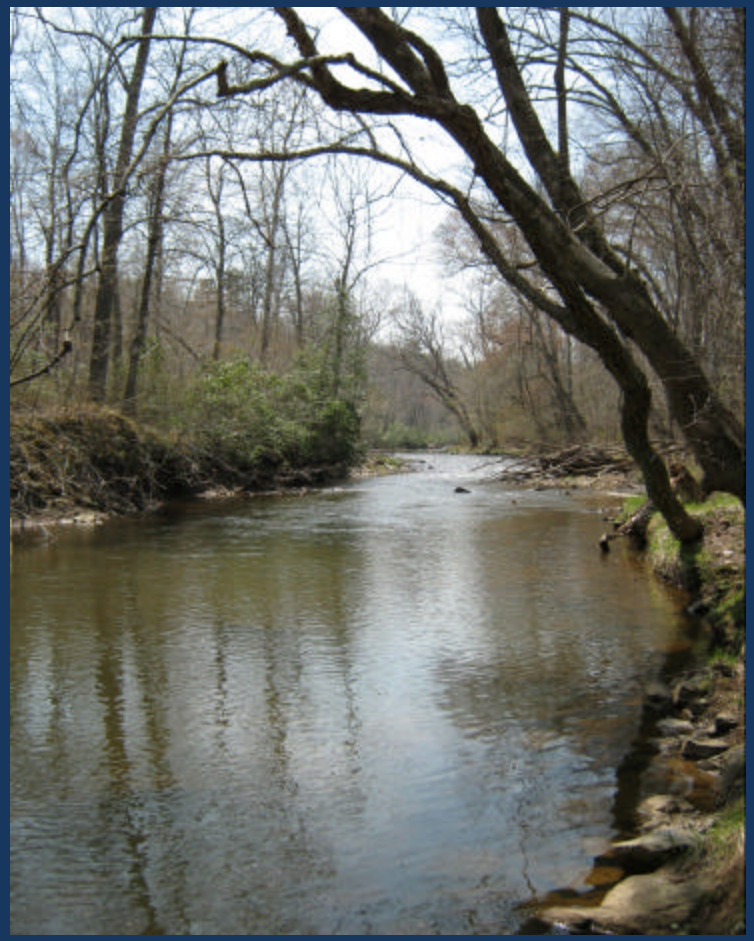
Bacteria Total Maximum Daily Load Studies for Tributaries to the Potomac River

Aquia Creek, Austin Run, Accokeek Creek, Potomac Creek, Potomac Run, and an Unnamed Tributary to the Potomac River



Public Meeting – Stafford County
April 19, 2011

Meeting Agenda

I. Introductions
II. Project Stream Information
III. Monitoring and Assessment
IV. TMDL Background Information
V. TMDL Development Methodology
VI. Next Steps
VII. Questions

Why are we here?

Portions of several tributaries to the Potomac River do not meet water quality standards.

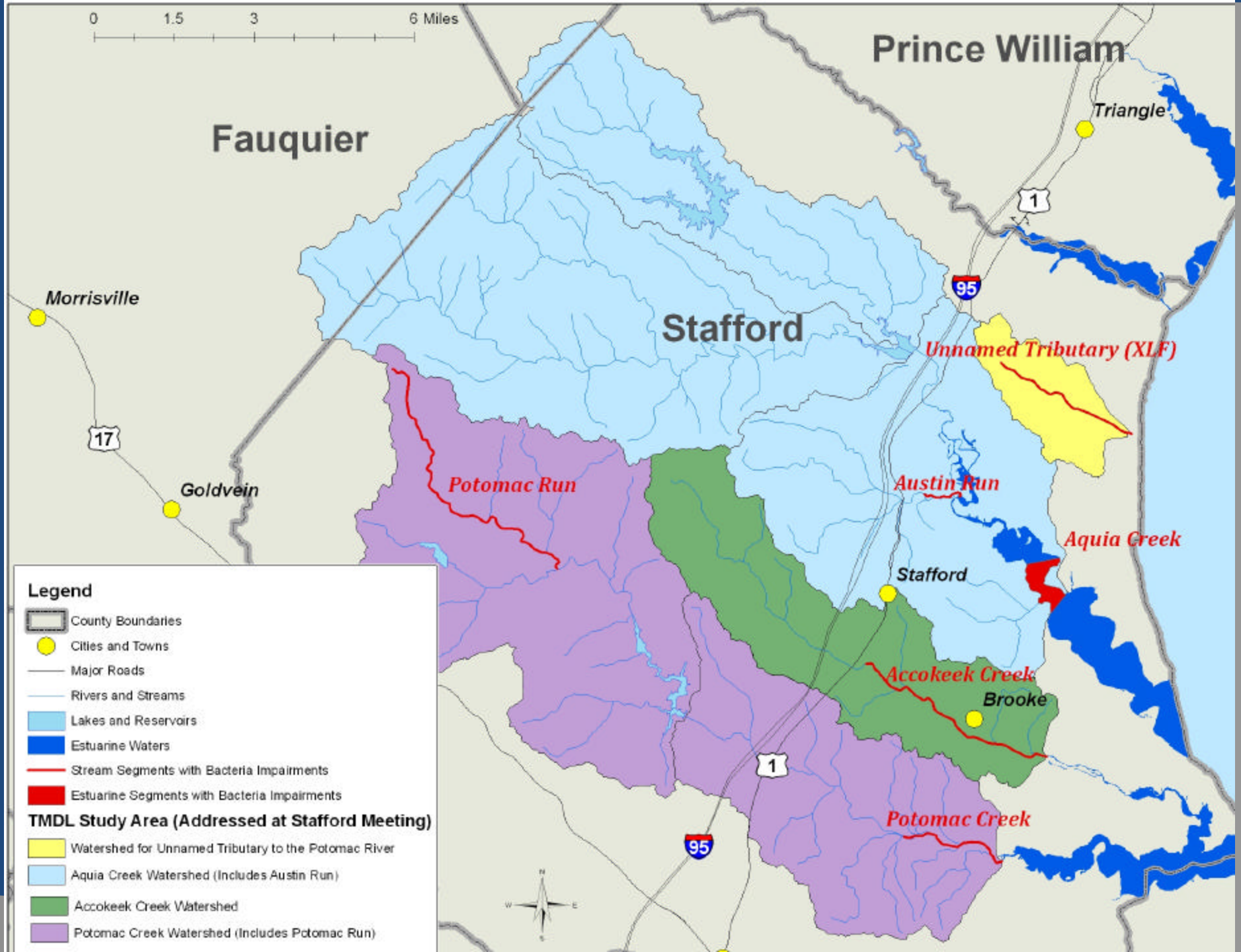
- Who is involved in this process?
- Which tributaries are included in this study?
- How do we know the standards aren't being met?
- Why aren't the standards being met?
- What is being done to correct the problem?

