Accotink Creek TMDL Study
4th TAC Meeting

Thursday July 28th, 2016

Today's Agenda

- Status update on
  - Sediment TMDL
  - Chloride TMDL
- Discuss options for setting allocations
- Next Steps

Sediment TMDL

GWLF Calibration Targets

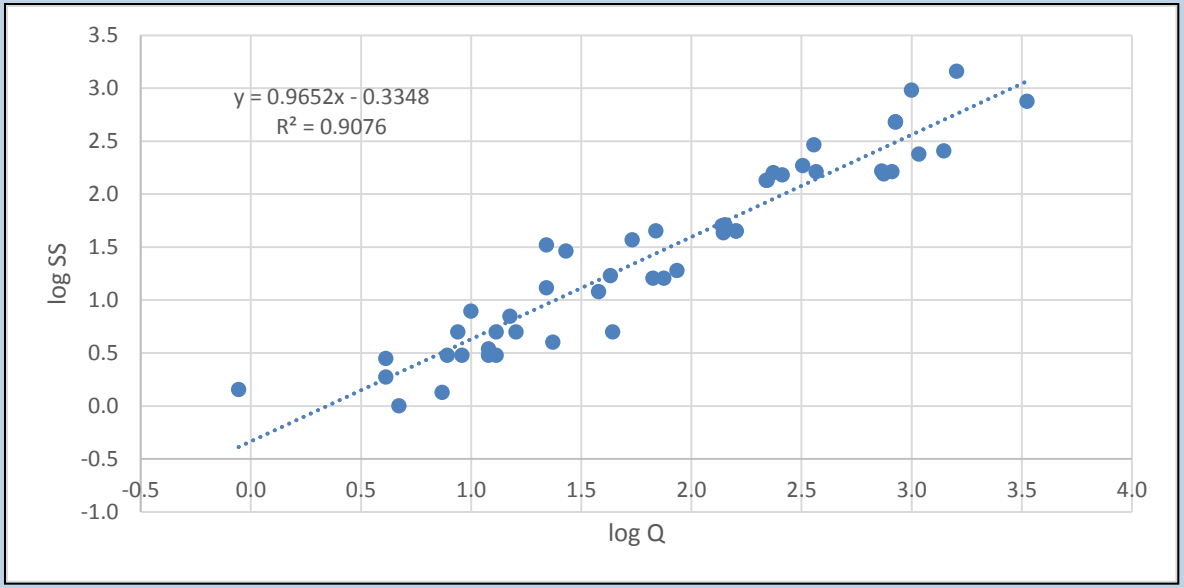
Sediment Sources	Target or Calculation Method	Source of Data
Transportation	122 mg/l, end-of-pipe	Average of Station Average Concentration from National Stormwater Quality Database, EPA Rain Region 2
Other Developed Land	88 mg/l, end-of-pipe	
Open Space	Universal Soil Loss Equation (as calculated by GWLF)	Based on soil data, slopes, GWLF defaults
Construction	1.8 t/ac	Chesapeake Bay Expert Panel Report
Point Source	By Permit and Outfall	Permit Discharge Monitoring Reports
Streambank Erosion	Calculated by GWLF; adjusted if necessary	Empirical Load Estimates Fairfax County Watershed Management Plan

Empirical Sediment Load Estimates for GWLF Verification

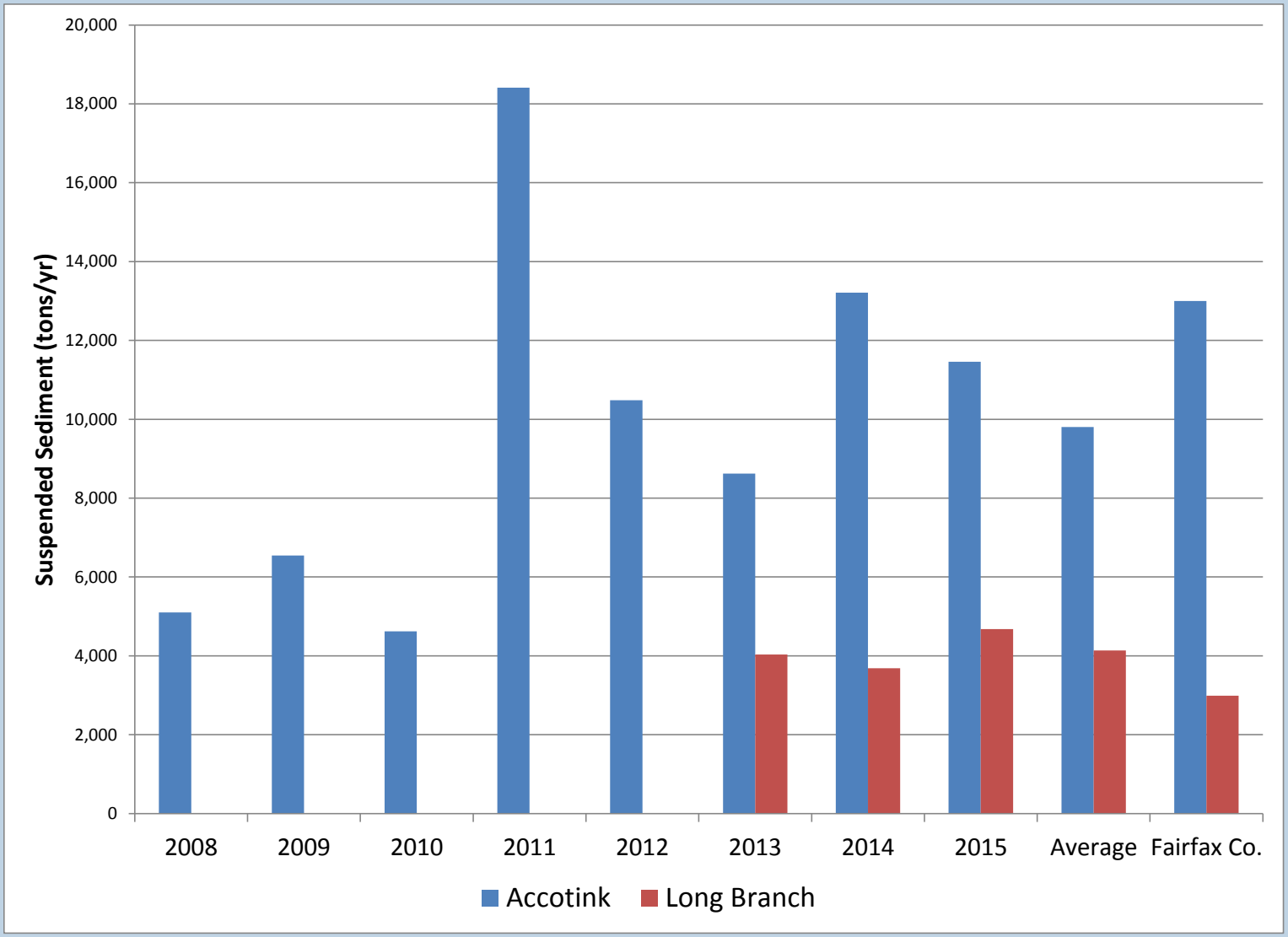
- Base empirical load estimates on
  - Suspended sediment grab samples
  - Continuous flow data
  - Continuous turbidity data (Long Branch)
- Compare to GWLF Model output

