

# Bacteria TMDLs for Kimberling Creek, Nobusiness Creek, East Wilderness Creek, Town Creek, and Walker Creek

Final Public Meeting  
November 19, 2015



# Overview of Presentation

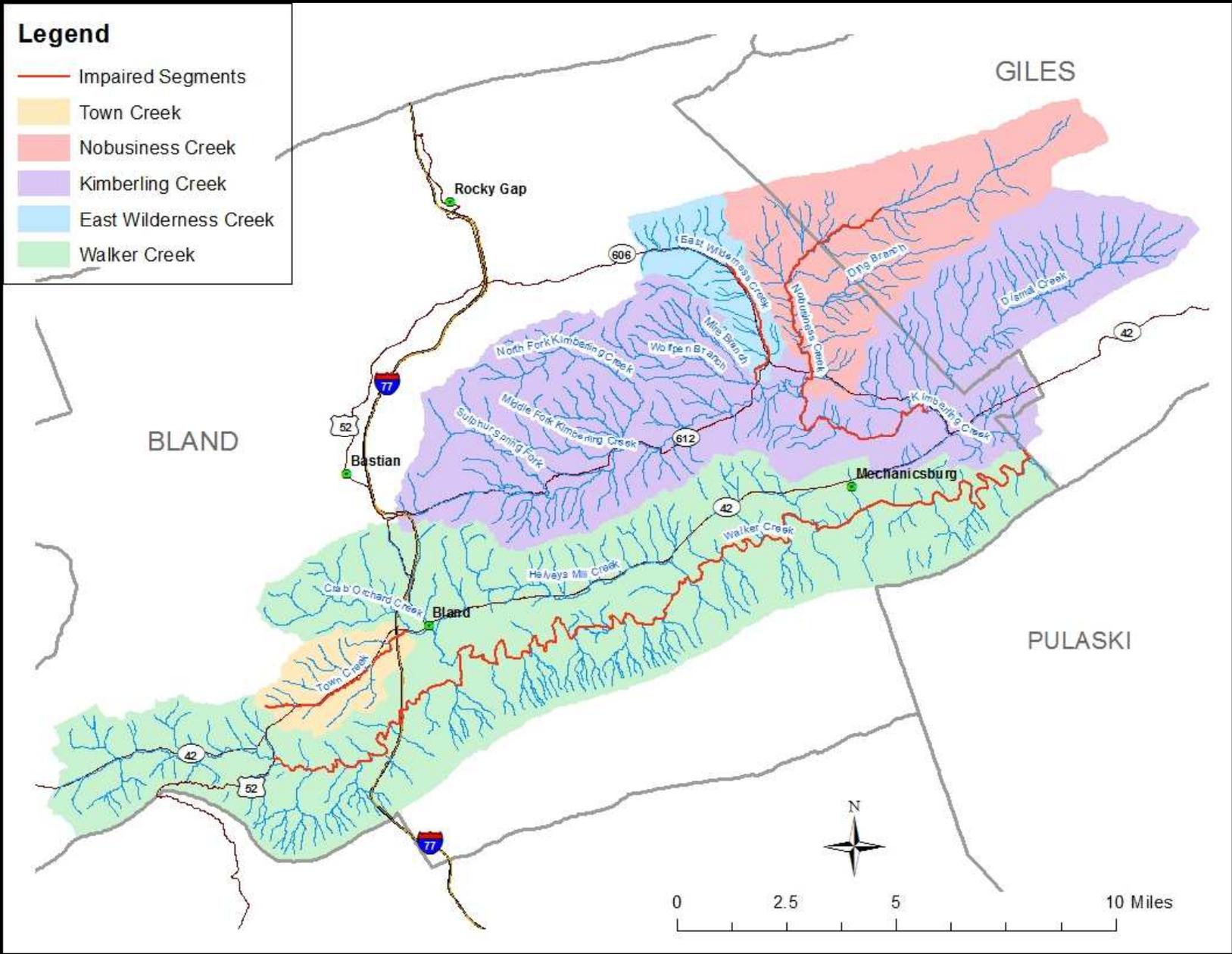
- ❖ Review of Previous Meeting
- ❖ Review of Impaired Segments
- ❖ Computer Modeling Results
- ❖ TMDL Allocations
- ❖ Next Steps