Who is involved in this process?

DEQ :	Lead Agency for TMDL Development
DCR :	Partners with DEQ in TMDL Development, Lead Agency for TMDL IP Development
Contractor:	Performs Modeling for TMDL Development (for this project, contractor is the Louis Berger Group).
TAC:	Representatives from state and local governments, watershed groups, planning district commission, soil and water conservation districts, etc. Provides technical input and information for TMDL development.
Citizens:	Any citizen who wishes to participate in the project; provide local knowledge and information.

Which tributaries are included?

- Sugarland Run
- Mine Run
- Pimmit Run
- Powells Creek
- Quantico Creek
- South Fork Quantico Creek
- North Branch Chopawamsic Creek
- Aquia Creek
- Austin Run
- Accokeek Creek
- Potomac Creek
- Potomac Run
- Unnamed Tributary to the Potomac River


0
1.5
3
6 Miles
Prince William
Fauquier
Stafford
Triangle
Morrisville
Goldvein
Stafford
Brooke
1
95
17
Unnamed Tributary (XLF)
Potomac Run
Austin Run
Aquia Creek
Accokeek Creek
Potomac Creek
Legend
County Boundaries
Cities and Towns
Major Roads
Rivers and Streams
Lakes and Reservoirs
Estuarine Waters
Stream Segments with Bacteria Impairments
Estuarine Segments with Bacteria Impairments
TMDL Study Area (Addressed at Stafford Meeting)
Watershed for Unnamed Tributary to the Potomac River
Aquia Creek Watershed (Includes Austin Run)
Accokeek Creek Watershed
Potomac Creek Watershed (Includes Potomac Run)

Stream Segment Information

Stafford County

Waterbody Name *Location*	**Segment Size**	**Cause**	**Upstream Limit**	**Downstream Limit**	**DEQ Monitoring Station(s)** *Station Location*	**Year First Listed as Impaired**	**2010 Exceedance Rate**
Unnamed Tributary to the Potomac River *Stafford County*	2.9 miles	*E. coli*	Headwaters of the unnamed tributary	Confluence with the Potomac River	**1aXLF000.13** *Route 633 Bridge Crossing*	2010	2 of 11 samples (18.2%)
Aquia Creek *Fauquier County* *Stafford County*	0.3638 mi^2	Enterococcus	Rivermile 4.28	Rivermile 3.28	**1aAUA003.71** *Railroad Bridge Crossing*	2008	5 of 38 samples (13.2%)
Austin Run *Fauquier County* *Stafford County*	0.79 miles	Fecal Coliform	Confluence with an unnamed tributary (streamcode XGQ)	Confluence with Aquia Creek	**1aAUS000.49** *End of Aquia Drive*	2004	3 of 8 samples (37.5%)
Accokeek Creek *Stafford County*	4.21 miles	*E. coli*	Confluence with an unnamed tributary	End of the free-flowing waters	**1aACC006.13** *Route 608 Bridge Crossing*	2006**	4 of 23 samples (17.4%)
Potomac Creek *Stafford County*	2.18 miles	*E. coli*	Railroad crossing at the west end of swamp, upstream from Route 608	Downstream until the east end of swamp	**1aPOM006.72** Route 608 Bridge Crossing	2006*	4 of 13 samples (30.8%)
Potomac Run *Stafford County*	6.13 miles	*E. coli*	Headwaters of Potomac Run	Confluence with Long Branch	**1aPOR000.40** (Route 648 Bridge Crossing)	2006	10 of 13 samples (76.9%)

* *Aquia Creek and Potomac Creek were originally listed with fecal coliform bacteria impairments in 2004. 2006 was the first assessment cycle where both streams were listed as impaired for E. coli.*

** *Accokeek Creek was originally listed with a fecal coliform bacteria impairment in 2002. 2006 was the first assessment cycle where Accokeek Creek was listed as impaired for E. coli.*

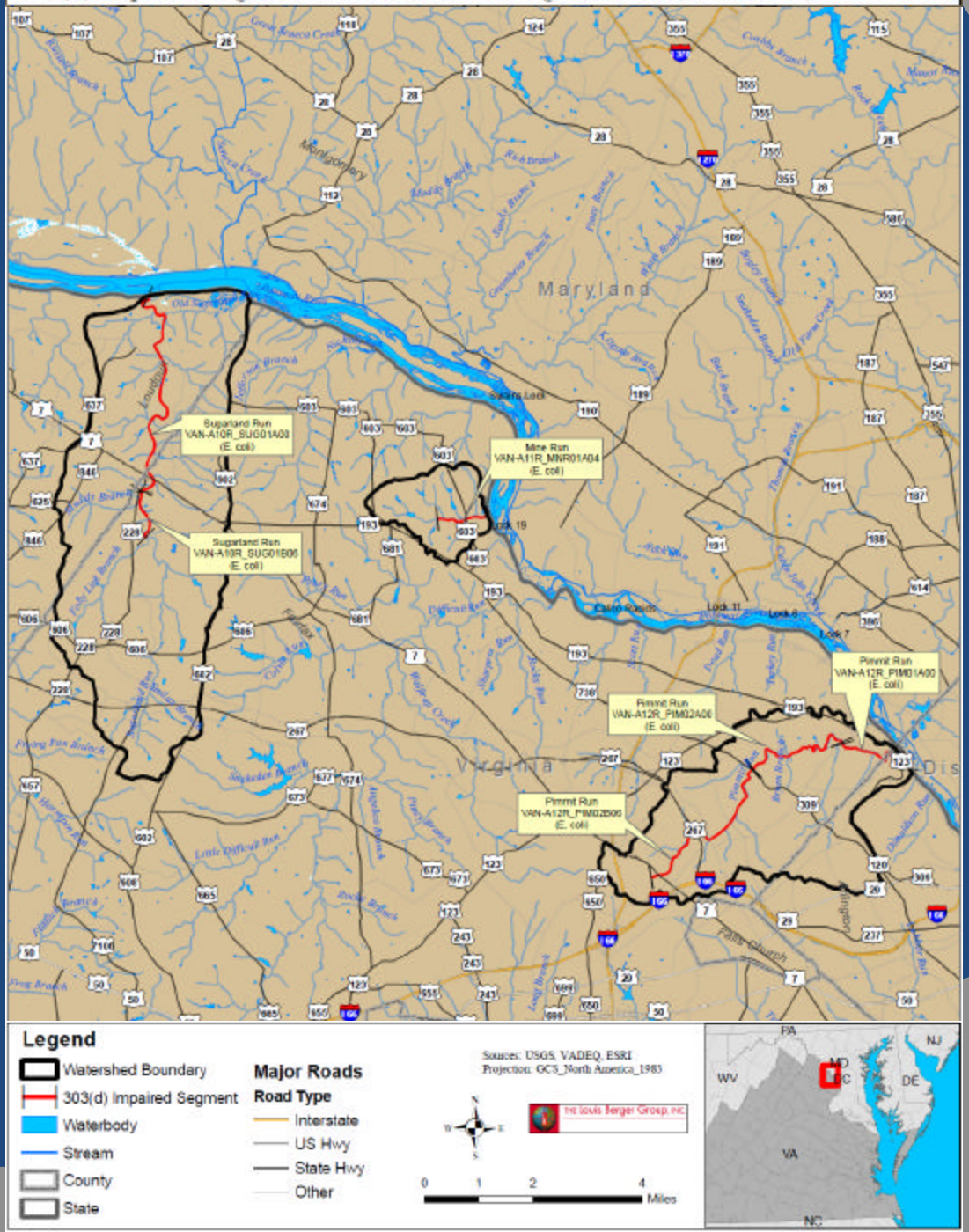
303(d) Impaired Segment Watersheds: Powells Creek, Quantico Creek, South Fork Quantico Creek, Little Creek, Chopawamsic Creek, North Branch Chopawamsic Creek, Aquia Creek, Austin Run, Accokeek Creek, Potomac Creek, Potomac Run, Unnamed Tributary to Potomac River