Accotink Creek Regression Models

Location	Model	R^2	Years Estimated
Long Branch	Log SS ~ Log Q+ Log Turbidity	0.91	2013-2015
Accotink Creek near Braddock Rd.	Log SS ~ Log Q	0.91	2008-2015

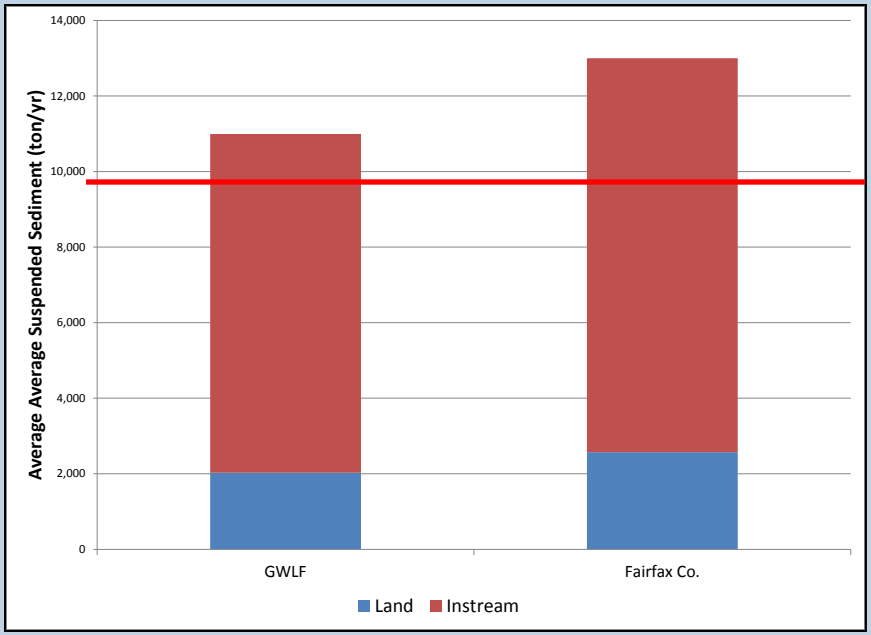


Estimated Annual Sediment Loads

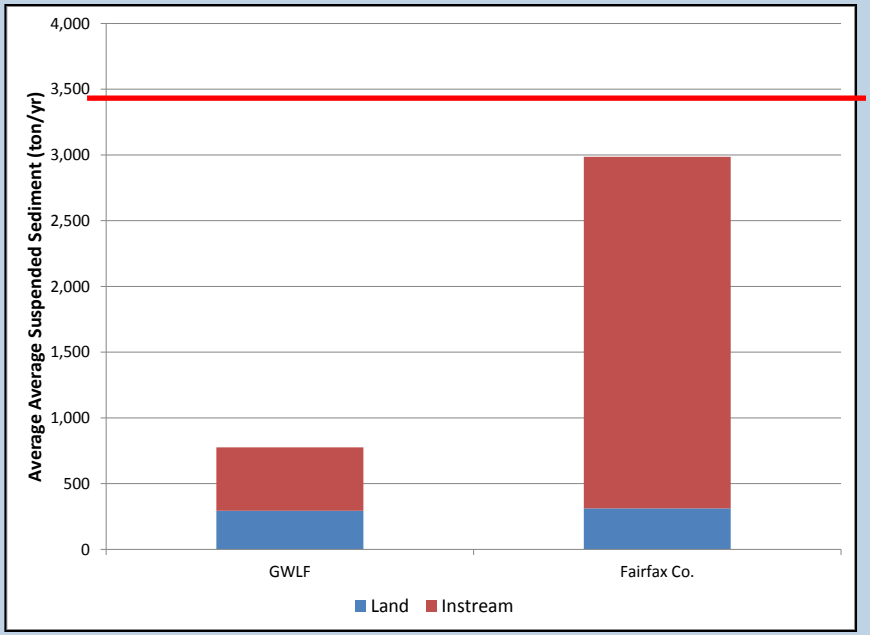


Comparison of GWLF, Fairfax County, and Empirical Load Estimates

Upper Accotink Creek

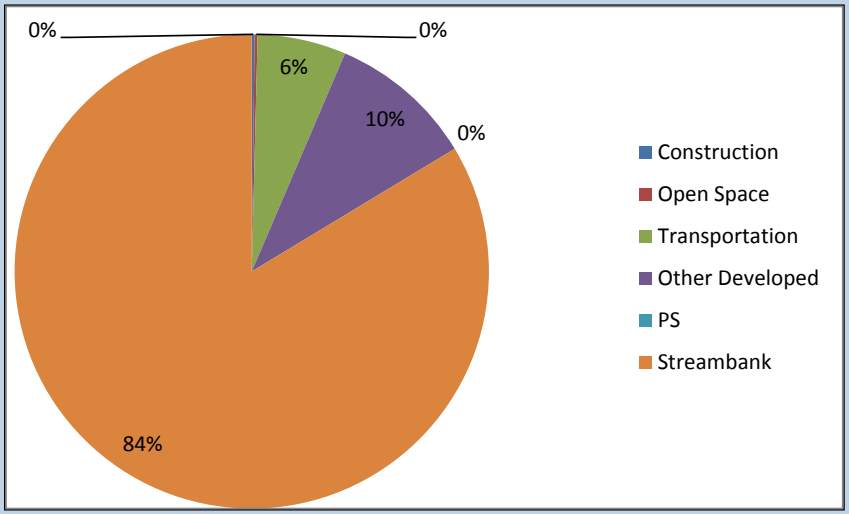


Long Branch

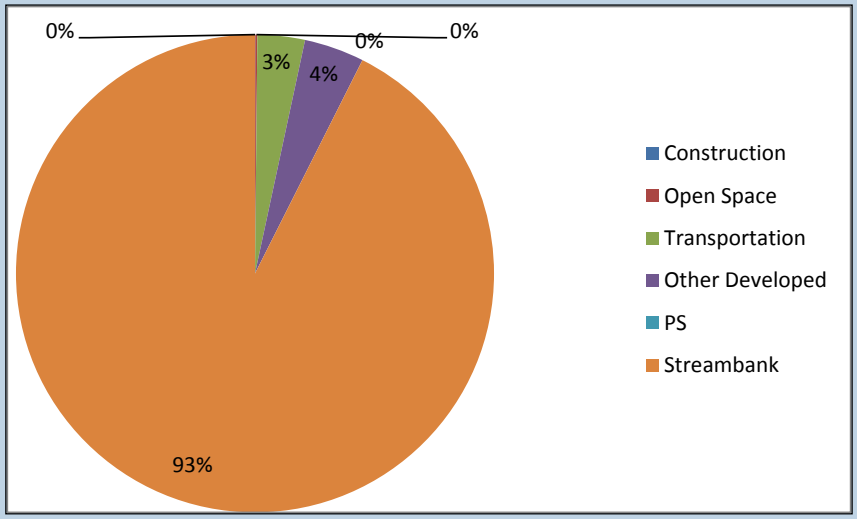


Regression Estimate

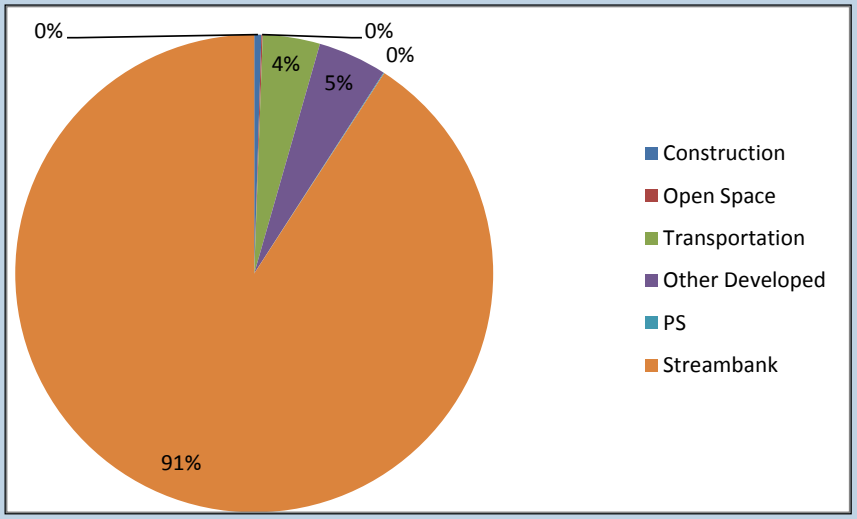
Sediment Loads by Source



Upper Accotink Creek



Long Branch[1]



Lower Accotink Creek[2]

[1]Includes adjustment to match estimated loads.