# Previous Meeting

## ❖ First Public Meeting : July 28, 2015

- Presented an overview of the TMDL Development process
  - Watershed and Source Characterization
  - Modeling
  - Allocation
- Presented watershed characterization (i.e., land use) and solicited feedback
- Presented initial estimated human, livestock, pet and wildlife populations and solicited feedback

# Location of Impaired Segments



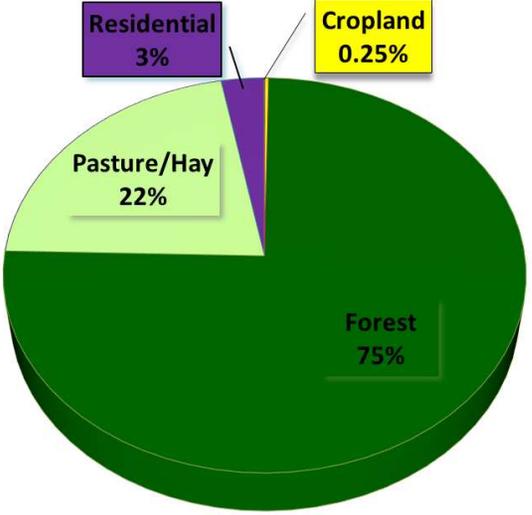
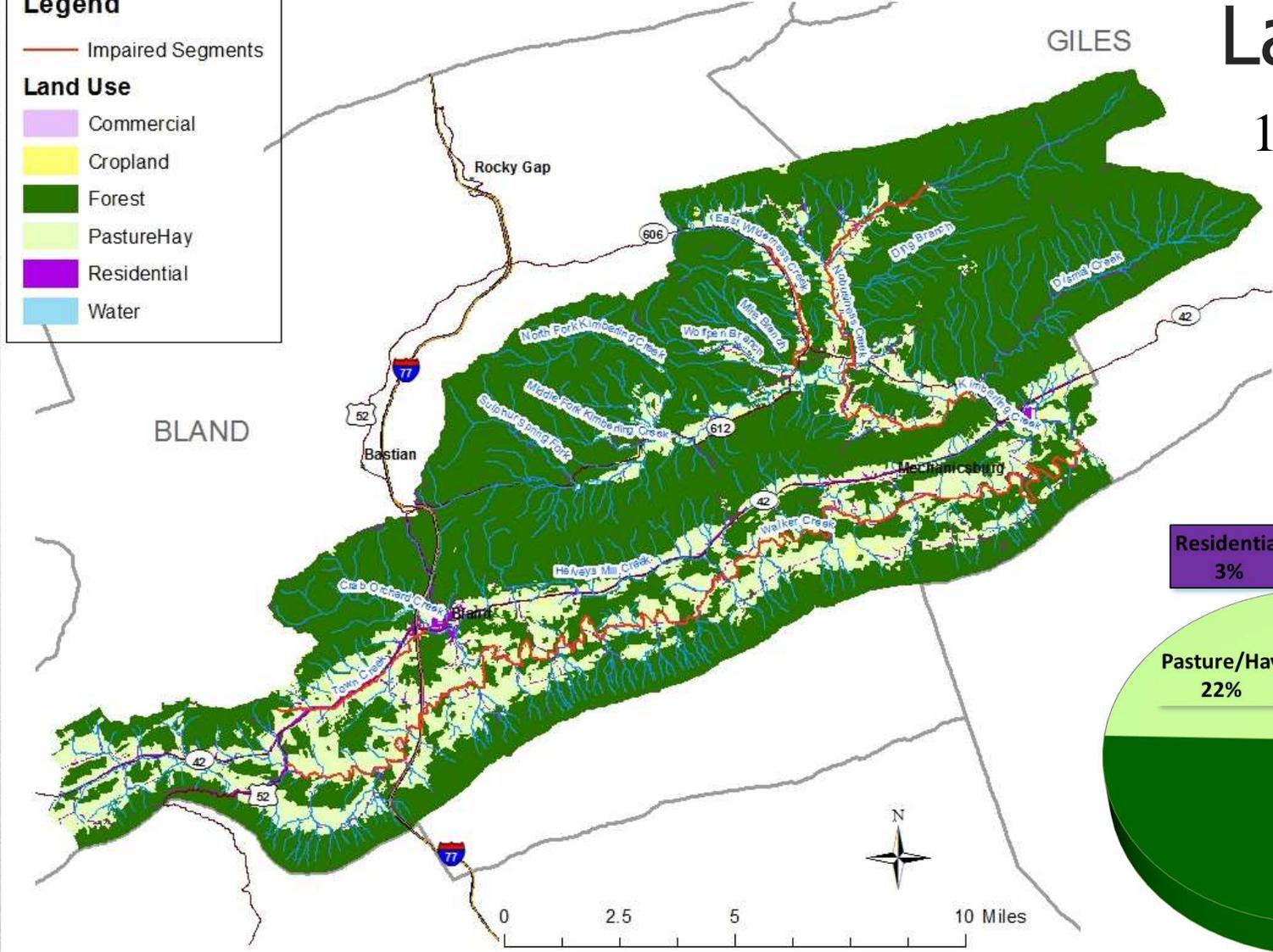


