7. Head **west** on **Hinson Farm Rd**	go 82 ft total 82 ft
	8. Turn left to stay on **Hinson Farm Rd**	go 256 ft total 338 ft
	9. Turn right onto **Tis Well Dr**	go 0.2 mi total 0.2 mi
	10. Take the 3rd right onto **Hinson Farm Rd**	go 0.2 mi total 0.4 mi
	11. Take the 1st right onto **Parkers Ln/State Route 628** Continue to follow State Route 628 About 1 min	go 0.4 mi total 0.9 mi
	12. Turn left onto **Karl Rd** About 1 min	go 0.2 mi total 1.0 mi
	13. Take the 1st right onto **Shenandoah Rd**	go 0.1 mi total 1.1 mi
	14. Take the 1st left onto **Bainbridge Rd** About 1 min	go 0.3 mi total 1.4 mi
	15. Turn left onto **Paul Spring Pkwy**	go 151 ft total 1.4 mi

Total: **1.4 mi** – about **5 mins**

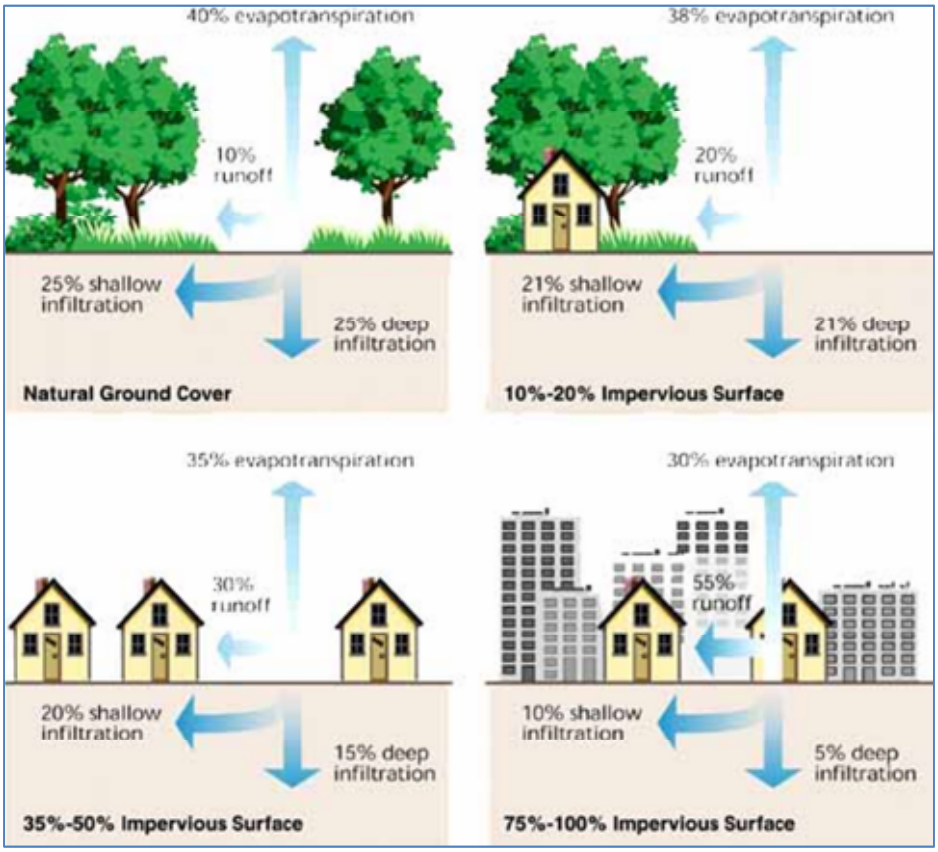
Site 3 - Paul Springs Branch
Degraded Reach of Stream

	16. Head **east** on **Paul Spring Pkwy** toward **Bainbridge Rd**	go 151 ft total 151 ft
	17. Take the 1st right onto **Bainbridge Rd** About 1 min	go 0.3 mi total 0.3 mi
	18. Take the 2nd right onto **Shenandoah Rd**	go 0.1 mi total 0.4 mi
	19. Turn left onto **Karl Rd**	go 0.2 mi total 0.6 mi
	20. Turn right onto **Collingwood Rd/State Route 628** Continue to follow State Route 628 About 2 mins	go 0.7 mi total 1.3 mi

