Arlington's Streams
Studying, Protecting, Restoring

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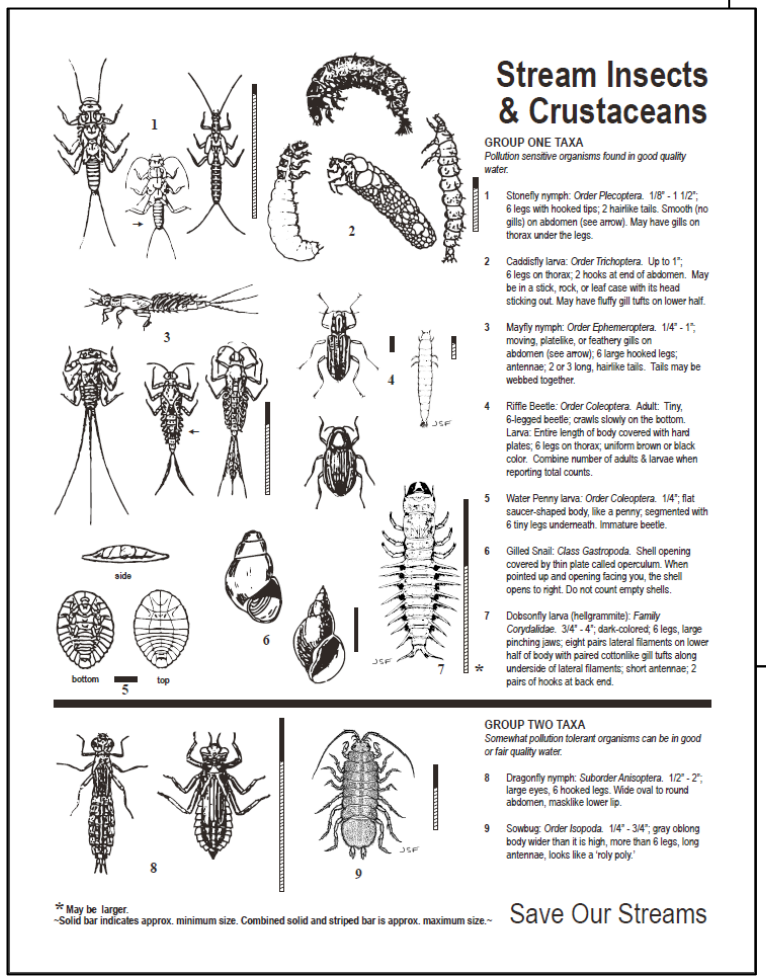
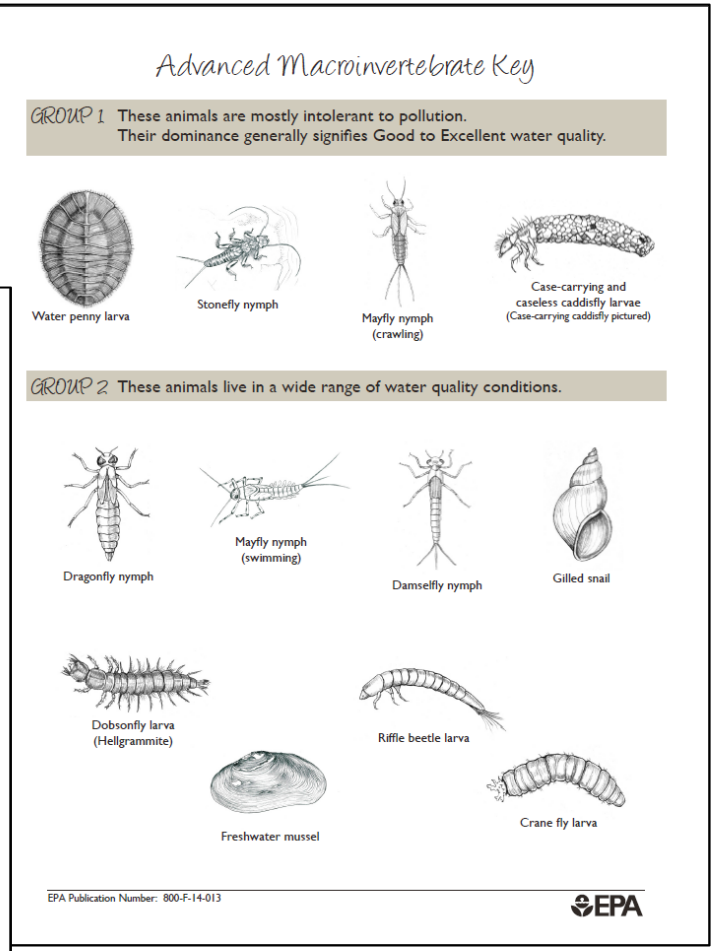
How do You Determine a Stream's Status?