Stream Segment Information

Prince William County

Waterbody Name *Location*	**Segment Size**	**Cause**	**Upstream Limit**	**Downstream Limit**	**DEQ Monitoring Station(s)** *Station Location*	**Year First Listed as Impaired**	**2010 Exceedance Rate**
Powells Creek *Prince William County*	4.62 miles	*E. coli*	0.2 rivermiles below Lake Montclair	End of the free-flowing waters	**1aPOW006.11** *Northgate Drive Bridge Crossing*	2006	2 of 13 samples (15.4%)
Quantico Creek *Prince William County Town of Dumfries*	1.45 miles	*E. coli*	Confluence with South Fork Quantico Creek	Start of the tidal waters of Quantico Bay.	**1aQUA004.46** *Route 1 Bridge Crossing*	2006	7 of 27 samples (25.9%)
South Fork Quantico Creek *Prince William County Town of Dumfries*	4.63 miles	*E. coli*	Headwaters of the South Fork Quantico Creek	Start of the impounded waters	**USGS Station 01658500**	2004	7 of 47 samples (14.9%)
North Branch Chopawamsic Creek *Stafford County Prince William County*	6.9 miles	*E. coli*	Headwaters of North Branch Chopawamsic Creek	Confluence with Middle Branch	**USGS Station 01659000**	2004	2 of 17 samples (11.7%)

303 (d) Impaired Segment Watershed Areas: Sugarland Run, Mine Run, Pimmit Run



Stream Segment Information

Fairfax County

Waterbody Name *Location*	**Segment Size**	**Cause**	**Upstream Limit**	**Downstream Limit**	**DEQ Monitoring Station(s)** *Station Location*	**Year First Listed as Impaired**	**2010 Exceedance Rate**
Sugarland Run *Fairfax County Loudoun County Town of Herndon*	0.95 miles	*E. coli*	Confluence with Folly Lick Branch	Boundary of the PWS designation area, at rivermile 4.82	**1aSUG004.42** *Route 7 Bridge Crossing*	2006	5 of 28 samples (17.9%)
	4.77 miles	*E. coli*	Boundary of the PWS designation area, at rivermile 4.82	Confluence with the Potomac River	**1aSUG004.42** *Route 7 Bridge Crossing*	2002	5 of 28 samples (17.9%)
Mine Run *Fairfax County*	0.93 miles	*E. coli*	Confluence with an unnamed tributary to Mine Run	Confluence with the Potomac River	**1aMNR000.72** Route 603 Bridge Crossing	2006	3 of 12 samples (25.0%)
Pimmit Run *Arlington County Fairfax County*	1.62 miles	*E. coli*	Confluence with Little Pimmit Run	Confluence with the Potomac River	**1aPIM000.15** *Route 120 (Glebe Road) Bridge Crossing*	2010*	3 of 11 samples (27.3%)
	2.46 miles	*E. coli*	Route 309 bridge crossing	Confluence with Little Pimmit Run	**1aPIM001.89** *Ranleigh Road Bridge Crossing*	2010*	3 of 14 samples (21.4%)
	3.29 miles	*E. coli*	Headwaters of Pimmit Run	Route 309 bridge crossing	**1aPIM004.16** *Route 309 Bridge Crossing*	2010*	4 of 10 samples (40.0%)

** Pimmit Run was originally listed with a fecal coliform bacteria impairment from 2002 to 2008. 2010 was the first assessment cycle where Pimmit Run was listed as impaired for E. coli.*

How do we know if water bodies in Virginia are healthy?

- Perform physical and chemical monitoring on water bodies throughout the state.
- Monitor parameters such as:
  - pH
  - Temperature
  - Dissolved Oxygen
  - Biological Community
  - Bacteria
  - Nutrients
  - Fish Tissues
  - Metals/Toxic Pollutants

What does DEQ do with the monitoring data that is collected?

Compare the data collected to the water quality standards.

Water Quality Standards:

- Regulations based on federal and state law.
- Set numeric and narrative limits on pollutants.
- Consist of designated use(s) and water quality criteria to protect the designated uses.

Designated Uses

- Recreational
- Public Water Supply
- Wildlife
- Fish Consumption
- Shellfish
- Aquatic Life

The attainment of the recreational use is evaluated by testing for the presence of *E. coli* bacteria in freshwater systems and enterococci bacteria in transitional and salt waters.