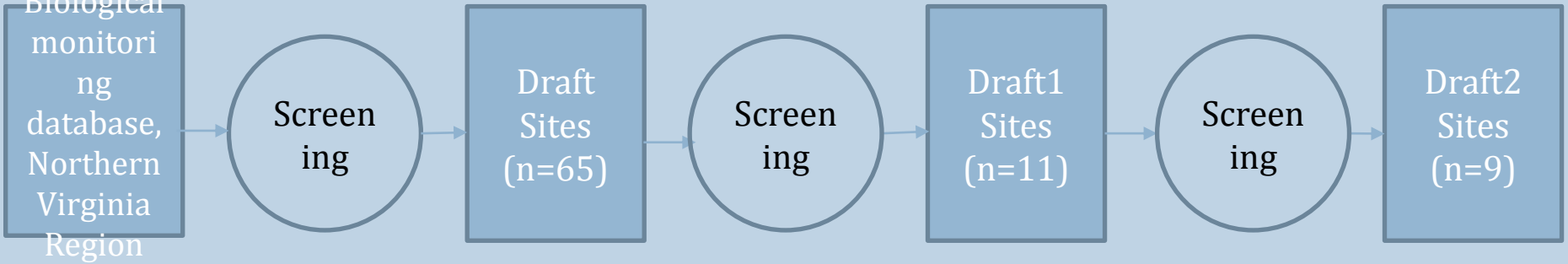
[2]Includes loads from upper Accotink Creek with 54% reduction due to Lake Accotink.

AllForX Method

- Calculate AllForX for impaired watershed (current conditions) and comparison watersheds
- Regress AllForX values against Virginia Stream Condition Index (VSCI) scores
- Identify AllForX threshold where regression line crosses VSCI impairment threshold (60)
- Sediment TMDL: AllForX threshold (from regression) multiplied by all-forested load from impaired watershed

DRAFT AllForX Comparison Watershed Screening Criteria, Accotink Creek Sediment TMDL

developed based on the AllForX methodology documented in Virginia Tech 2015, Yagow 2014, and Yagow et al. 2013.



VSCI CRITERIA
Not in the Blue Ridge province
Includes monitoring data after 2004
Average score greater than or equal to 60
Greater than or equal to three samples

CMPI CRITERIA
Includes monitoring data after 2004
Average score greater than 40
Greater than or equal to two samples

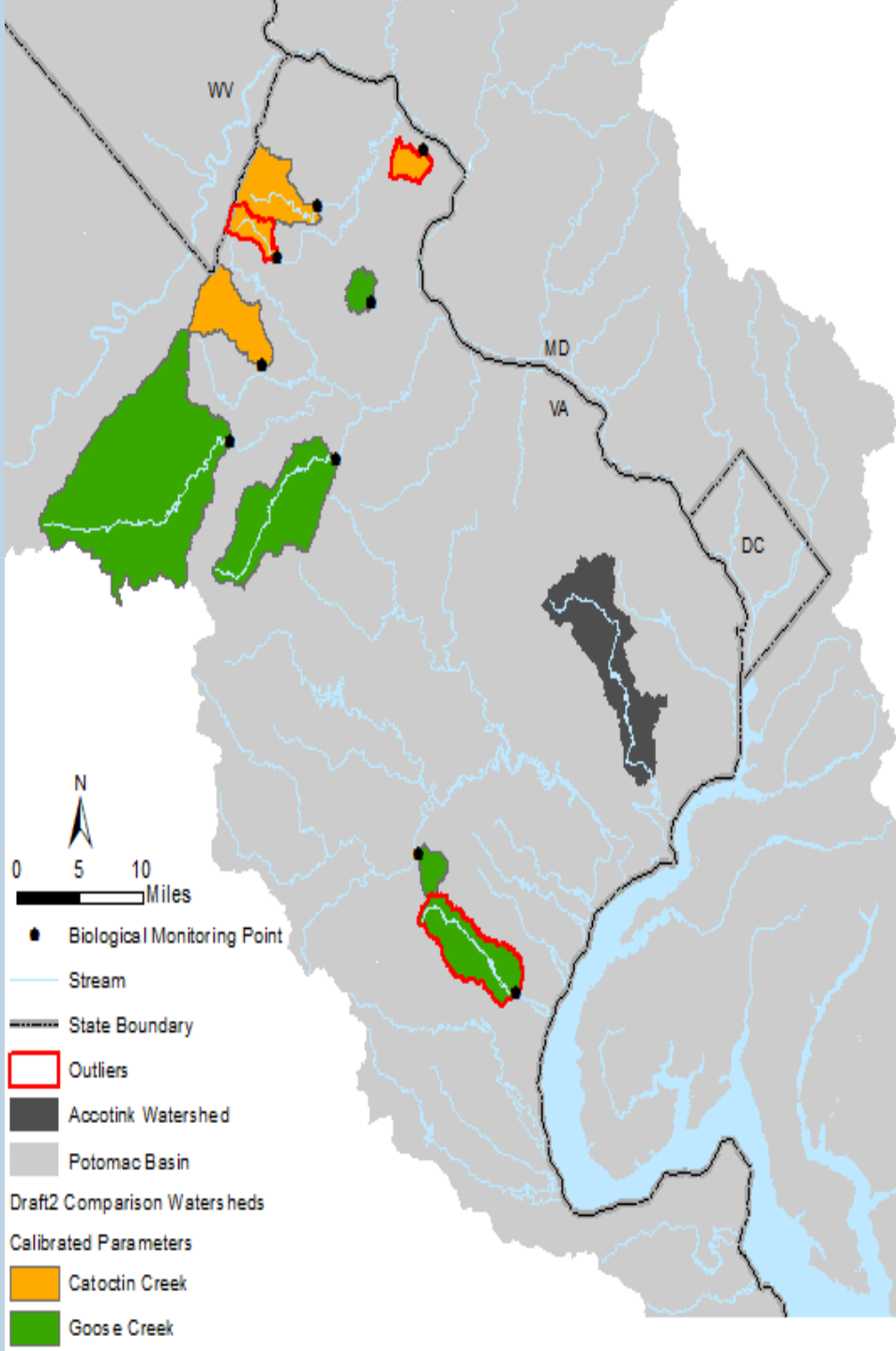
CRITERIA
Within 45 miles of the Accotink watershed
In the Potomac basin
Not nested
Stream order 1-4
(preference given to 3rd order streams when selecting between nested 3rd and 4th)