Determining Status

- Common guides and apps can be misleading when used for purposes beyond their intent or ability





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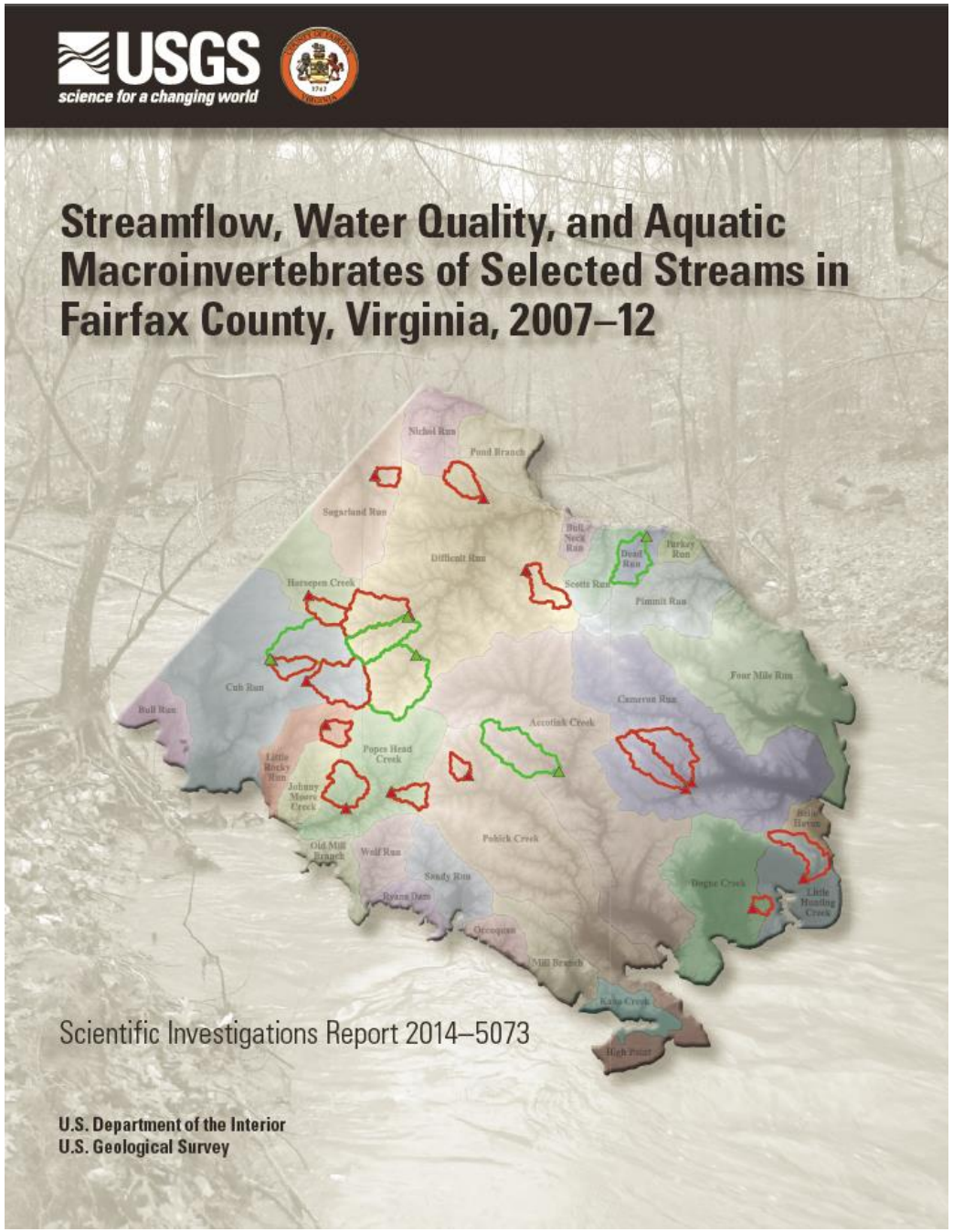
Fairfax's Comprehensive Baseline Study

- Conducted in partnership with USGS
- First 5 years complete, into second 5-year period
- Indepth streamflow, chemical and macroinvertebrate monitoring at 20 sites around Fairfax