**Legend**

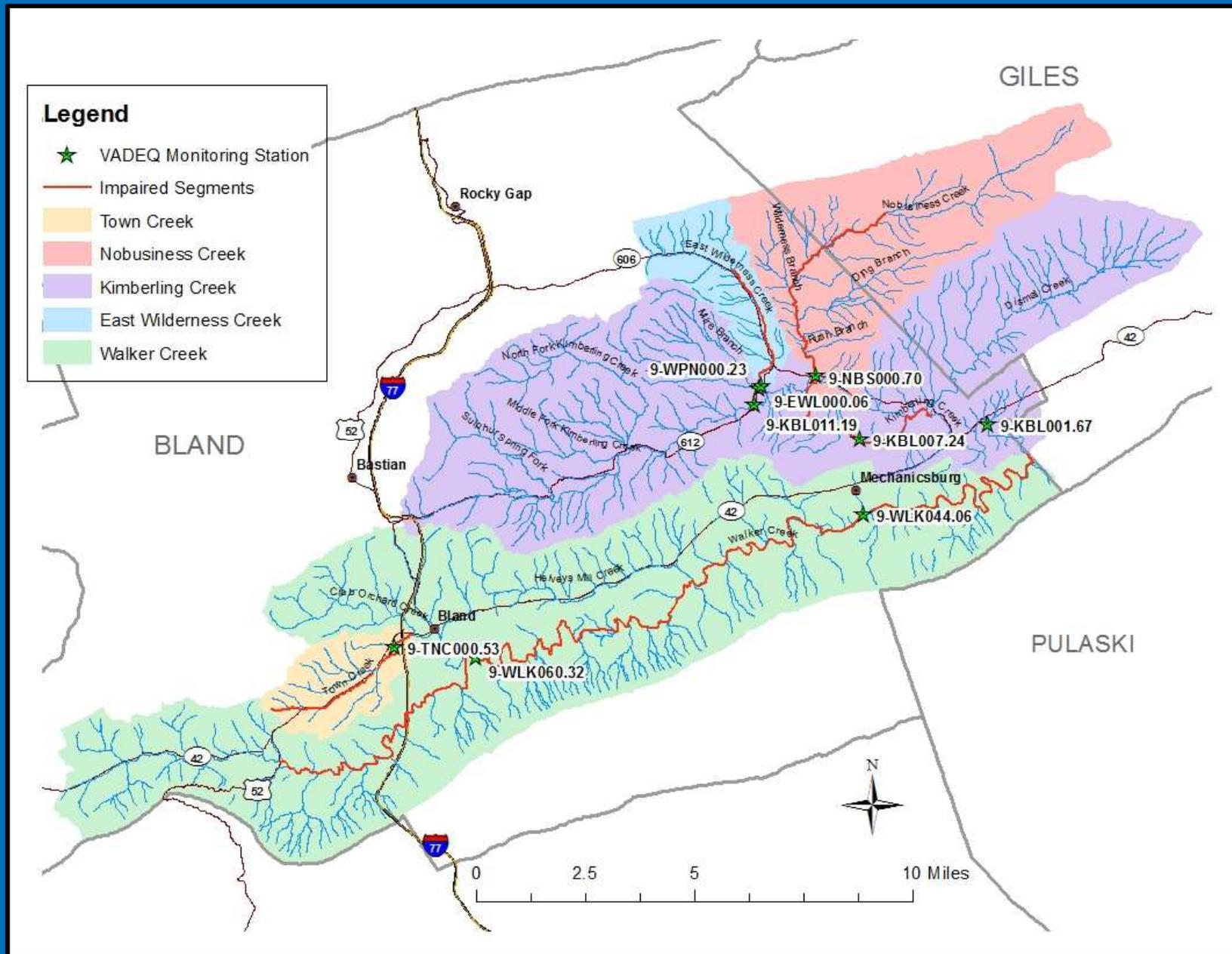
- Impaired Segments
- Land Use**
- Commercial
- Cropland
- Forest
- Pasture/Hay
- Residential
- Water