CRITERIA
Watershed size
>4 sq mi, <150 sq mi

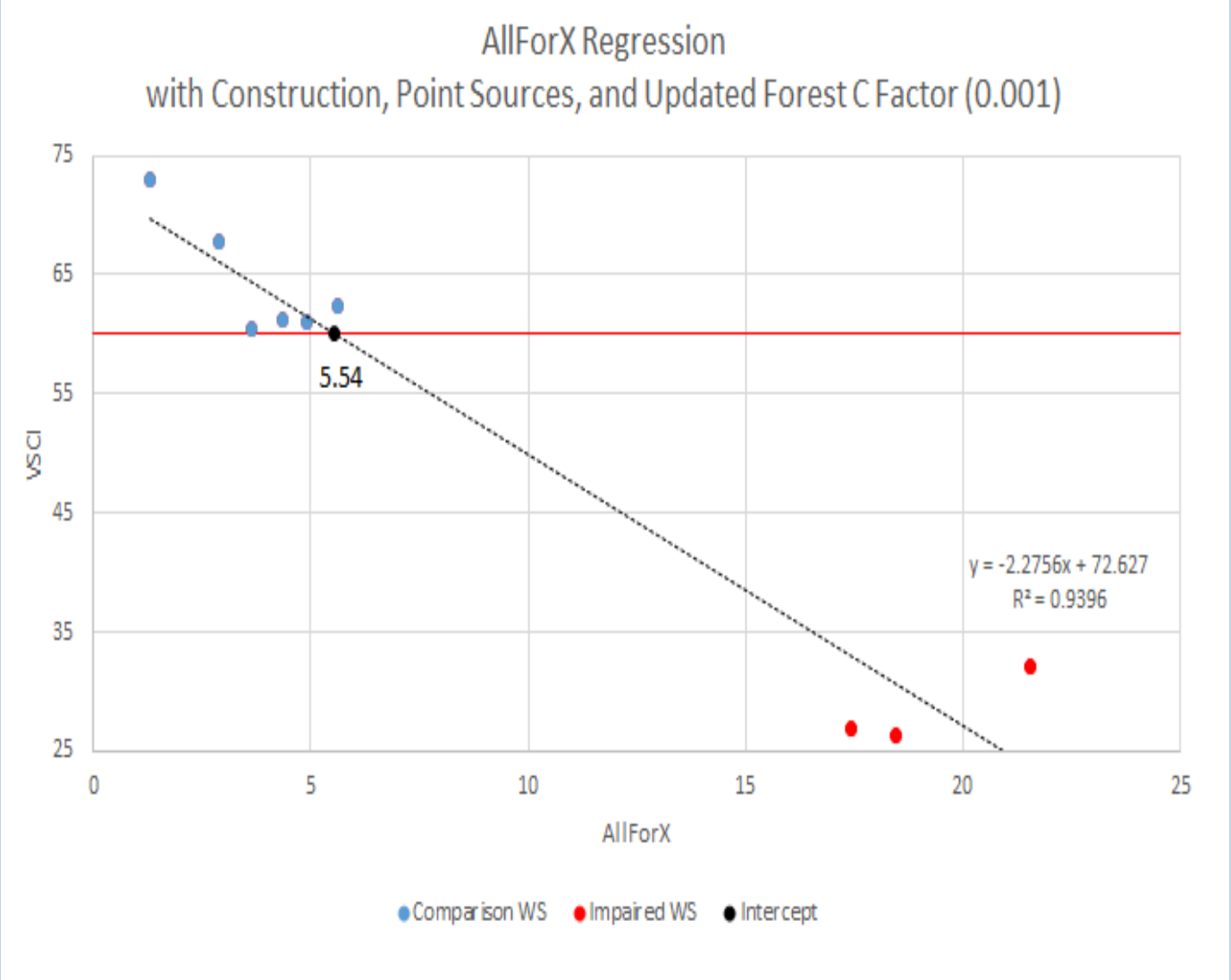
References:
Virginia Tech. 2015. TMDLs for benthic impairments in Little Otter River (sediment and total phosphorus), Johns Creek, Wells Creek, and Buffalo Creek (sediment). Prepared for VA DEQ. 141p.
Yagow, G. 2014. Creating data layer for analysis of AllForX comparison watersheds. Memo-to-file dated June 19, 2014.
Yagow, G., B. Benham, K. Kline, and C.J. Mitchem. 2013. Developing sediment load thresholds protective of aquatic life. 2013 ASABE Annual International Meeting. Kansas City, Missouri. July 21-24.

Model Inputs

- Calibrated parameters from either Goose Creek or Catoctin Creek applied to each watershed
- Observed data
  - BMPs, land use, soil, 6 weather stns, animals, permitted discharges, construction
- MapShed calculated inputs
  - K, LS, sediment A factor, etc.



DRAFT AllForX Regression



Preliminary TMDL Reductions

Impairment	TMDL Reduction
Upper Accotink	70%
Long Branch	68%
Lower Accotink	74%

Questions?

Chloride TMDL

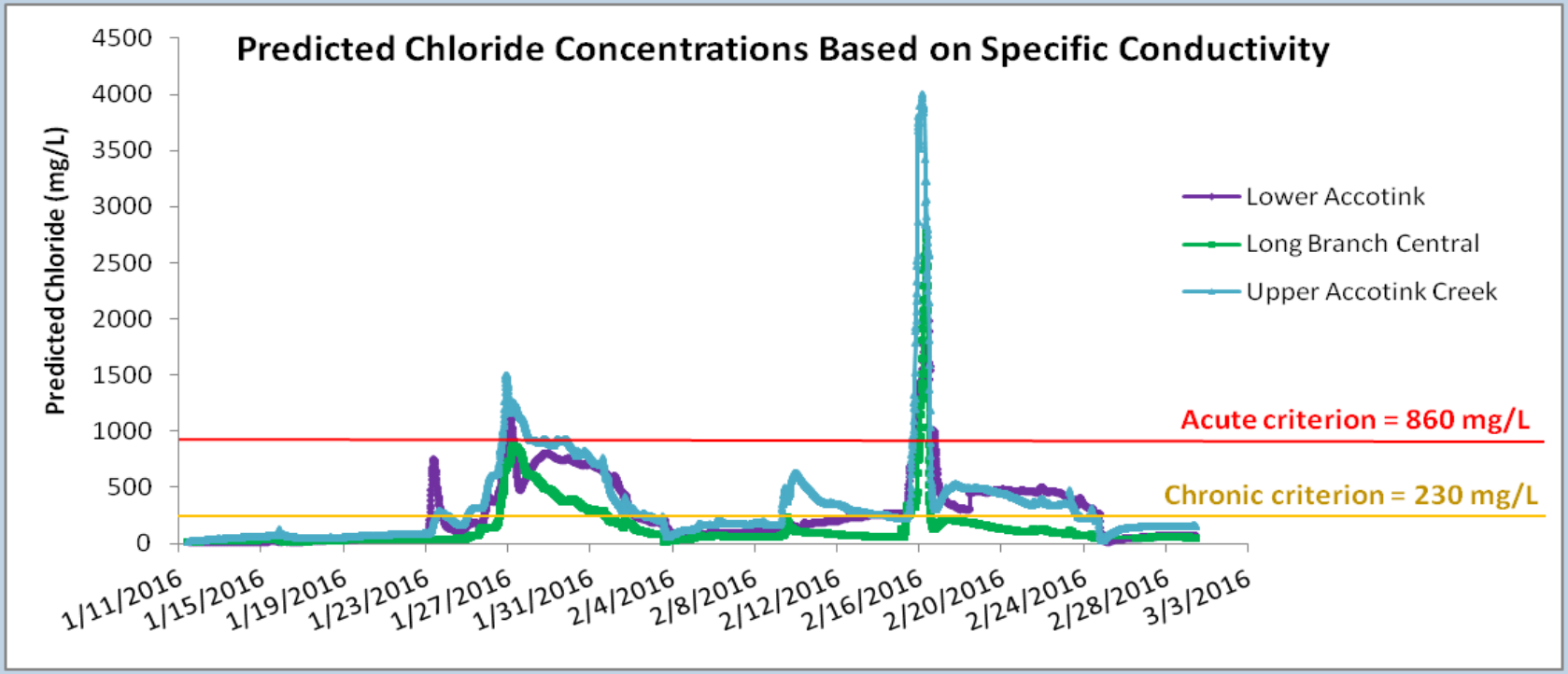
- Chloride Message
  - Public Safety will not be compromised by the implementation of this TMDL
  - The TMDL will be implemented through best management practices that include training and use of better technologies to more efficiently, safely and effectively apply chlorides.
  - This form of implementation will improve water quality while saving costs and maintaining public safety