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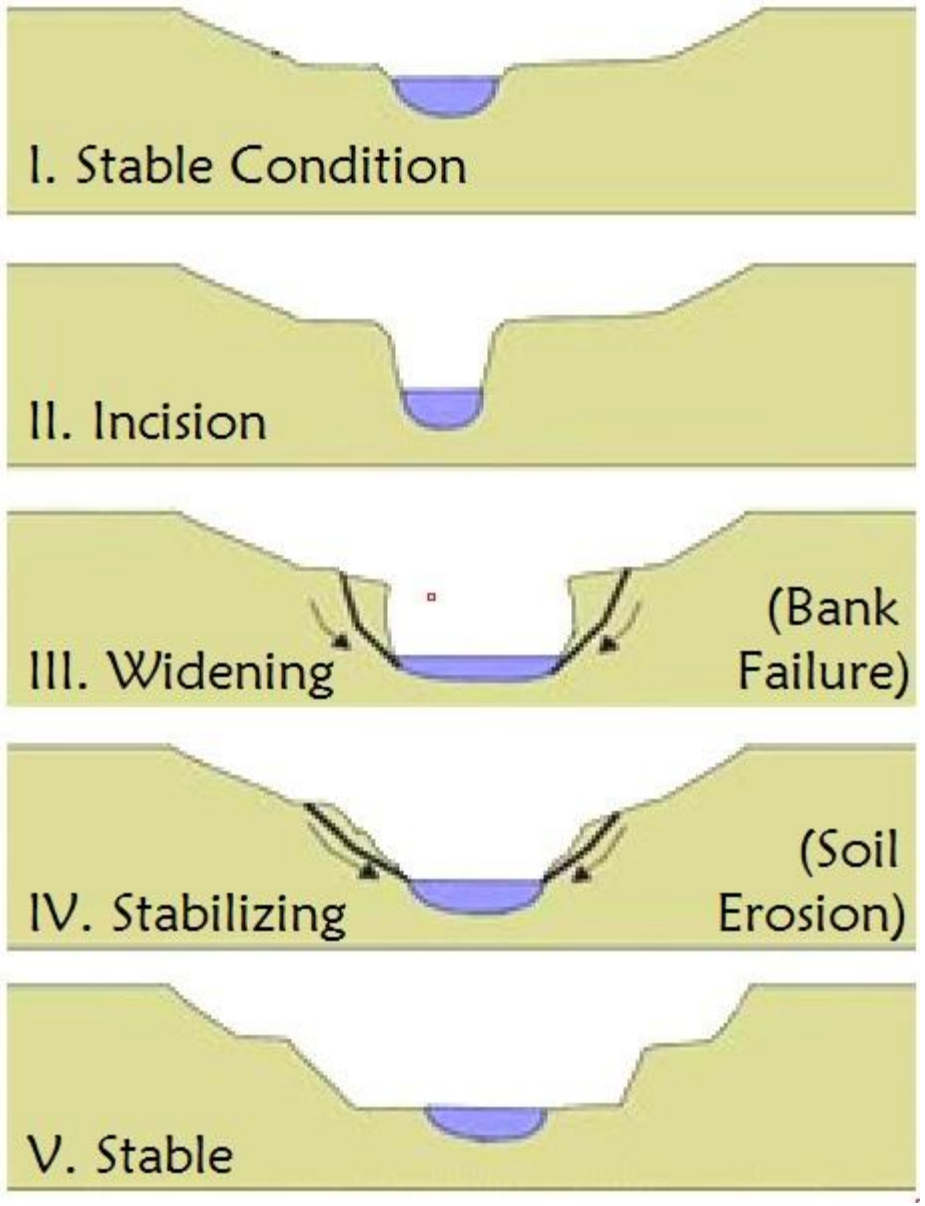
Arlington's Stream Assessment Study

- Channel Evolution Model
- Utilities & outfalls assessed
- High priority watersheds:
  - Gulf Branch
  - Windy Run
  - Donaldson Run
  - Pimmit Run
  - Palisades
- Is a component of the Stormwater Master Plan



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Determining Status

To determine status, a comprehensive picture and consistent methods of monitoring over time are important.

- Habitat surveys
- Fish
- Macroinvertebrates
- Chemical

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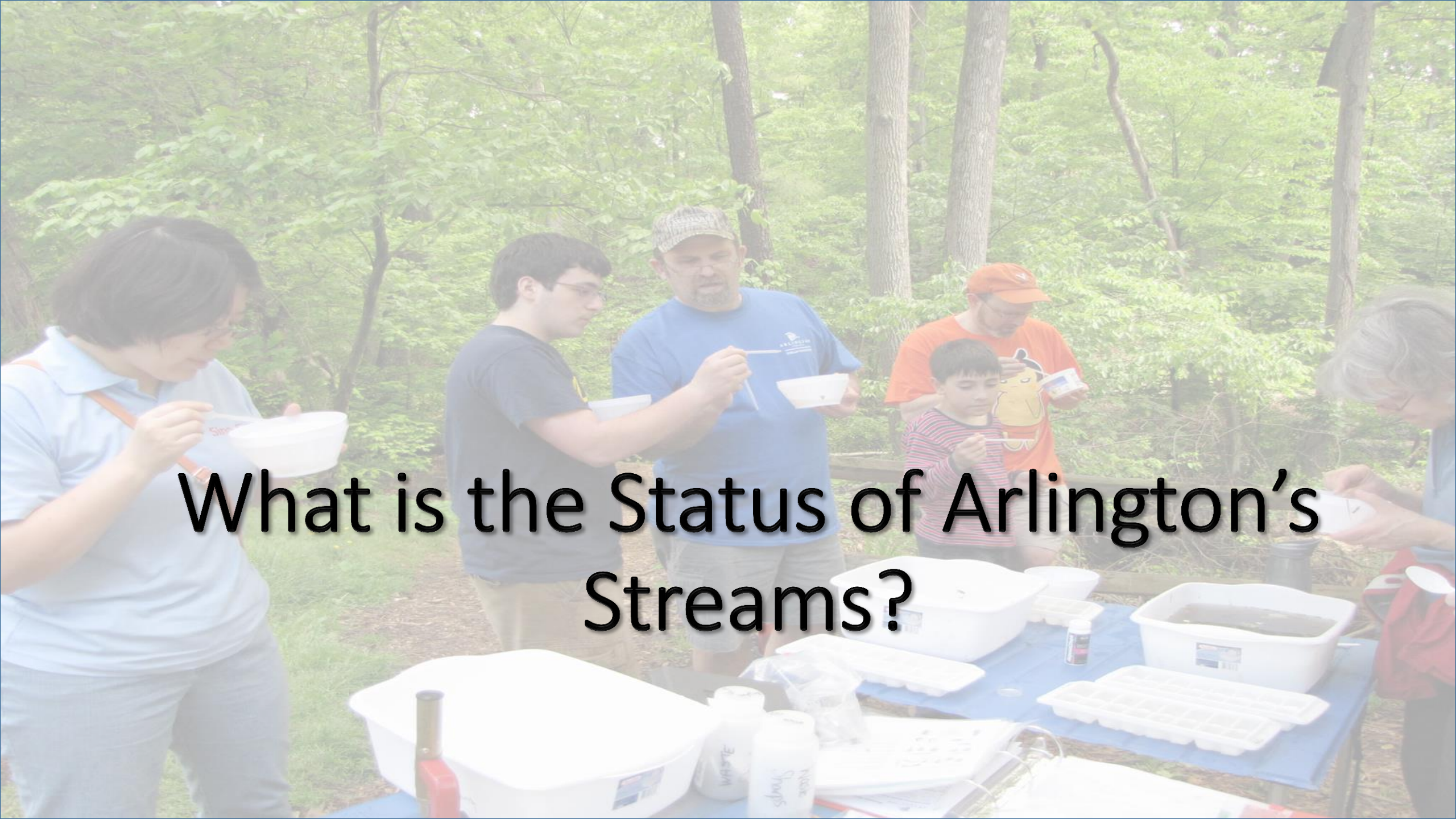