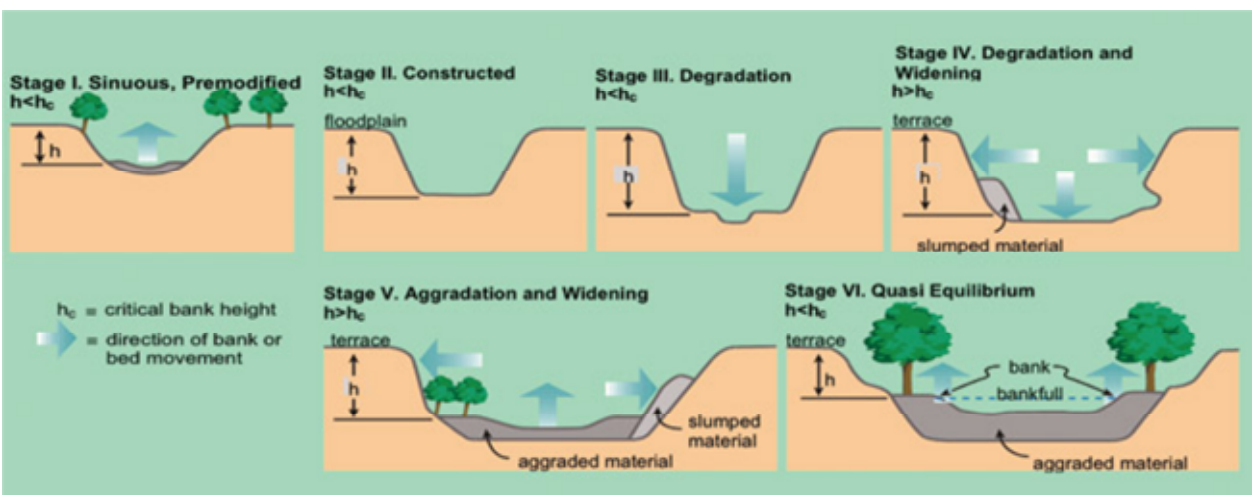
Total: **1.3 mi** – about **4 mins**

Finish - Sherwood Hall Library
Parking Lot Stormwater Management

The Impacts of Impervious Surfaces



Stream Channel Evolution Model



AUDUBON NATURALIST SOCIETY
STREAM QUALITY ASSESSMENT SURVEY

Date: _____

Data Collectors' Name(s) _____ Team Leader _____ Phone # _____

_____ _____

_____ _____

SITE INFORMATION

Watershed _____

Stream _____ Order _____ Site No. _____ Season/year: _____

County _____ State ____ Specific Location _____

HABITAT ASSESSMENT

Choose an appropriate reach (riffle-pool-riffle stretch of stream) for macroinvertebrate collection, then conduct this assessment BEFORE collecting macroinvertebrates. Check box which best represents actual conditions.

1. BED COMPOSITION OF RIFFLES

Riffle 1	Riffle 2	
_____	_____	% silt (mud)
_____	_____	% sand (1/16" - 1/4" grains
_____	_____	% gravel (1/4" - 2" stones)
_____	_____	% cobbles (2" - 10" stones)
_____	_____	% boulders (>10" stones)

Make sure these total 100%

2. EMBEDDEDNESS

Percentage of substrate (stream bottom) covered or surrounded by sediments. Check (✓) for each.

Riffle 1 Center	Riffle 1 Left		Riffle 2 Center	Riffle 2 Left
_____	_____	less than 25%	_____	_____
_____	_____	25 - 50%	_____	_____
_____	_____	50 - 75%	_____	_____
_____	_____	more than 75%	_____	_____

Embeddedness Values:

EXCELLENT less than 25%. Tops of the majority of rocks > 3 inches across are clean of silt or sediment. Sides of the majority of rocks > 3 inches across are not surrounded by silt or sediment. Plume of sediment almost nonexistent. Most rocks look as if they have been set on the stream bed.

GOOD 25 to 50%. Tops of the majority of rocks > 3 inches across are clean of silt and sand. Sides of the majority of rocks are surrounded, or mostly surrounded, by silt or sediment giving them a "cemented in" look. Plume of sediment small to moderate.

FAIR 50 to 75%. Tops of the majority of rocks > 3 inches across are partially covered by silt or sediment. Sides of the majority of rocks are surrounded by silt or sedimnent giving them a "cemented in" look. Plume of sediment moderate to extensive.

POOR . more than 75%. Tops of the majority of rocks are covered by silt or sediment. Sides of a majority of rocks are surrounded by silt or sediment giving them a "cemented in" look. Sediment plume extensive.

3. STREAMSIDE COVER

- ☐ Dominant vegetation trees with thick shrub/grass and perennial understory.
- ☐ Dominant vegetation trees with sparse perennial/ annual understory.
- ☐ Dominant vegetation woody shrubs and annuals.
- ☐ Majority plants present are annuals.