Recreational Use Impairment:
Fecal Coliform, *E. coli* and Enterococci Bacteria

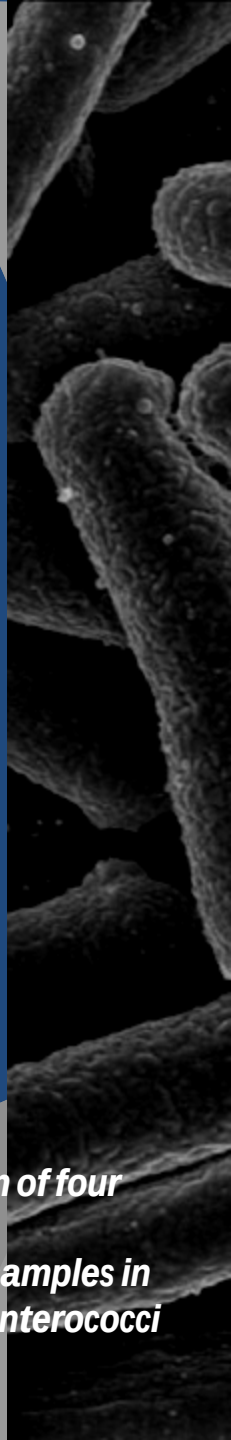
Fecal Coliform:
- Found in the digestive tract of humans and warm blooded animals
- Indicator of the potential presence of pathogens in water bodies

Escherichia coli:
- Subset of fecal coliform bacteria
- Correlate better with swimming associated illness in freshwater

Enterococci:
- Subset of fecal streptococcus bacteria
- Indicator used for determining recreational risks in salt or transitional waters

Indicator	Geometric Mean (CFU/100 ml)
E. Coli (Freshwater)	126
Enterococci (Transitional and Saltwater)	35

- *Geometric Means are calculated using all data collected during any calendar month with a minimum of four weekly samples.*
- *If there are insufficient data to calculate a monthly geometric mean, no more than 10% of the total samples in the assessment period should exceed 235 cfu/100 ml of E. coli in freshwater, and 104 cfu/100 ml of enterococci in transitional and saltwater.*



Potential Sources of Fecal Coliform, *E. coli* and Enterococci Bacteria

What happens when a water body doesn't meet water quality standards?

- Waterbody is listed as "impaired" and placed on the 303(d) list.
- Once a water body is listed as impaired, a Total Maximum Daily Load value must be developed for that impaired stream segment to address the designated use impairment.
- TMDL Studies are required by law:
  - 1972 Clean Water Act (CWA)
  - 1997 Water Quality Monitoring Information and Restoration Act (WQMIRA)

What is a TMDL ?
Total Maximum Daily Load

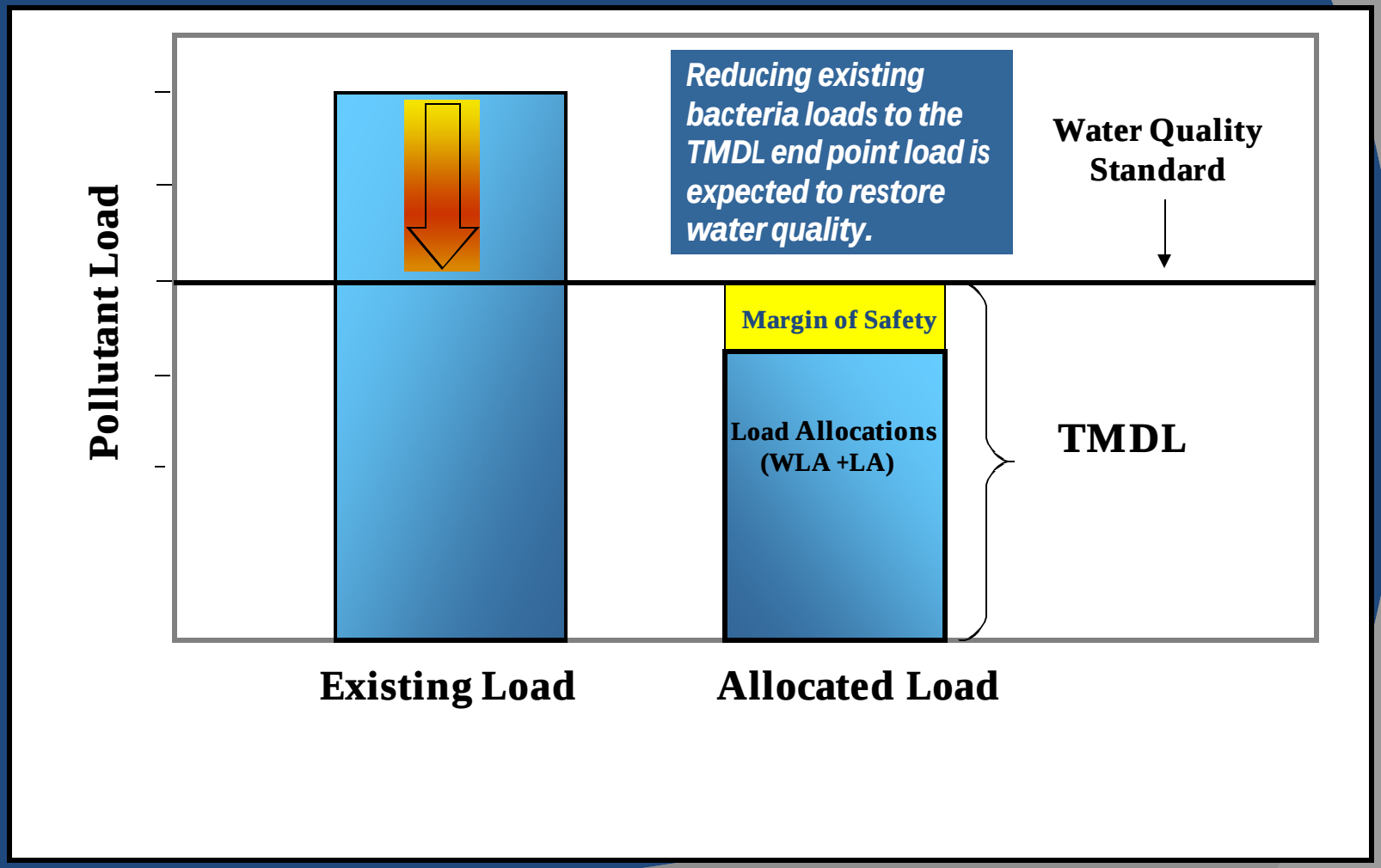
TMDL = Sum of WLA + Sum of LA + MOS

Where:

TMDL	=	Total Maximum Daily Load
WLA	=	Waste Load Allocation (point sources)
LA	=	Load Allocation (nonpoint sources)
MOS	=	Margin of Safety

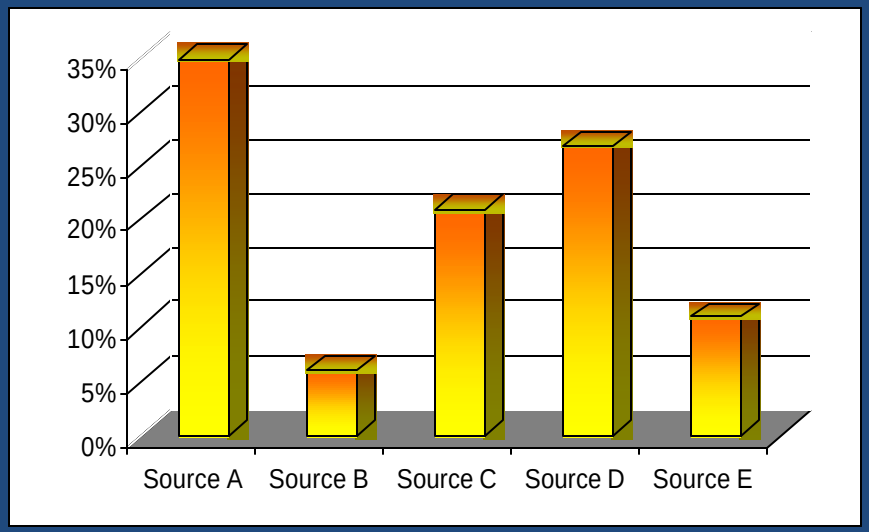
A TMDL is the maximum amount of a pollutant a water body can receive and still meet water quality standards.

An Example TMDL



TMDL Development Methodology

1. Identify all sources of a given pollutant within the watershed.

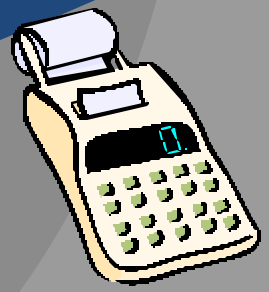


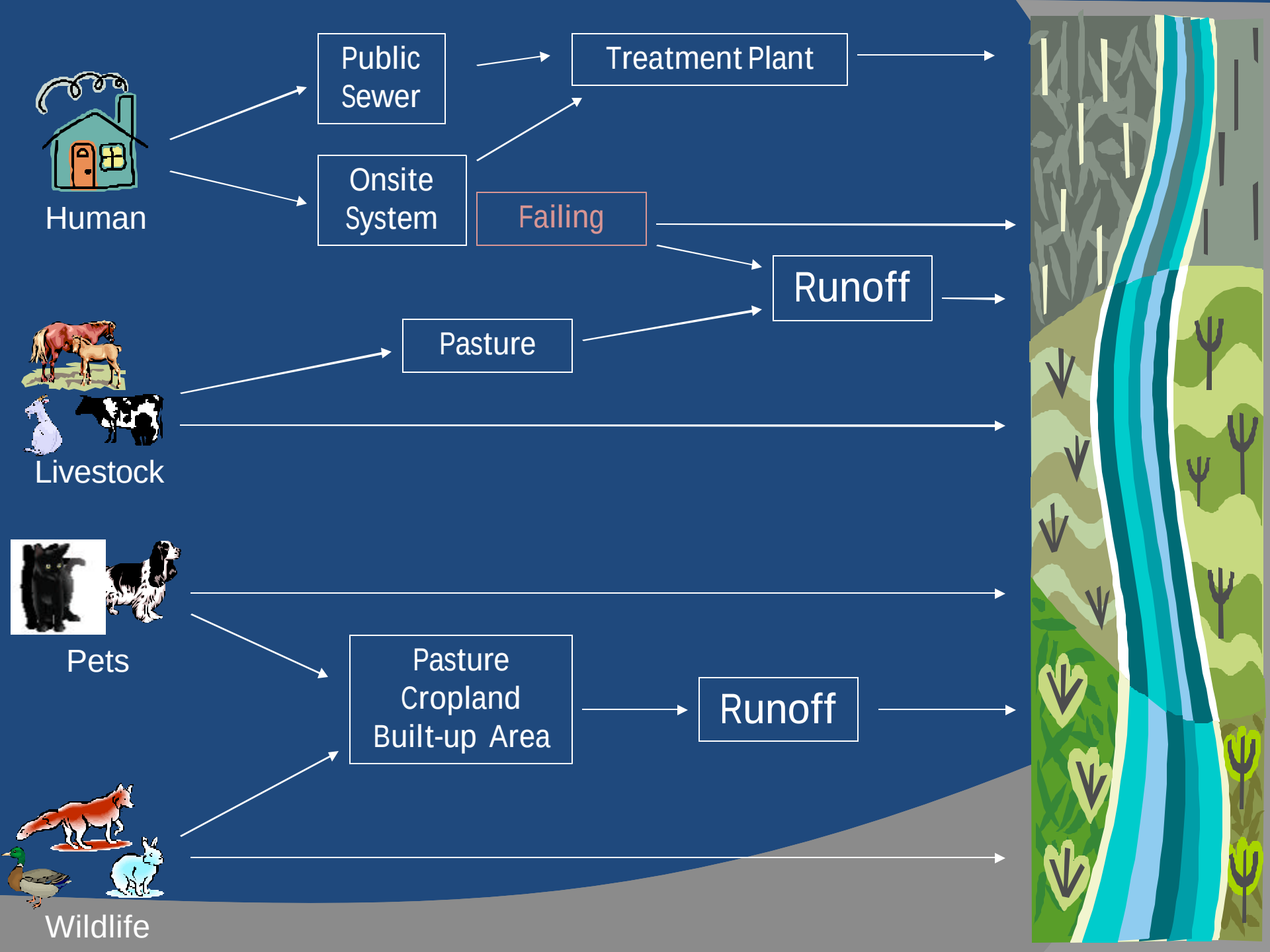
2. Calculate the amount of pollutant entering the stream from each source type.