- Evaluation of approaches
  - Flow * Standard (230 mg/L Chloride)
    - Simple equation
    - More emphasis on Maximum Daily Load
  - HSPF Model
    - The model is a tool
    - Data rich watershed – allows for good calibration
    - Instream processes and mixing considered

Analysis of Monitoring Data

- Continuous Specific Conductance monitoring
- Chloride grab samples
- Regression model relating Cl concentration to specific conductance
- Use regression model to estimate daily/hourly Cl concentrations

Estimated Chloride Concentrations



Reductions Required to Meet Criteria, Based on Estimated Chloride Concentrations

Location	Reduction for Acute Criterion	Reduction for Chronic Criterion	Period (number of days)
Ranger Road*	73%	87%	11/19/11-1/8/15 (1,027 days)
Braddock Rd.	75%	82%	2/5/15- (147 days)
Telegraph Rd.	23%	64%	1/11/16-2/29/16 (50 days)
Long Br.	69%	72%	4/17/13- (1,138 days)

* Based on Braddock Rd. regression

Steps in Estimating Application Rate (lbs Cl/ac/snow event)

Number	Step	Source of Information
1	Assemble deicers (bought, used) per year	VDOT, Vienna, Fairfax Co.
2	Estimate Cl per deicier	VDOT
3	Estimate applied area	CBP impervious roads
4	Estimate number of snow events	Model meteorology; Reagan airport snow readings

1. Application Criteria: 0.05 in water equivalent as snow
2. 75% road rate applied to parking lots, driveways, sidewalks in commercial, industrial, and high density residential land
3. Application rates weighed by primary, secondary, and local road miles
    - Higher weight to segments with higher percentage of primary and secondary roads

Calibration of Mass Balance

Division of Application Rate

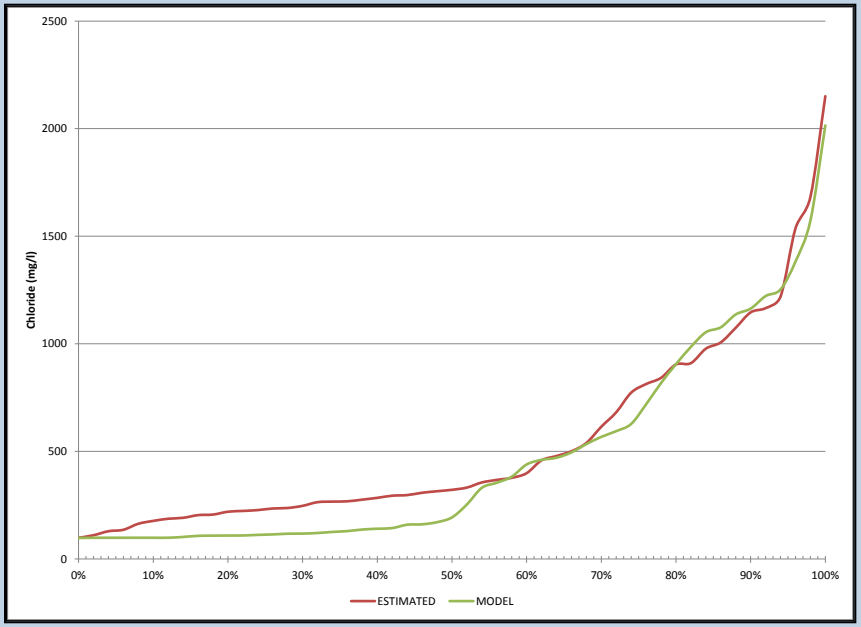
- 60% of application rate on impervious
- 15% of application rate on pervious
- 25% not accounted for
  - Deep ground water
  - Uncertainty in estimates

Percent of Estimated Cl Load

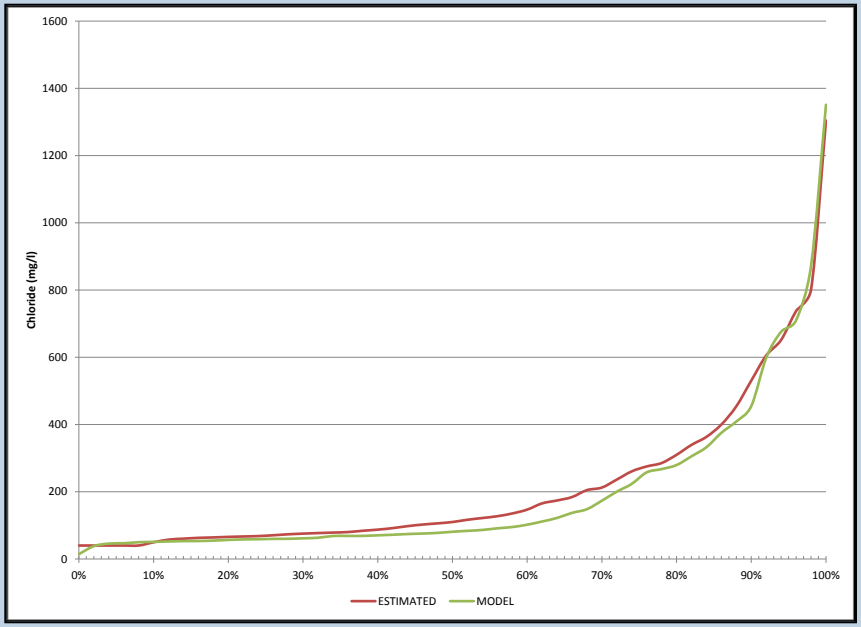
Watershed	Percent Load
Ranger Road	107 %
Long Branch	109 %
Braddock Road	96 %

Calibrated to Cumulative Frequency Distribution of Estimated Chloride Concentrations