ABIOTIC DATA

Time _____ pH _____

Water temperature ____C ____F [F=(1.8 x C) + 32]

Ambient air temperature ____C ____F

General weather conditions _____

Date/time of last rainfall (if known) _____

Return form to: Audubon Naturalist Society, 8940 Jones Mill Road, Chevy Chase, MD 20815 (301) 652-9188

or

Webb Sanctuary, 12829 Chestnut Street, Box 51, Clifton, VA 20124-0051 (703) 803-8400

HABITAT ASSESSMENT

Habitat Parameter	Optimal 20-19-18-17-16	Sub-optimal 15-14-13-12-11	Marginal 10-9-8-7-6	Poor 5 -4-3-2-1-0
Channel Flow Score ☐ Comments:	Water reaches base of both banks; and minimal amount of channel substrate exposed.	Water fills more than 75% of available channel.	Water fills 25-75% of the available channel; and/or riffle substrates mostly exposed.	Very little water in channel, and mostly present as standing pools.
Bank Stability Score ☐ Comments:	Banks stable; no evidence of erosion or bank failure; side slopes; little potential for future problems.	Moderately stable; infrequent, small areas of erosion mostly healed over; slight potential in extreme floods.	Moderately unstable; moderate frequency and size of erosional areas; high erosion potential during extreme high flow.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends.
Bottom Deposition in Slow Areas of Stream Score ☐ Comments:	Less than 5% of the bottom affected by scouring and/or deposition.	5 - 30% affected; scour at constrictions and where grades steepen; some deposition in pools.	30 - 50% affected; deposits and/or scour at obstruction, constriction, and bends; filling of pools prevalent.	More than 50% of the bottom changing frequently; pools almost absent due to deposition; only large rocks in riffle exposed.
Riparian Forest Zone Width (Least Buffered Side) Comments: Score ☐	Width of riparian forest zones > 54feet; human's activities have not impacted this zone.	Zone between 36-54 feet; human's activities have impacted this zone only minimally	Zone between 18 and 36 feet; human's activities have impacted the riparian zone a great deal.	Zone 18 feet: little or no riparian forest due to man-induced activities (i.e. parking lots, roadbeds, clearcuts, lawns, or crops).

Total score ☐

ADDITIONAL WATERSHED OBSERVATIONS

Canopy Cover (check one):

_____ Fully shaded _____more shaded than open _____More open than shaded _____Open

Comments:_____

Turbidity (check one):

_____Clear _____Slightly turbid (cloudy) _____Turbid (very cloudy) _____Opaque (no light transmission)

Comments:_____

Stream bank (observe bank from water line to 6" up the bank slope)

Soil color _____

Soil type or mix of types (choose from list below) _____

- Sandy. Porous soils, you can see sand grains.
- Loamy. Rich in humus or organic material, dark in color.
- Clay. Nonporous, when squeezed between thumb and forefinger, clay soils usually stick together.

BIOTIC DATA

Use the stream collecting instructions to make a macroinvertebrate count. Macroinvertebrates will be identified to *Order* level for insects and crustaceans, and to *Class* level for worms, leeches, snails, and clams. If you can detect more than one family within an *Order* , please note that in the appropriate space. Sort and record data on macroinvertebrates until you have reached 100 individuals. (*If you collect an individual which you can't ID to Family, (this applies to insect orders) preserve in the vial provided and return with survey form.)*

# of net samples to reach collected individuals _____ # of collected individuals_____

MACROINVERTEBRATE TALLY

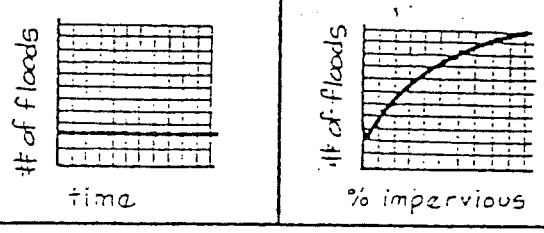
	No. individuals	No. of forms/Names of forms (if known)
Class:		
Oligochaeta-Worms	_____	_____ / _____
Hirudinea-Leeches	_____	_____ / _____
Gastropoda-Snails	_____	_____ / _____
Pelecypoda-Clams	_____	_____ / _____
Crustacea		
Order:		
Decapoda-Crayfish	_____	_____ / _____
Isopoda-Aquatic Sowbug	_____	_____ / _____
Amphipoda--Scud	_____	_____ / _____
Insecta		
Order:		
Plecoptera-Stoneflies	_____	_____ / _____
Ephemeroptera-Mayflies	_____	_____ / _____
Trichoptera-Caddisflies	_____	_____ / _____
Diptera-Trueflies (Midges, black flies, craneflies)	_____	_____ / _____
Megaloptera-Dobsonflies Fishflies, Alderflies	_____	_____ / _____
Coleoptera-Beetles	_____	_____ / _____
Odonata-Dragonflies & Damselflies	_____	_____ / _____

Notes/Comments
(use back side of sheet for additional comments)