3. Enter available data into a computer model. Model simulates pollutant loadings into the watershed.

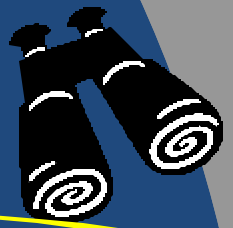
4. Use the model to calculate the pollutant reductions needed, by source, to attain Water Quality Standards.

5. Allocate the allowable loading to each source and include a margin of safety.




Human
Public Sewer
Onsite System
Treatment Plant
Failing
Runoff
Livestock
Pasture
Pets
Pasture
Cropland
Built-up Area
Runoff
Wildlife

TMDL Development Methodology



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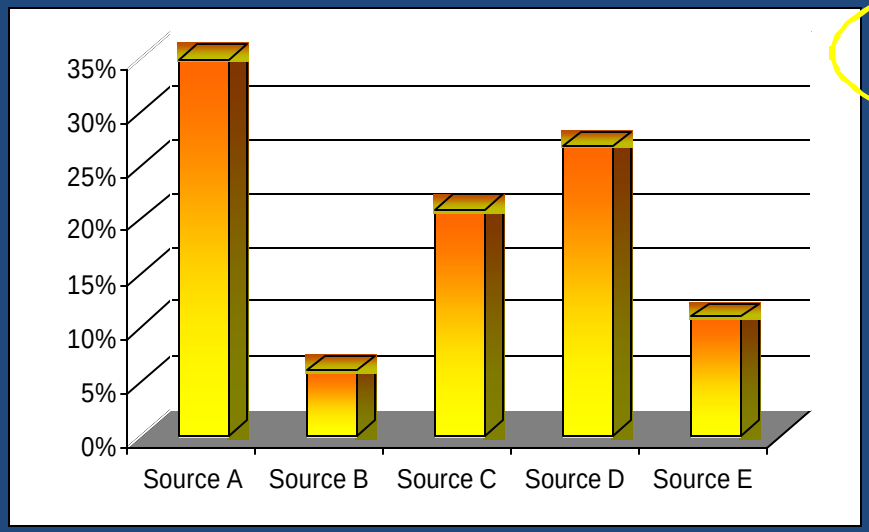

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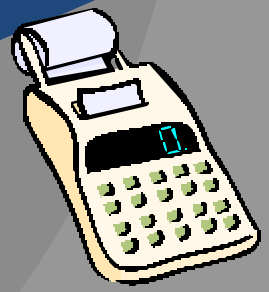

TMDL Development Methodology

Calculate the amount of pollutant entering the stream from each source type.

- Bacteria loading from <u>Human Sources</u>
  - Public Sewer and Straight pipes (1990 Census Data)
  - Septic systems (local VDH health districts)

- Bacteria loading from <u>Livestock</u>
  - Livestock inventory (2007 Agricultural Census Data, local Soil & Water Conservation Districts, Cooperative Extensions, Farm Bureau)
  - Livestock grazing and stream access
  - Confined animal facilities
  - Manure management

- Bacteria loading from <u>Wildlife</u>
  - Wildlife Inventories (VDGIF)

- Bacteria loading from <u>Pets</u>
  - Pet Inventories (Census Data 2009, American Veterinary Medical Association (AVMA))

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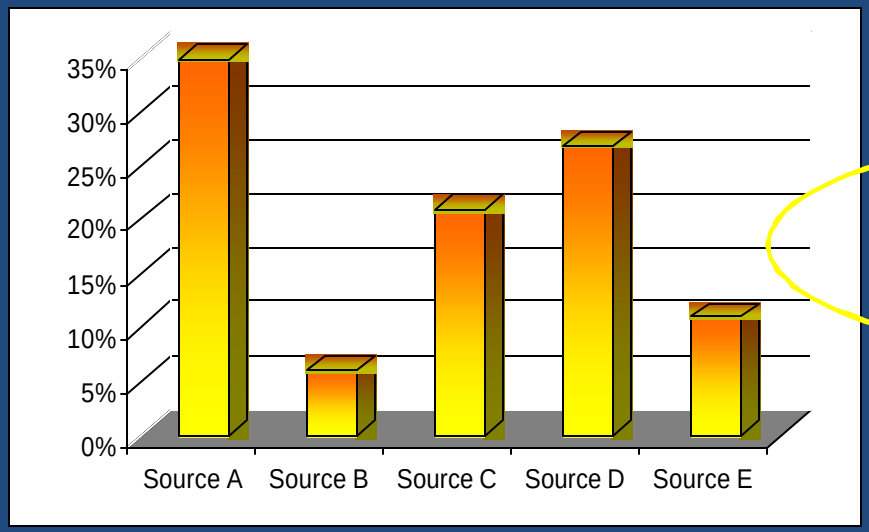

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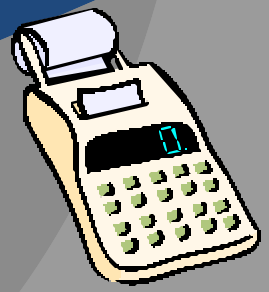