What is the Status of Arlington's Streams?

In-stream Habitat

- Professionally assessed in spring 2012 and 2015
- Decrease in values noted in 2015
- Suboptimal and optimal ratings noted during both assessments
- *"All of the study reaches rated highly for physical potential for propagation and inhabitation. The index does not take algal proliferation into consideration."*

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (FRONT)

STREAM NAME:		SITE (or ID) #:
LAT (DD):	LONG (DD):	
LAT (D,M,S):	LONG (D,M,S):	
INVESTIGATORS:	FORM COMPLETED BY:	
PROJECT:	DATE _____ TIME _____ AM PM	REASON FOR SURVEY:
FIELD SEASON:	COMMENTS:	

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

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Chemical

- Basic water chemistry was professionally collected in 2011/2012 and 2015
- Momentary snap-shot of water quality
- Conductivity, pH, DO, Temp
- All within allowable ranges per DEQ/EPA criteria, however an increase in conductivity was noted in 2015 at all sites

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Fish

- Provide “long term” data compared to chemical data
- Professionally assessed in Fall 2011 at 11 sites around County
- Tolerance values of collected species were predominantly marginal-tolerant
- Fairfax and MD DNR IBI scores rates sites as Poor/Very Poor

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Macroinvertebrates

- Can be seen without magnification
- Do not have a backbone
- Live a part or all of their life within the Arlington's streams
- Have been classified by VA DEQ with specific tolerance values
- Provide "long term" data compared to chemical data

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Virginia Stream Condition Index (VSCI)

Weighted average of specific, individual metric scores.

A type of Index of Biotic Integrity (IBI).

VSCI Scale

≥73 Excellent
60 – 72 Good
43 – 59 Stress
≤42 Severe Stress

VSCI is derived from:

- Total Taxa Richness (Family)
- EPT Richness (Family)
- Percent Ephemeroptera
- Percent PT-H
- Percent Scrapers
- Percent Chironomidae
- Percent Top Two Dominant Families
- Family Biotic Index (FBI)

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Arlington County VSCI Scores

- Severe Stress scores for all in spring 2015 & 2014
- Ten Stress scores (56%) in fall (7 in 2014). Remaining scores were Severe Stress

Stantec sampling occurred prior to County's 2015 sampling in the same reaches.

	Spring VSCI		Fall VSCI	
	2015	2014	2015	2014
Gulf Branch	39.6	41.9	38.4	44.1
Windy Run	29	15.2	55.9	56.6
Little Pimmit	33.4	28.4	37.5	41.5
Donaldson Run	31.3	22.7	34.9	47.2
Banneker - 4MR	30.9	22.3	28.2	32.2
Bluemont - 4MR	39.6	34.7	39.1	47.9
Lubber Run	28.9	12.3	20.4	43.7
Barcroft - 4MR	40.1	31.5	58.4	50.4
Upper Long Branch	28.8	39.1	43.8	43.7