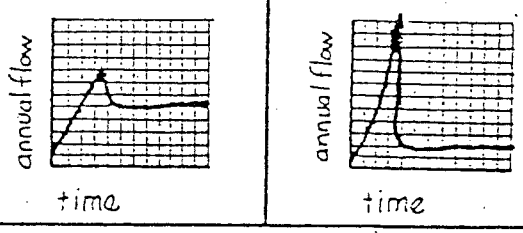
Anacostia: A Watershed Transformed

IMPACTS OF URBANIZATION

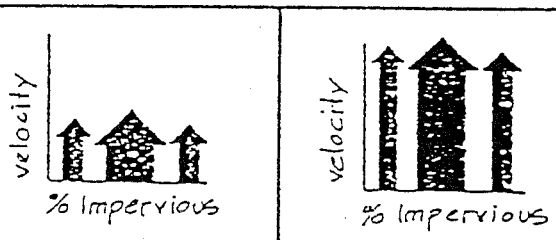
Before | After



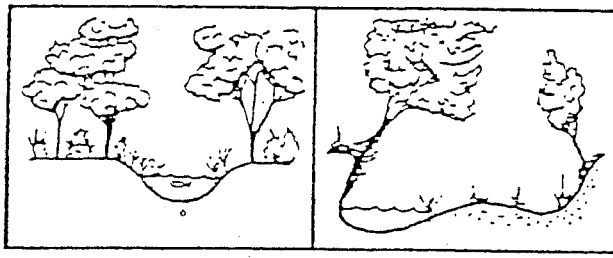
INCREASED BANKFULL FLOODING
The frequency of bankfull floods increases from once every other year prior to development, to over 5 each year for a 50% impervious watershed. In the Anacostia, short but intense summer storms turn stream channels into raging torrents, causing severe channel scour and erosion.



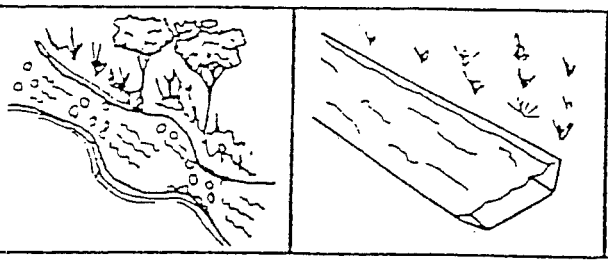
LOWER DRY WEATHER FLOW
Reduced dry weather flows may cause small perennial urban streams to become seasonally dry, while significantly reducing the wetted perimeter of larger urban streams, thus reducing aquatic habitat area. In much of the Anacostia, seasonally reduced discharges significantly restrict the availability of fish and aquatic habitat.



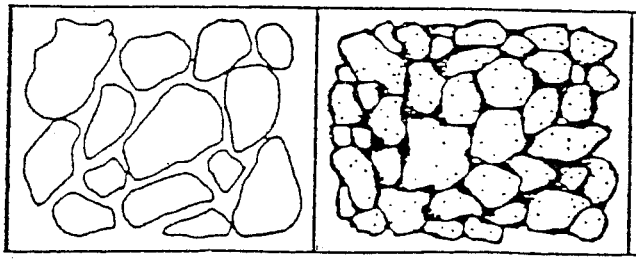
INCREASED STREAM VELOCITY
Greater amounts of stormwater discharge in concert with rapid concentration times over smooth, paved surfaces produce increases in stream velocity. In portions of the Anacostia, this increased channel velocity has caused severe erosion and destruction of both aquatic and riparian habitat.



CHANNEL WIDENING
Increased stormflow velocity in urban streams severely erodes the adjacent stream banks, resulting in a loss of riparian habitat and forest cover. In portions of the developed Anacostia, channels have become two to eight times wider than in undeveloped zones.



LOSS OF POOLS & RIFFLES
Pools and riffles provide habitat diversity for the aquatic community. Stream channel erosion and construction site runoff create significant changes in stream morphology. In portions of the Anacostia, this change has eliminated many pools and riffles that support fish habitat.



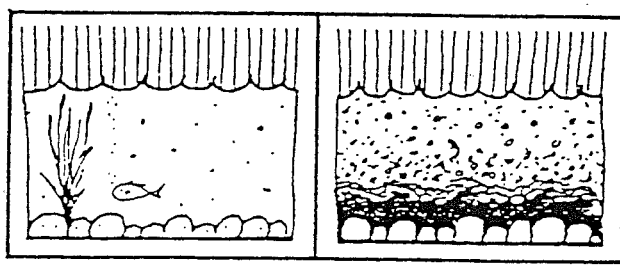
CHANGE IN SUBSTRATE QUALITY
With urbanization comes a shift in the grain size of channel sediments, from coarser grained particles, to a mixture of fine and coarse particles. This results in a phenomena known as embedding: sand, silt, and clay fill voids in the channel bottom, reducing water circulation, oxygen, and organic matter needed by aquatic insects.