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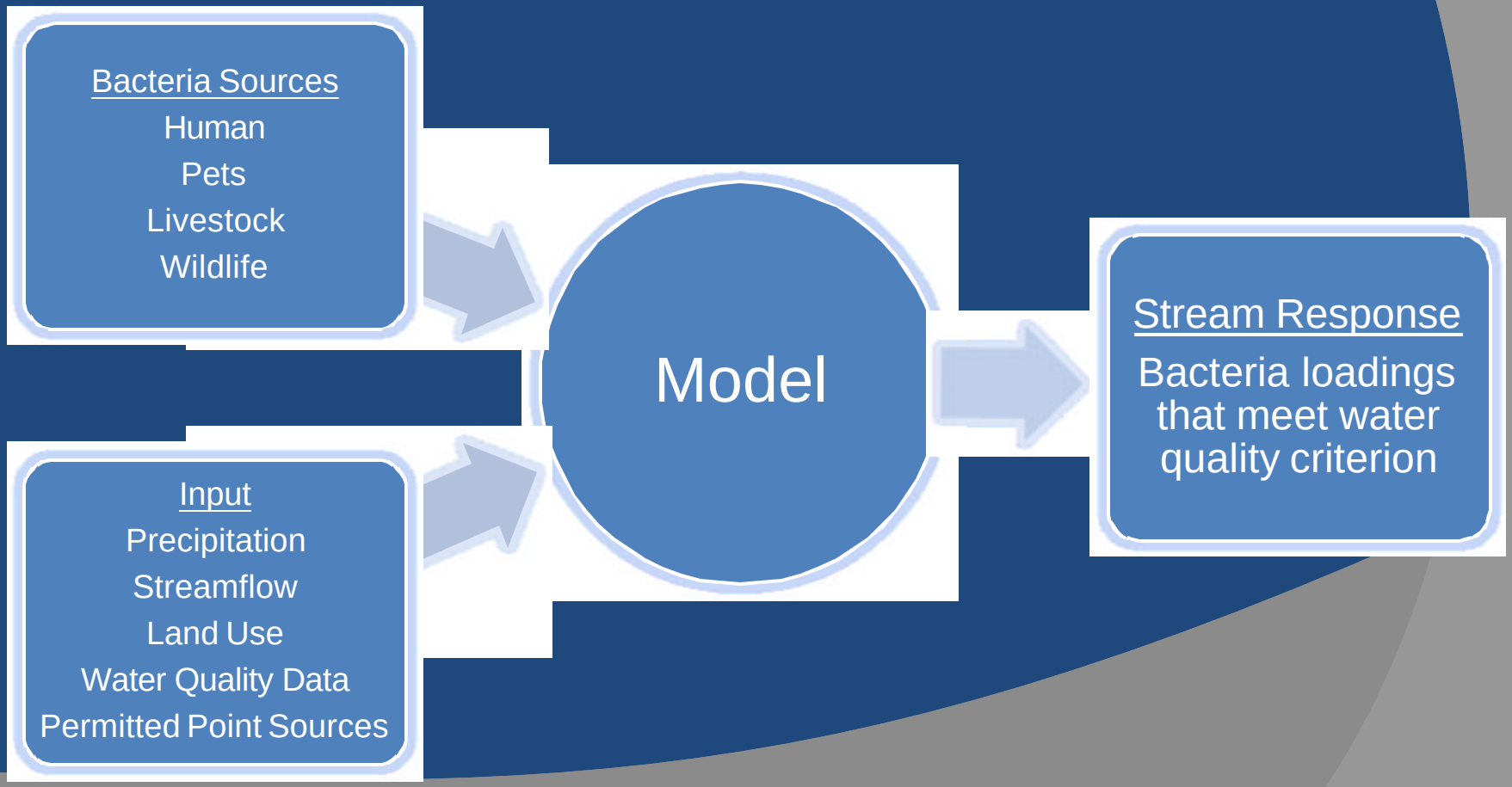

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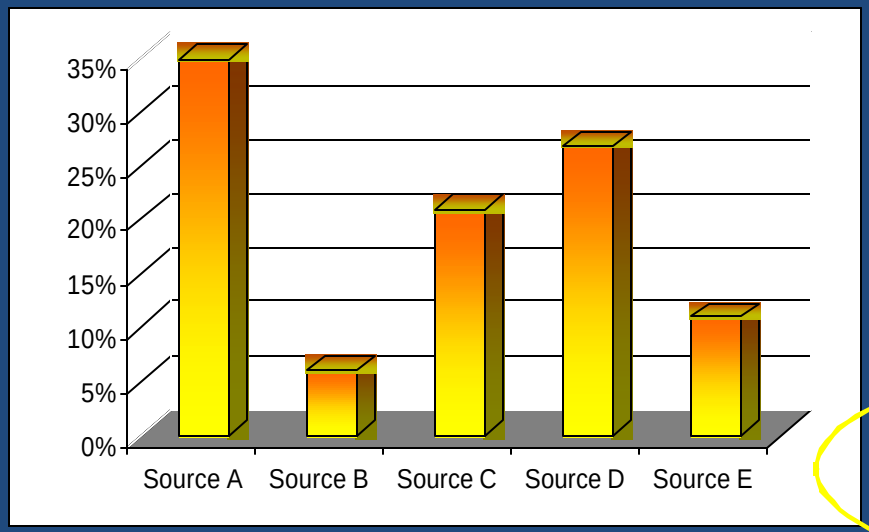

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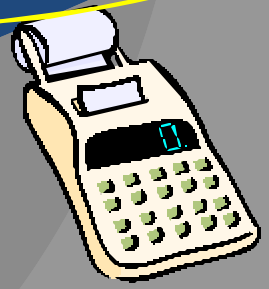