VSCI Scale

≥73 Excellent

60 – 72 Good

43 – 59 Stress

≤42 Severe Stress

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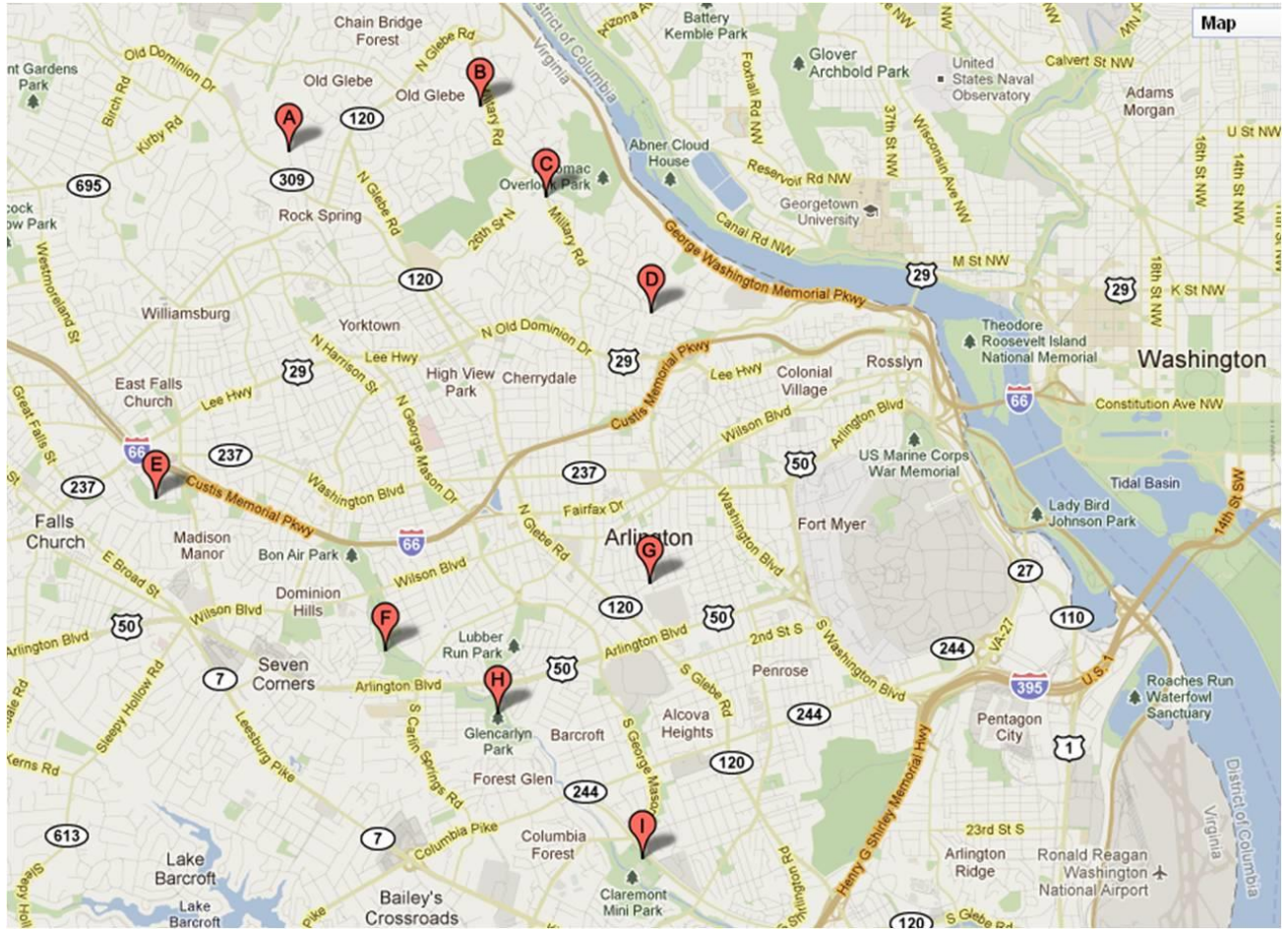
Stantec Comparison of 2011/2012 & 2015 VSCI Scores

- Spring 2015 & 2012 scores were consistent at Severe Stress
  - Northern drainage scores were better in 2012
  - No pattern with 4MR drainages
- Fall 2015 & 2011 were consistent at Severe Stress for 4MR & Gulf Branch drainages
  - Little Pimmit, Windy, DR were “Stress” in 2015



Arlington Monitoring Sites

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Stantec Data Suggests

- Northern sites are doing better than Four Mile Run drainage sites
- Systems are doing better during the fall, than spring
  - Highest VSCI scores were in Fall 2015 at all sites but Lubber and Gulf (which were highest in fall 2011).

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In a nutshell (based on current data)

Habitat & Chemical

Fish*

Macroinvertebrates

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What are the stressors for Arlington streams?