MWCOG Dept. of Environmental Programs

Anacostia: A Watershed Transformed

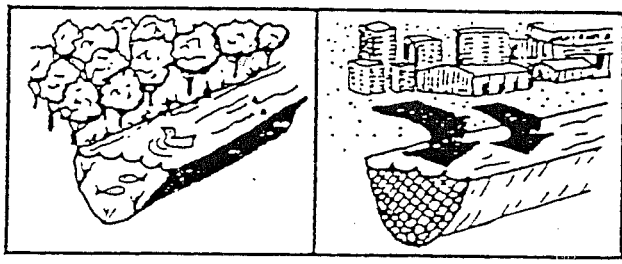
IMPACTS OF URBANIZATION

Before | After



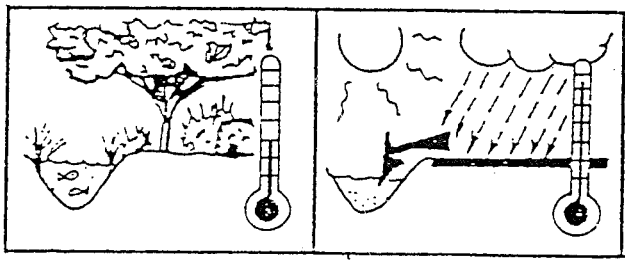
CONSTRUCTION SEDIMENT PULSE

During the initial phase of development, an urban stream receives a massive pulse of sediment that has eroded from upland construction sites. In the Anacostia, sediment levels often decline once upland development is stabilized, yet never return to pre-development levels, because of increased streambank erosion.



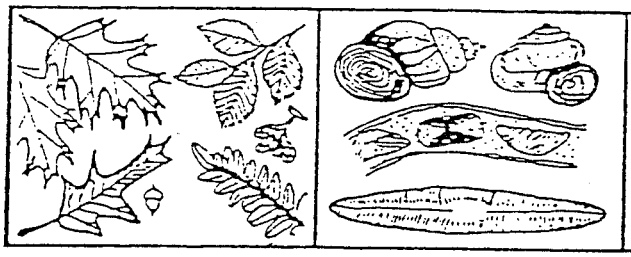
INCREASED POLLUTANT LEVELS

Pollutant levels in urban streams can often be one to two orders of magnitude greater than a forested watershed. In the Anacostia, pollutant wash-off from impervious areas include: nitrogen, phosphorus, carbon, solids, fecal material, herbicides, pesticides, and trace metals, and oil and grease.



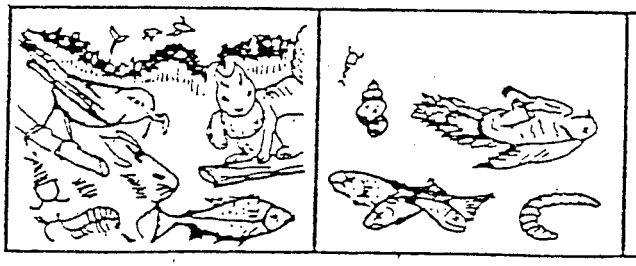
INCREASED WATER TEMPERATURE

Impervious areas function as heat sinks. This heat is transferred to stormwater runoff. Intensive urbanization can raise stream water temperatures by 5 to 10 degrees celsius. In the Anacostia, this thermal loading severely interferes with the physiological requirements of coldwater aquatic organisms such as trout and stoneflies creating stress and environmentally uninhabitable conditions.



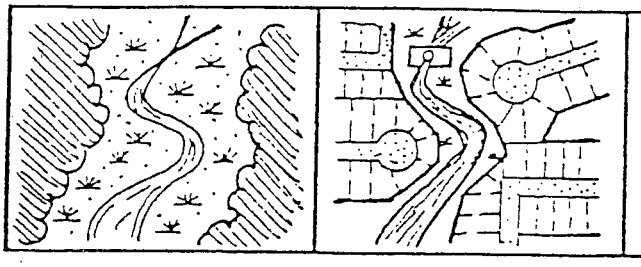
SHIFT IN ENERGY SOURCE

In a natural stream, the aquatic community is driven by an energy source made up of decomposing leaves and woody debris. In urban streams, reduced tree canopy in combination with nutrient accumulation results in increased benthic algal production. This change manifests itself in a dramatic shift of species in the stream.



REDUCTION OF COMMUNITY DIVERSITY

In intensively developed areas, urban streams support only a fraction of the fish and aquatic insects that exist in undeveloped watersheds. This loss of biological diversity leaves the natural community vulnerable to changes in climate and habitat.