Upper Accotink

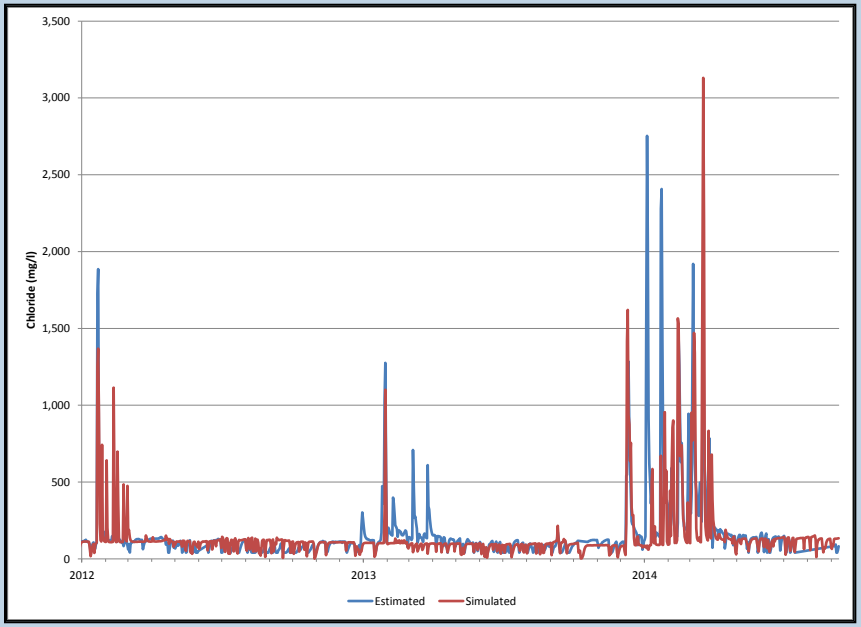


Long Branch

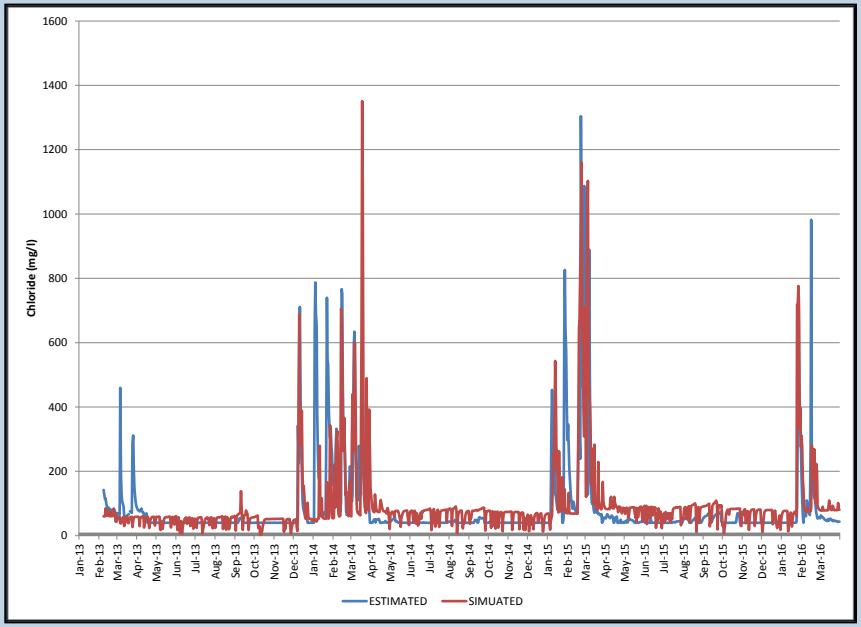


Time Series of Estimated and Modeled Chloride Concentrations

Upper Accotink

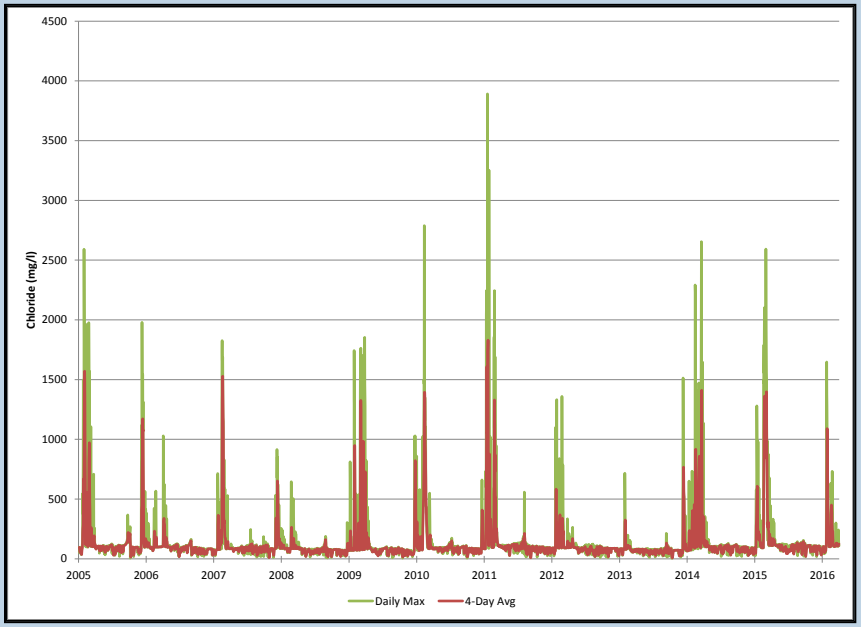


Long Branch

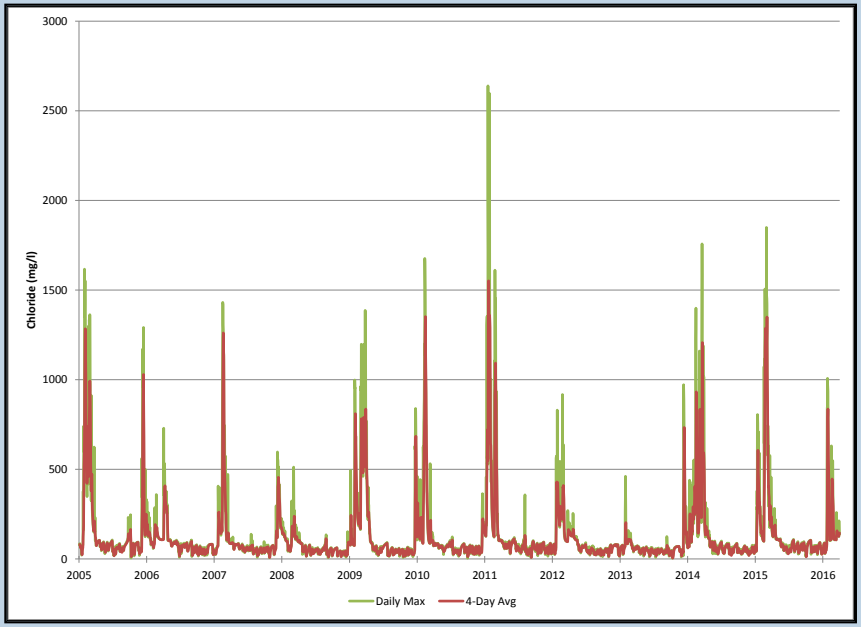


Simulated Maximum Daily and Four-Day Average Chloride Concentrations

Upper Accotink