TMDL Development Methodology

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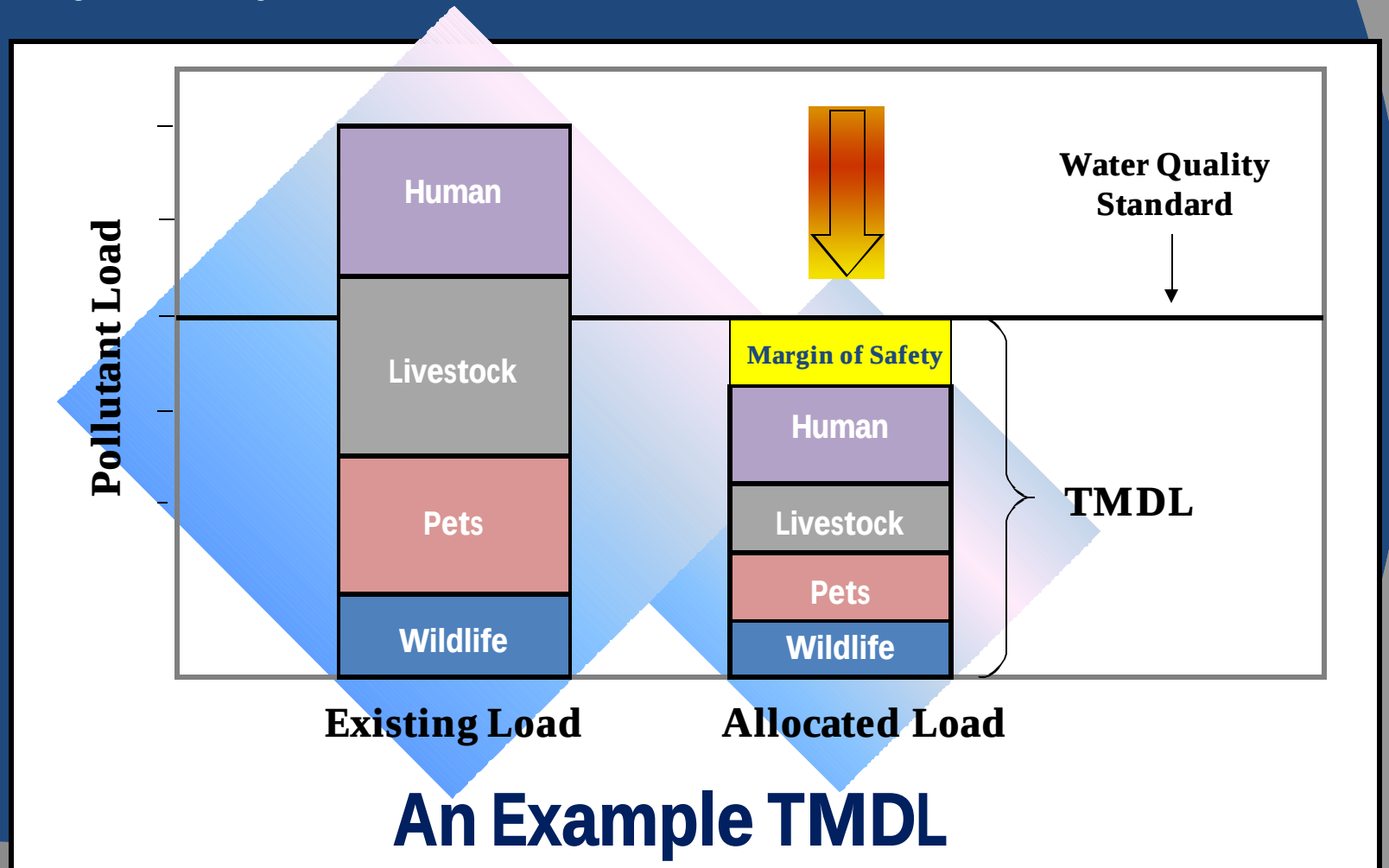
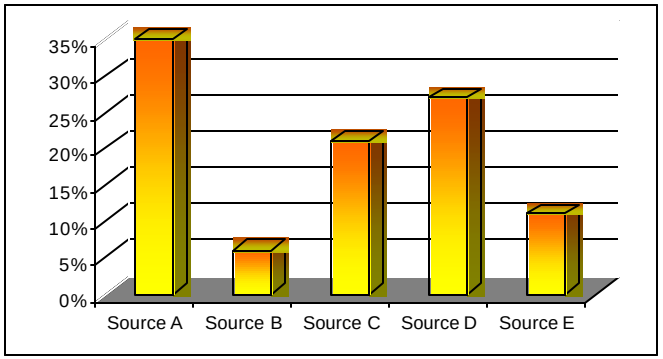


An Example TMDL

We are here

TMDL Study

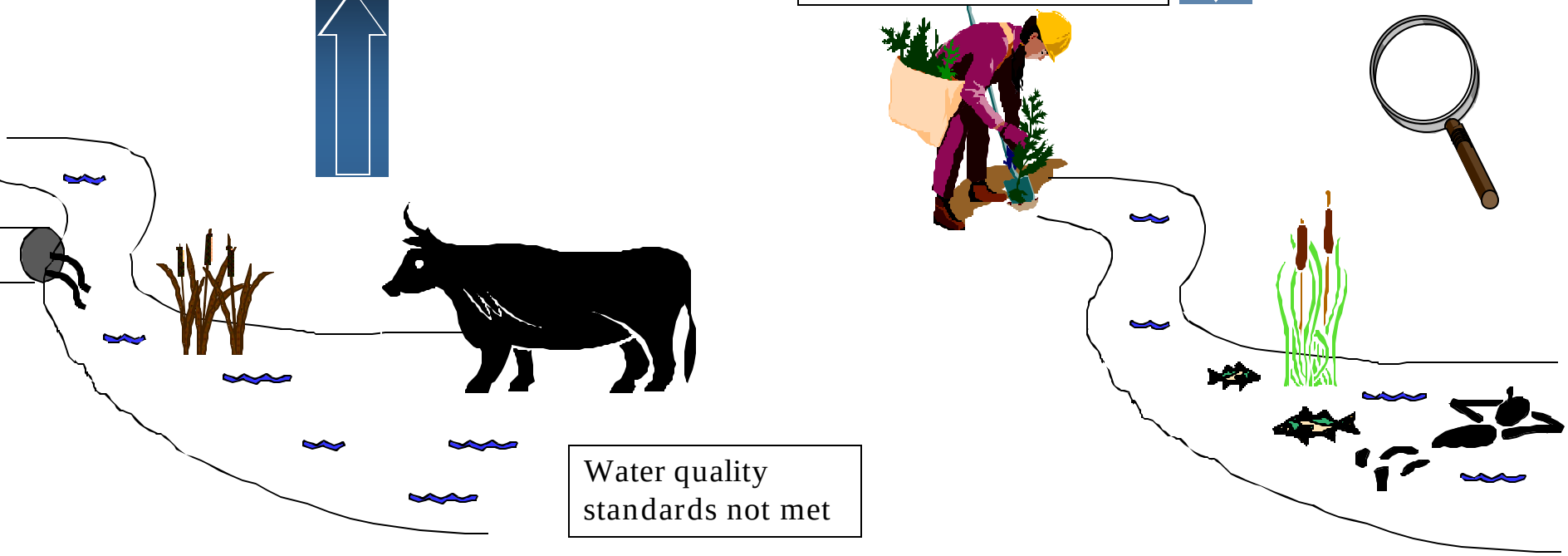


Implementation Plan

DCR

Implementation

Monitoring



Water quality standards not met

Next Steps

Planned Project Tasks and Milestones	January-11	February-11	March-11	April-11	May-11	June-11	July-11	August-11	September-11	October-11	November-11	December-11
Data Gathering	■	■	■	■								
Joint TAC Meeting			■									
First Round of Public Meetings				■								
Source Assessment				■	■	■						
Model Calibration and Validation						■	■					
Second Round of TAC Meetings							■					
Draft TMDL Allocations								■				
Third Round of TAC Meetings									■			
Draft TMDL Reports										■		
Final Round of Public Meetings										■		
Comment Period on Draft Report										■	■	
Final Report Submitted to EPA for Approval												■

What is next?

Comment Period for Materials Presented at the Public Meeting:

- **April 19, 2011 to May 19, 2011**
- **Comments should be submitted in writing to:**

Jennifer Carlson
Jennifer.Carlson@deq.virginia.gov
13901 Crown Court, Woodbridge, VA 22193

Questions?

CONTACTS

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