LOSS OF FRESHWATER WETLAND BUFFERS

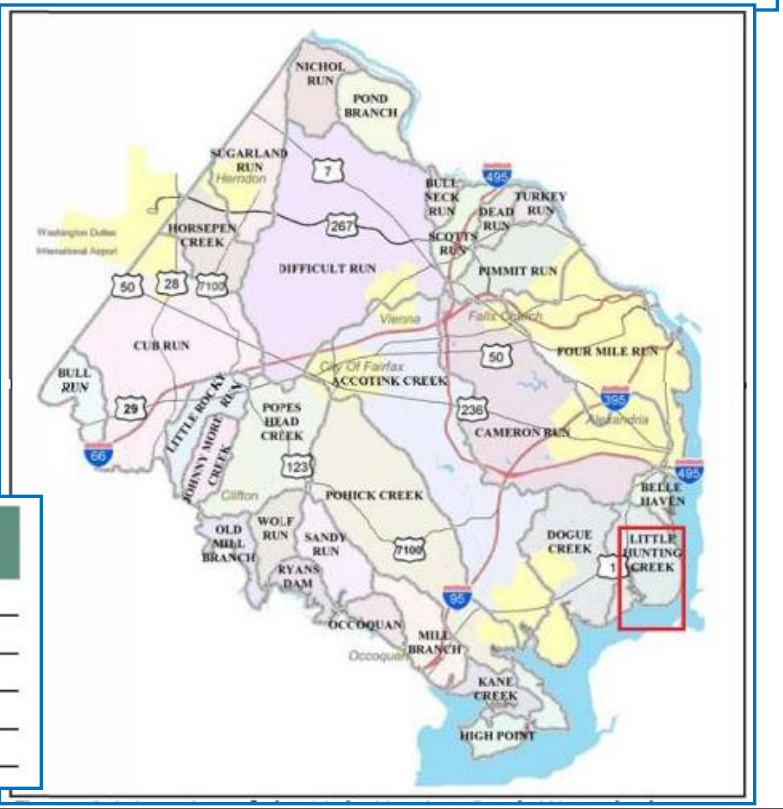
A stream ecosystem is dependant upon its extensive freshwater wetlands, floodplains, riparian buffers, seeps, springs, and ephermal channels. Historically in the Anacostia, these associated areas were frequently destroyed or altered by agriculture and urban development.

Little Hunting Creek Watershed

FACTS:

- **Little Hunting Creek is one of the most developed watersheds in Fairfax County.**
- **The watershed encompasses 7,067 acres (11.04 square miles).**
- **The headwaters of Little Hunting Creek is in Huntley Meadows Park.**
- **82% of developable land within the watershed has been developed, not including road right-of-ways and wetlands.**
- **The land use mostly consists of residential (48%), roads/sidewalks (34%), commercial/industrial (18%), and open space (17%).**
- **The watershed contains some of the oldest developed areas in Fairfax County.**
- **Currently, 25% of the total area within the watershed is impervious.**
- **According to the 2002 Fairfax County stream physical assessment, the majority of Little Hunting Creek water quality and habitat are in poor condition. This is partially due to high fecal coliform levels.**

Subwatershed Name	Area (acres)	Tributary Name	Major Tributary Length (miles)
North Little Hunting Creek	1,384	Little Hunting Creek	2.23
South Little Hunting Creek (includes South Branch)	1,404	Little Hunting Creek South Branch	2.10 0.56
Paul Spring Branch	1,262	Paul Spring Branch	3.25
North Branch	1,760	North Branch	2.48
Potomac River (includes East and West Potomac)	1,257	N/A	N/A
TOTAL	**7,067**		

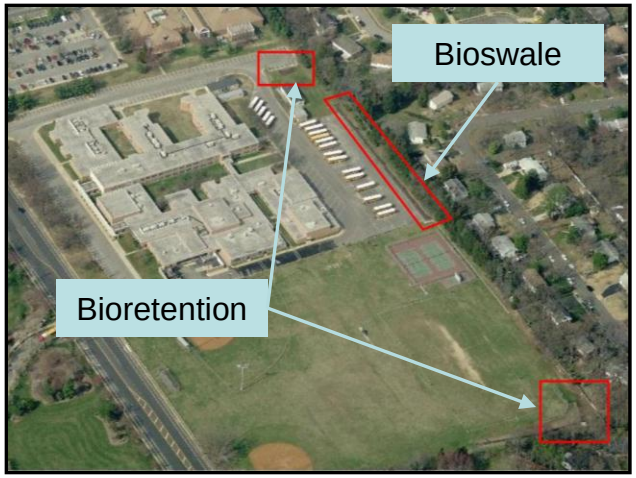


Stream	Percent of Stream Length				
	Very Poor	Poor	Fair	Good	Excellent
North Little Hunting Creek	33%	51%	16%	0%	0%
Paul Spring Branch	0%	47%	53%	0%	0%
North Branch	9%	82%	9%	0%	0%
Tributary to the Potomac River	0%	100%	0%	0%	0%
Total Watershed	**15%**	**58%**	**27%**	**0%**	**0%**

Whitman Middle School

MOUNT VERNON DISTRICT TAX MAP NO. 102-1 Watershed: Little Hunting Creek
Issue: Possible Water Quality/Quantity Improvements

Runoff from the parking lots of Whitman Middle School flowed untreated directly the North Branch tributary of Little Hunting Creek. To improve stormwater management, three stormwater best management practices (BMPs) were installed at Whitman Middle School. The goal of the BMPs is to retain as much stormwater on site as possible. If stormwater cannot be retained, we would provide treatment in order to remove pollutants before it enters our waterways.



CONSTRUCTION

Key Project Elements:

The two bioretention areas and bioswale slow the runoff, allowing the stormwater to infiltrate into the ground. The soil and plants filter out pollutants, like nitrogen and phosphorus, cleaning the runoff before it flows into North Branch.