Lower Accotink



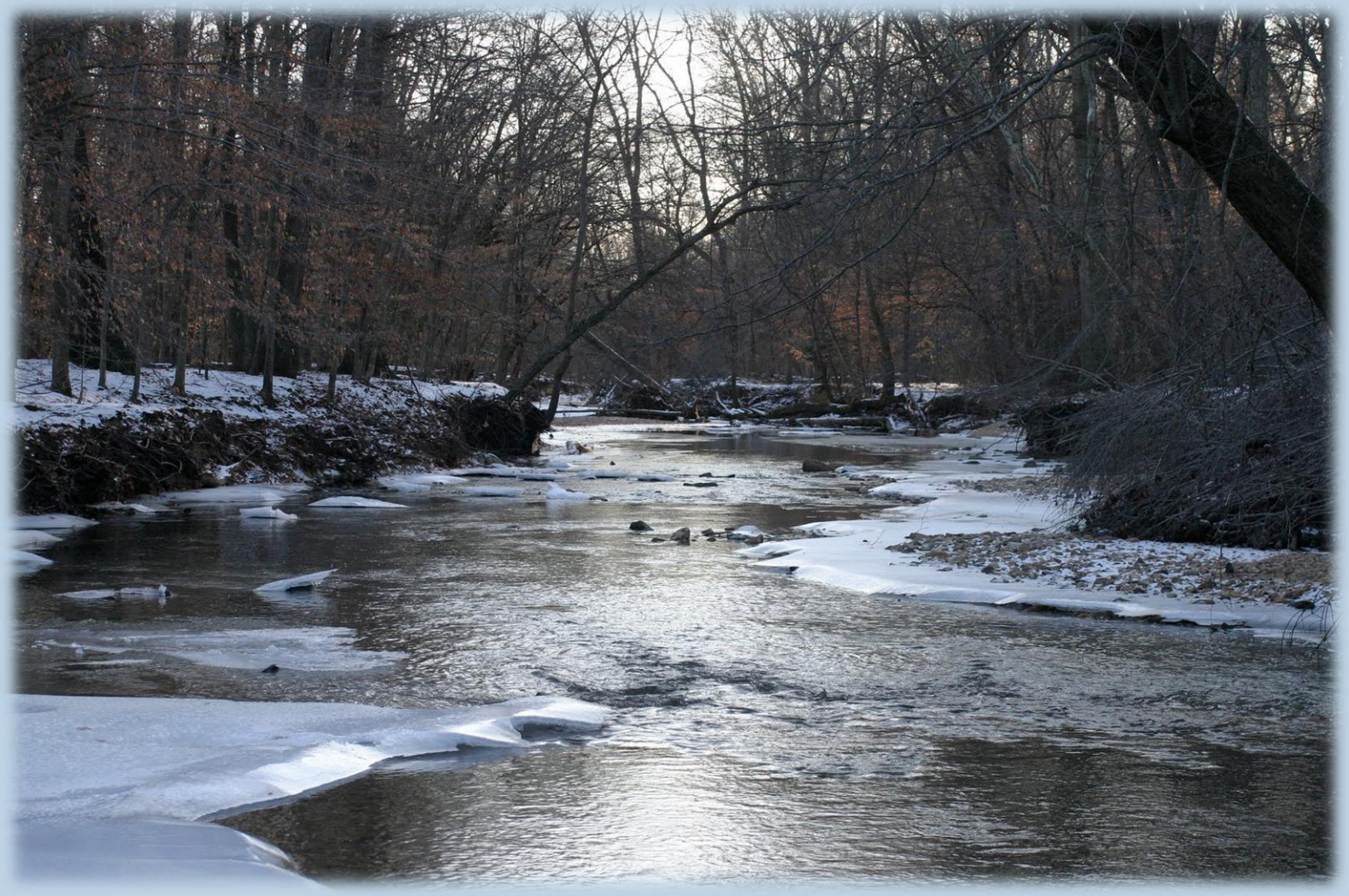
Long Branch simulation results not shown.

Estimated Required Reductions

Impairment	Model: 2006-2016	Model: 2012-2016	Estimated Chloride Concentrations[1]
Upper Accotink Creek	84%	86%	82%
Lower Accotink Creek	80%	83%	64%
Long Branch	70%	71%	72%

[1] Based on Specific Conductance and Chloride Regression Relationships.

Questions?