- “Urban Stream Syndrome”
- 42% impervious surfaces
- Nonpoint source runoff
- Flashy stream behavior during storms

Urban stream syndrome – altered hydrology, increased nutrient and contaminant transport, decreased channel stability, reduced biotic richness and increased dominance of perturbation-tolerant organisms. (Fairfax Study)

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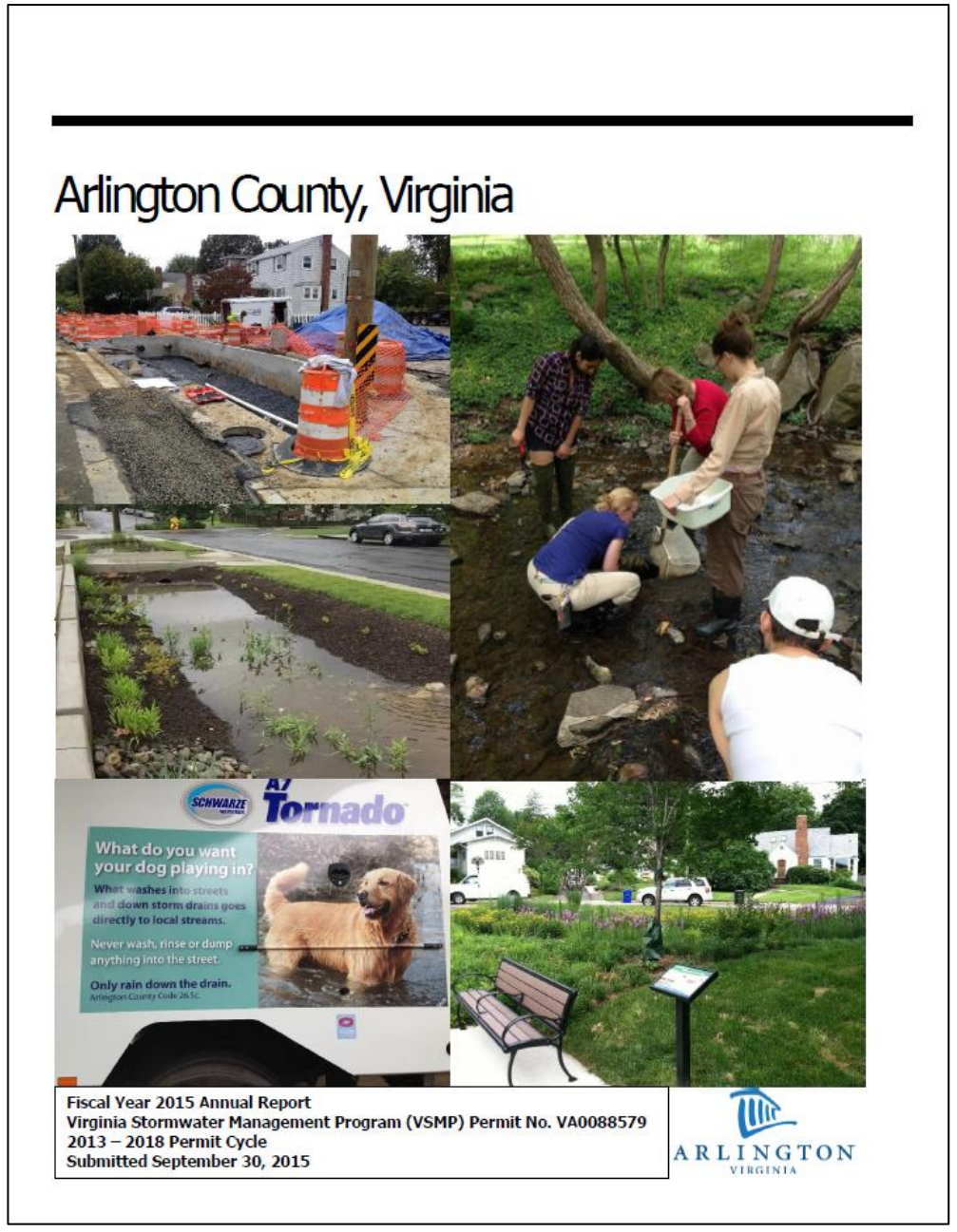
What is being done to improve stream quality?

Improving Stream Quality: MS4 Permit

Municipal Separate Storm Sewer System

- Regulatory method used by EPA/state to mandate specific programs and actions at the local level
- Covers numerous practices including:
  - Street sweeping
  - Monitoring
  - StormwaterWise Landscapes
  - Nutrient management plans
  - Green Streets
  - Illicit discharges
  - Outreach
  - And more