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- The watershed encompasses 7,067 acres (11.04 square miles).
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- Currently, 25% of the total area within the watershed is impervious.
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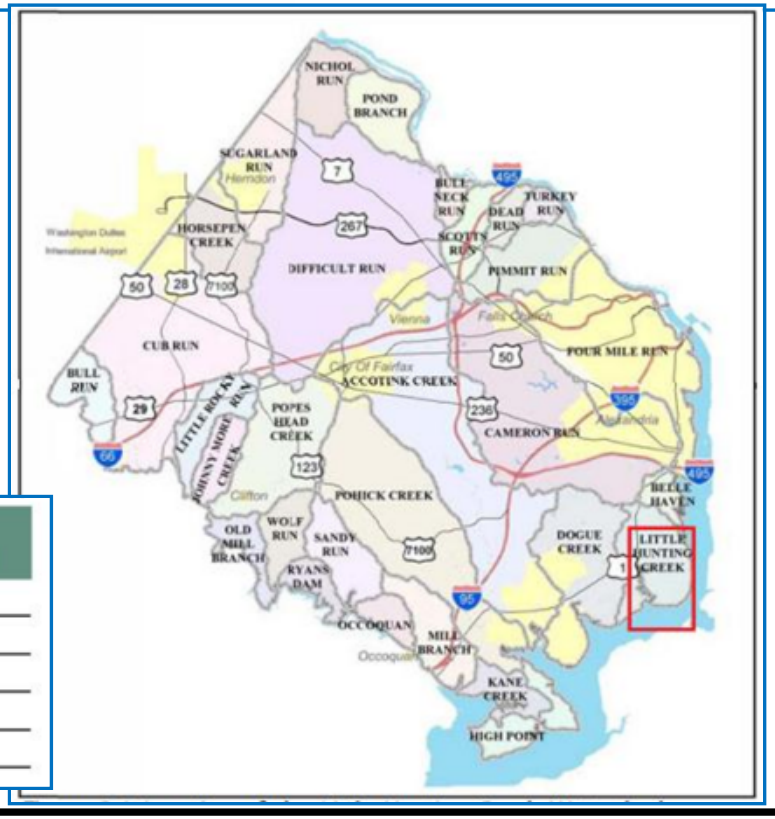

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Whitman Middle School

MOUNT VERNON DISTRICT TAX MAP NO. 102-1 Watershed: Little Hunting Creek
Issue: Possible Water Quality/Quantity Improvements

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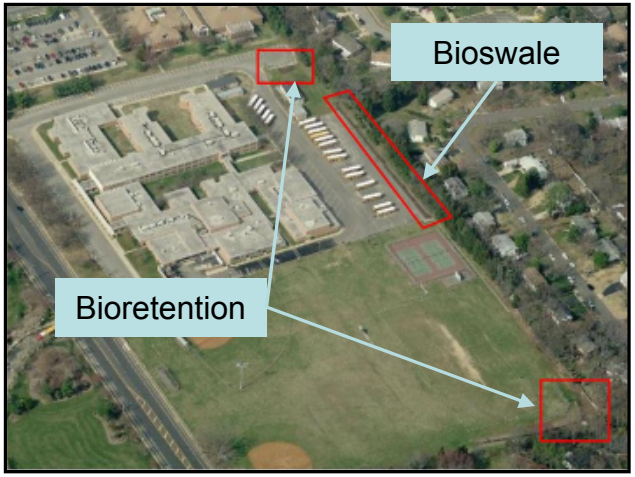

CONSTRUCTION

Key Project Elements:

The two bioretention areas and bioswale slow the runoff, allowing the stormwater to infiltrate into the ground. The soil and plants filter out pollutants, like nitrogen and phosphorus, cleaning the runoff before it flows into North Branch.

Mount Vernon Estates Stream Restoration

Mount Vernon

MOUNT VERNON DISTRICT TAX MAP NO. 110 - 2 Watershed: Little Hunting Creek

Parking in far lot from Mount Vernon Estates

Walk north on the Mount Vernon Trail, outfall is approximately 400 feet on your right

PRE-CONSTRUCTION

Problematic Conditions: Large quantities of stormwater causes bank erosion, tree loss, and general negative impacts to aquatic life.

Possible Solution: Reduce runoff from upstream and stabilize eroding banks & re-vegetate.

CONSTRUCTION

Key Project Elements: The eroded stream was filled with suitable material to reconnect the channel to the natural floodplain.

Key Project Elements: The project was designed using "natural stream restoration techniques" which aim at creating habitat for native wildlife.

POST-CONSTRUCTION

Stream erosion is one of the major causes of poor habitat in our waterways. Fixing a stream reduces the amount of sediment smothering the stream bottom and reduces the amount of phosphorus harming our waterways and the Chesapeake Bay downstream.