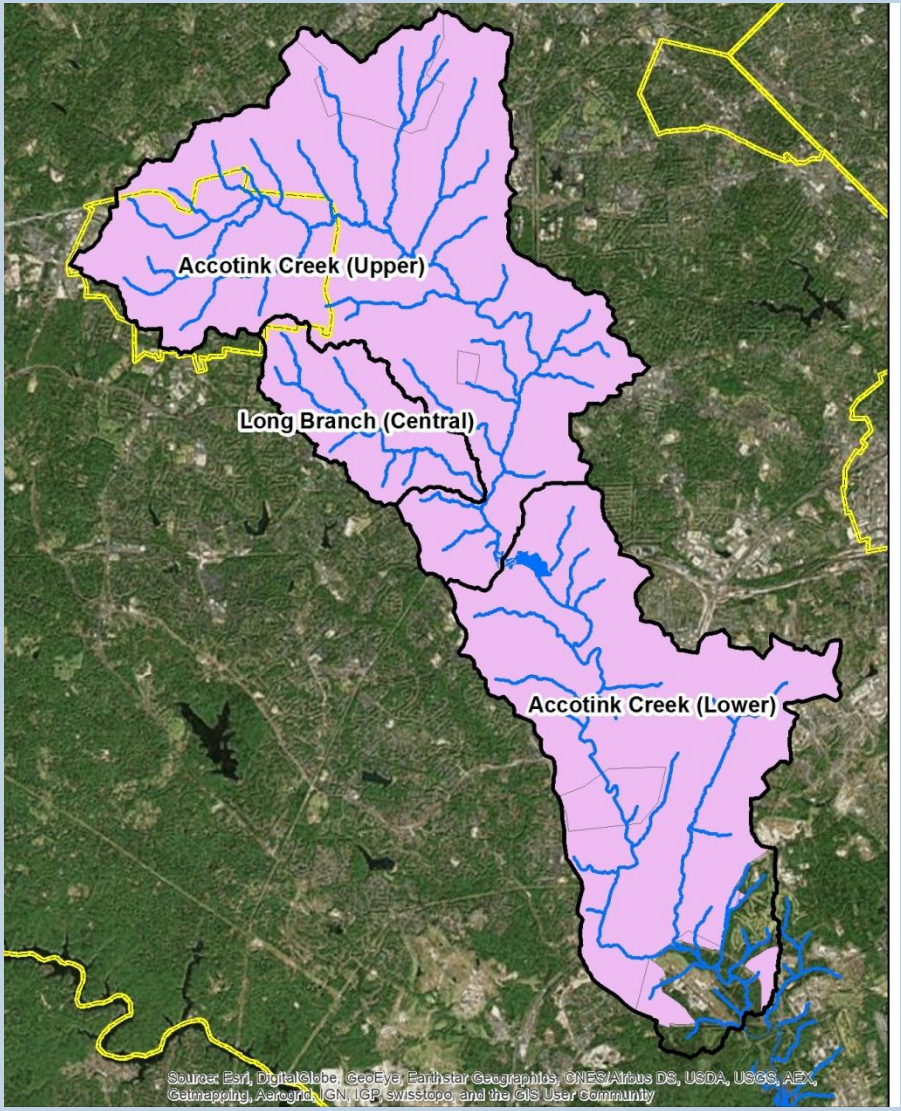


Allocations

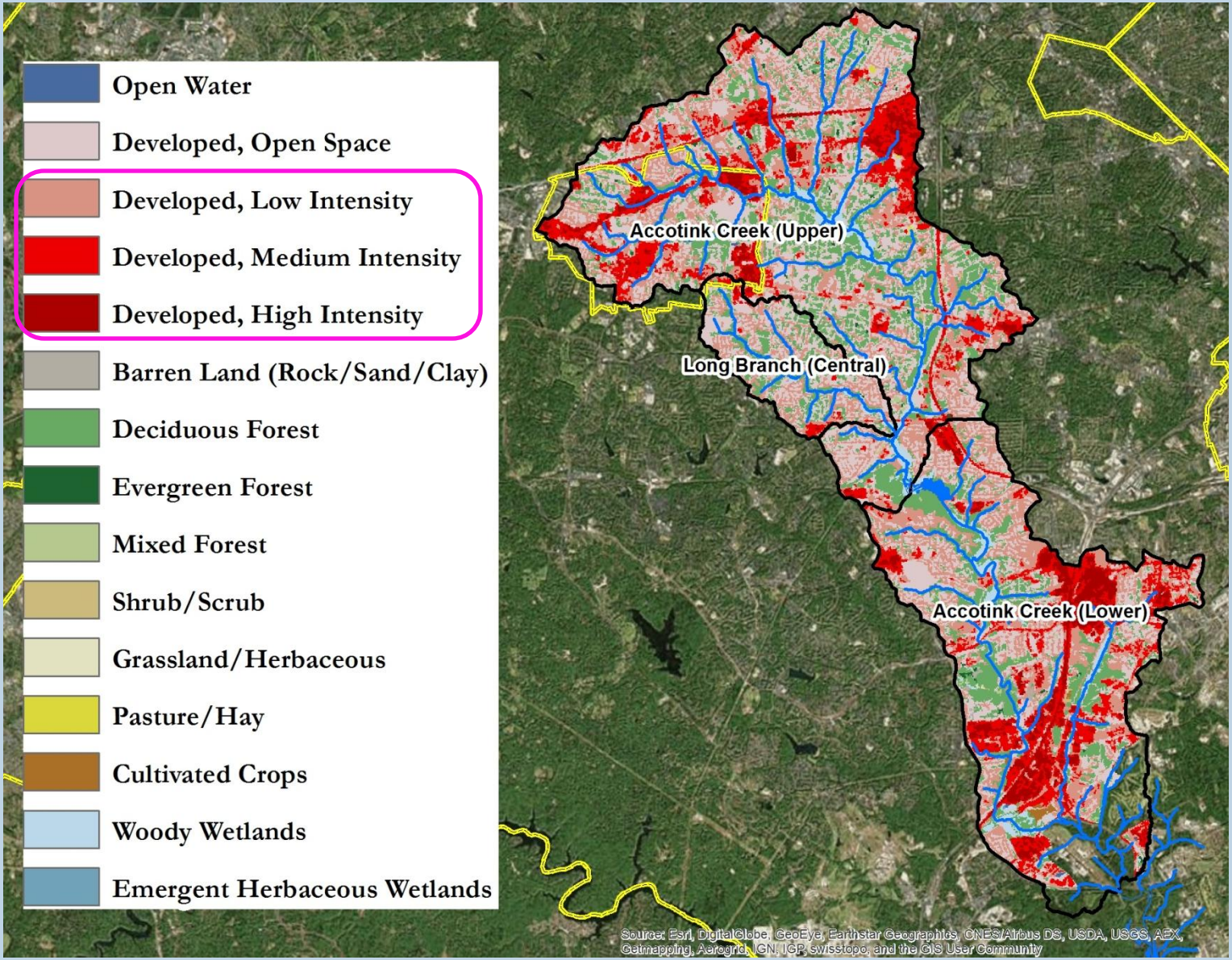
- TMDL = WLA + LA + MOS
- MOS = 10% of the TMDL
- Next step is to determine the WLA
  - Decision point – MS4 WLAs

MS4 Wasteload Allocations

- WLA ← MS4 service area within...
  - Phase I: the entire county
  - Phase II: the Census Urbanized Area
- Deriving the MS4 Wasteload Allocation, 2 options:
  - Using actual delineated service area
  - Using surrogate land uses within the Census Urbanized Area



Accotink Creek Watershed Land Uses



MS4 Wasteload Allocations

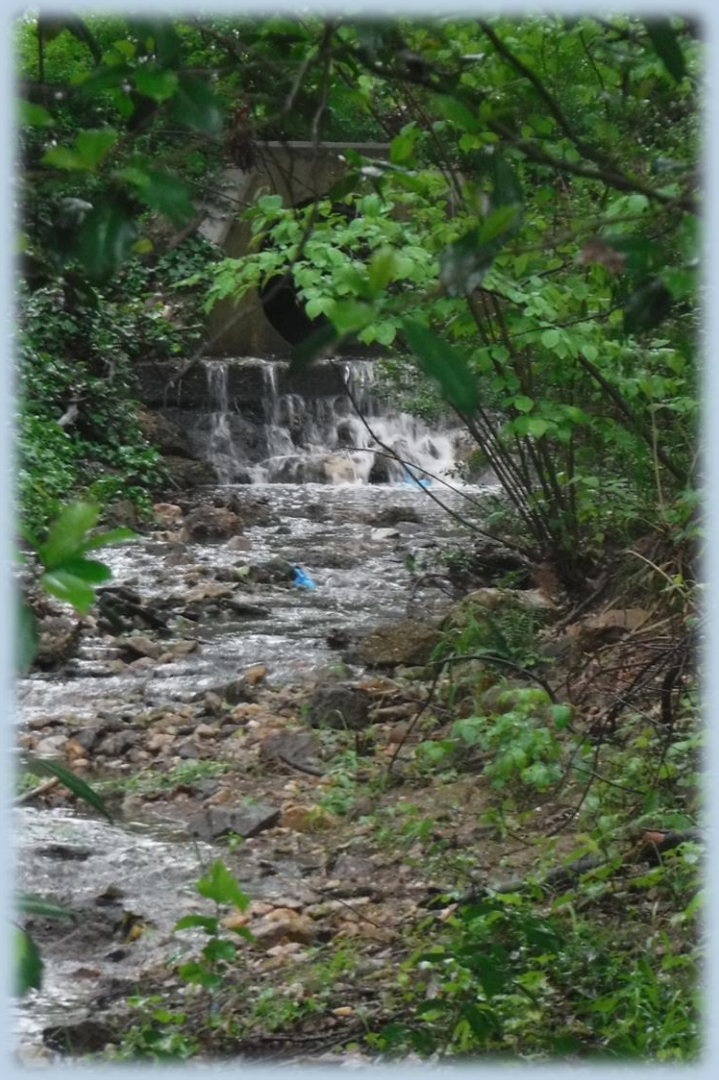
- MS4s are connected systems
- WLA aggregation – By Municipality
  - Municipalities: Fairfax County, Fairfax City, & Town of Vienna
  - Included: Municipality, VDOT, Public Schools, NVCC, Ft. Belvoir, and GMU

Example from 2008 Lower Accotink Creek Bacteria TMDL

Table 5-1: MS4 Wasteload Allocation for *E. coli*		
Permit Number	**MS4 Permit Holder**	**Wasteload Allocation (cfu/year)**
VA0088587	Fairfax County	1.73E+12
VAR040062	VDOT	
VAR040104	Fairfax County Public Schools	
VAR040095	Northern Virginia Community College	
VAR040093	Fort Belvoir	

Next Steps

- Finalize the allocations (WLA & LA)
  - MS4 dependent
- Draft the report
- Bring draft TMDL report to TAC
  - Last opportunity for advisory role
- Bring draft TMDL report to public



Revised Timeline