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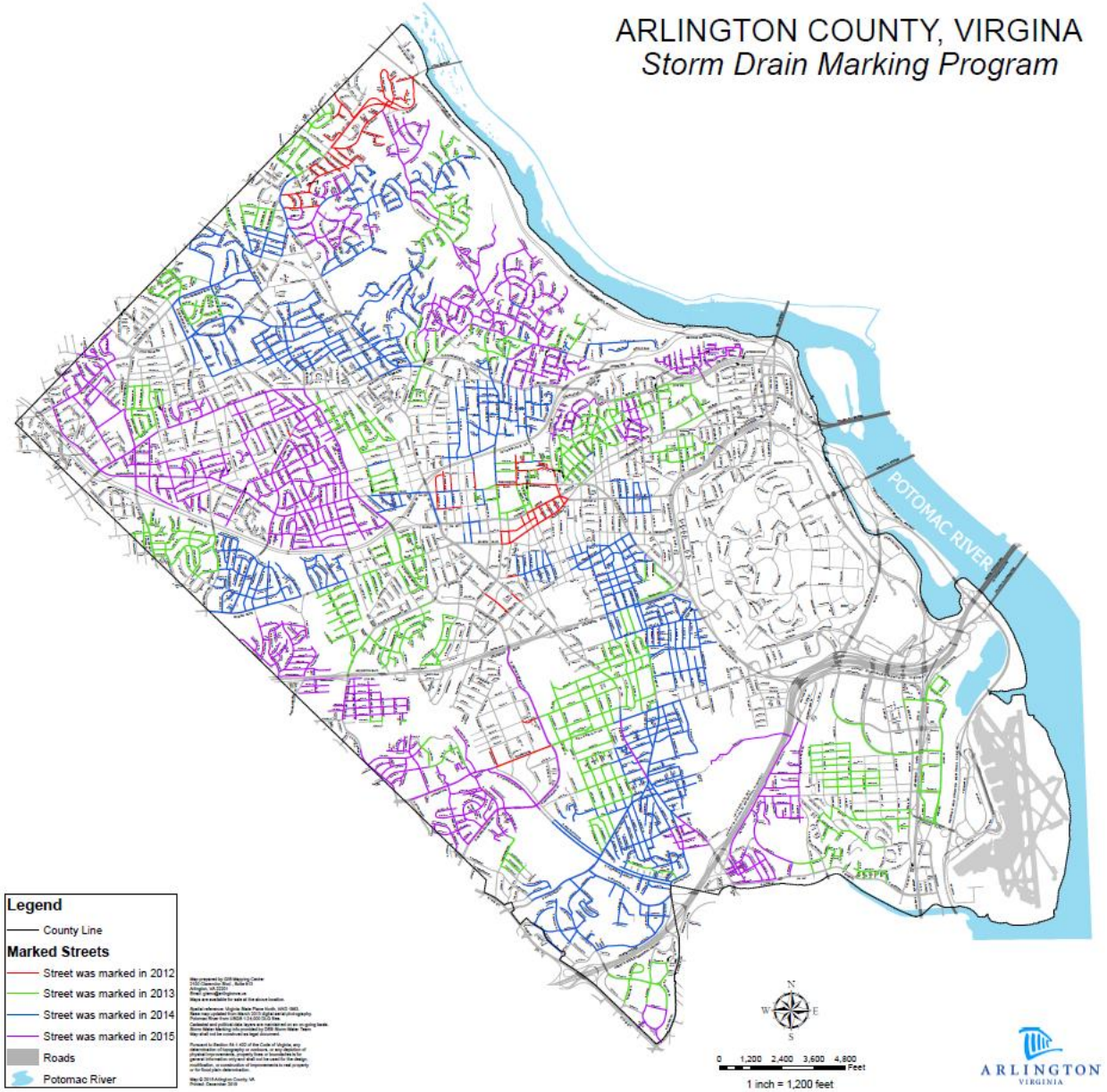
Improving Stream Quality: Storm Drain Marking

- Educational
  - For those doing the marking as well as those that see the markers
- Enforcement
  - If illegal discharges are discovered at a location that is marked, the penalties can be more harsh