Existing Conditions: The stream has been restored to a more natural design. A riparian seed mix and native trees were planted on impacted areas of the site.

Future activities: Continued monitoring of the vegetation and structures (cross veins, log jams, etc.) will occur. Ideally, aquatic organisms will re-inhabit the restored reach.

5/2009

Essex Manor Pond Restoration

MOUNT VERNON DISTRICT **TAX MAP NO. 102 - 2** **Watershed: Little Hunting Creek**

Essex Manor Court
Alexandria, VA 22308

PRE-CONSTRUCTION

Problematic Conditions:.

Concrete trickle ditches were designed to move low flow as efficiently as possible and to leave most of the pond bottom dry to facilitate mowing. Subsequent research shows that a non-paved meandering flow path gives more opportunity for pollutant removal and improves water quality.

CONSTRUCTION

Key Project Elements:

By removing the concrete trickle ditch, integrating a wetland system and changing the control structure the pond will provide water quality benefits not seen in typical dry ponds.

POST-CONSTRUCTION

This pond not only provides water quantity and quality control, but the vegetated pond provides habitat for wildlife.

Green Sanctuary at Mount Vernon Unitarian Church

MOUNT VERNON DISTRICT **TAX MAP NO. 93-3** **Watershed: Little Hunting Creek**

1909 Windmill Lane
Alexandria, VA 22307

EXISTING CONDITIONS:

Problematic Conditions:.

The Mt. Vernon Unitarian Church straddles two subwatersheds of Little Hunting Creek and its seven acres are at the highest point in the drainage area. As a result, when it rains, a large volume of rapidly moving water flows downhill from the church property.

In 2005, MVUC was selected as one of the first entities to participate in implementation of the Little Hunting Creek Watershed Plan. Fairfax County provided monetary support for projects at MVUC because of the great benefits to the community and to our streams.

Stormwater management practices installed at MVUC help limit the volume of runoff, reduce erosion downstream and remove pollutants. The project features two rain gardens on one side of the driveway and an inlet structure on the other site.

The red & yellow arrows represent the flow of water from the site. Only the flow identified by the red arrows is addressed by this project.

CONSTRUCTION

Who to Call
Water Quality, Stormwater and Stream Complaints

SWPD - DPWES 8 November 2010

Complaints	Contacts			
	Primary	Phone Number	2nd	3rd
Algae, Scum on water - Color or Smell	SWPD	703-324-5500	DEQ	FRD
Bright green water (due to pea soup green algae)	SWPD	703-324-5500		
Car Products - gas, oil, antifreeze	FRD	703-246-4386	DEQ	SWPD
Car Wash - soap suds	SWPD	703-324-5500	DEQ	
Chemicals - gas, paint, etc	FRD	703-246-4386	DEQ	SWPD
Construction Site Runoff and debris	EFID	703-324-1950	DCR	SWPD
Dark Brown Water (due to the leaching of tannins from decaying leaves)	SWPD	703-324-5500		
Drainage problems - Yard	MSMD	703-877-2800		
Drinking Water Leak	FCWA	703-698-5800		
Dumping Trash, Garbage & Tires	HD	703-246-2300	SWPD	
Dumping Yard debris - stormsewer or pond)	MSMD	703-877-2800	DEQ	SWPD
Dumping Material (Private Property - Junk, Automobiles)	DPZ	703-324-1300		
Fish Kills	DEQ	703-583-3800	FRD	SWPD
Flooding	Police Non Emergency	703-691-2131		
Foam or Suds in a stream	SWPD	703-324-5500	DEQ	FRD
Mosquitoes	HD	703-246-2300		
Orange goo on banks and in stream (due to iron fixing bacteria)	SWPD	703-324-5500		
Paint - Latex or Oil Based	SWPD	703-324-5500	DEQ	FRD
Sewer gas, Sanitary Sewer - Backup, Discharge, Overflow	WWCD	703-323-1211		
Swimming Pool Discharge - Chlorine	SWPD	703-324-5500	DEQ	
SWM Facilities not functioning	MSMD	703-877-2800		
Water line breaks	FCWA	703-698-5800		

Emergency : 911
Non Emergency Police Fire Rescue: 703-691-2131
Fairfax County Office of Emergency Management: 703-324-2362
Fairfax County's emergency information line: 703-817-7771
Animal Control 703-266-6490
Animal Warden 703-830-3310
Air Related issues should be directed to the Health Department
703-246-2300
Evenings / Weekends / Holidays - VA Dept. of Emergency Management
800-468-8892

Common Wealth of Virginia

DCR	Department of Conservation and Recreation Culpeper, VA 540-347-6420
DEQ	Department of Environmental Quality Woodbridge VA

Fairfax County

DPZ	Department of Planning and Zoning
EFID	Environmental Facilities Inspection Division
FCWA	Fairfax County Water Authority
FRD	Fire and Rescue Department
HD	Health Department
MSMD	Maintenance and Stormwater Management
SWPD	Stormwater Planning Division