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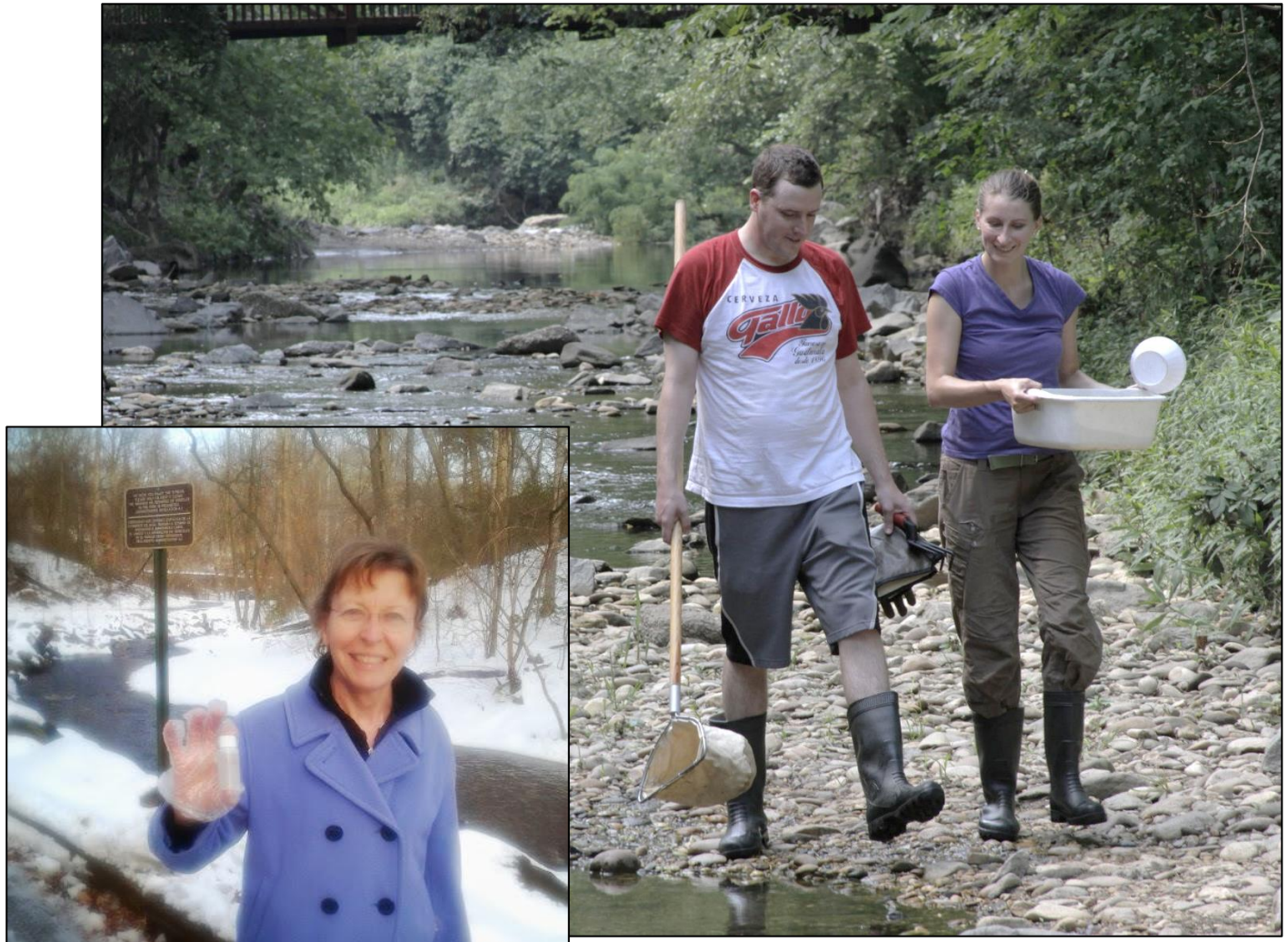
Improving Stream Quality: Citizen Science Monitoring Programs

- Professional studies 2011 & 2015
- Macro program: Updated protocol, in-field staff support, and new training
- Bacteria program: QAPP & annual recertification



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Improving Stream Quality: Stream Restoration Projects

<u>Coming Soon:</u>

- Four Mile Run (Arlington/Alexandria section, south of Mt Vernon Ave Bridge)
- Donaldson Run Trib B
- Windy Run
- Ballston Pond (Lubber Run)

<u>Completed:</u>

- Donaldson Run Trib A

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Improving Stream Quality: Green Streets

- South Hayes Street (Pentagon City)
- 8th Street South
- Patrick Henry Drive
- N Albemarle Street

Coming:

- N Kensington & 32nd St N
- John Marshall Drive

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Improving Stream Quality: StormwaterWise Landscapes

- Applications to be accepted for 2016 program Feb 14 – Apr 1
- 87 completed projects to date
  - 129 accepted into program
- 4 practices: rain gardens, conservation landscaping, permeable pavement, pavement removal

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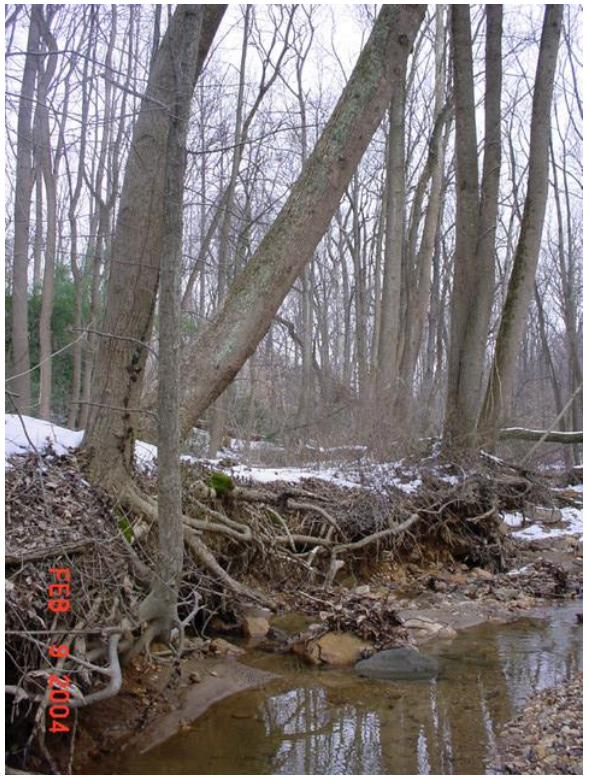
Conversations about Streams Are Rarely Just About Streams

- Many interests overlap around streams
  - Trees
  - Infrastructure (drinking water and sewage lines)
  - Recreation in parks
    - Trails
  - Wildlife
  - Water quality
    - Chemical
    - Macroinvertebrate



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Thanks & Good Night

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