# Land Use

115,104 acres

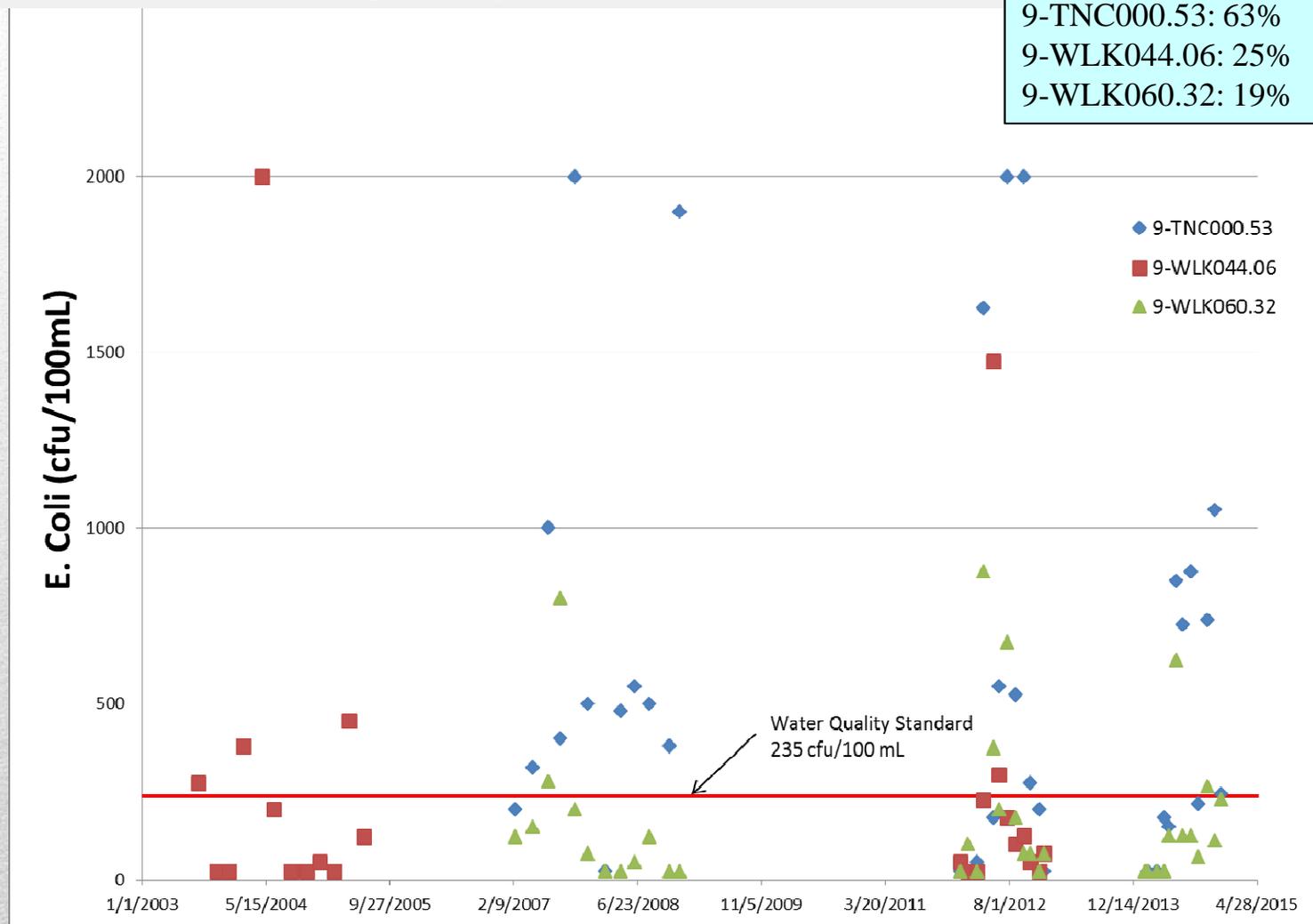


# Location of Water Quality Stations

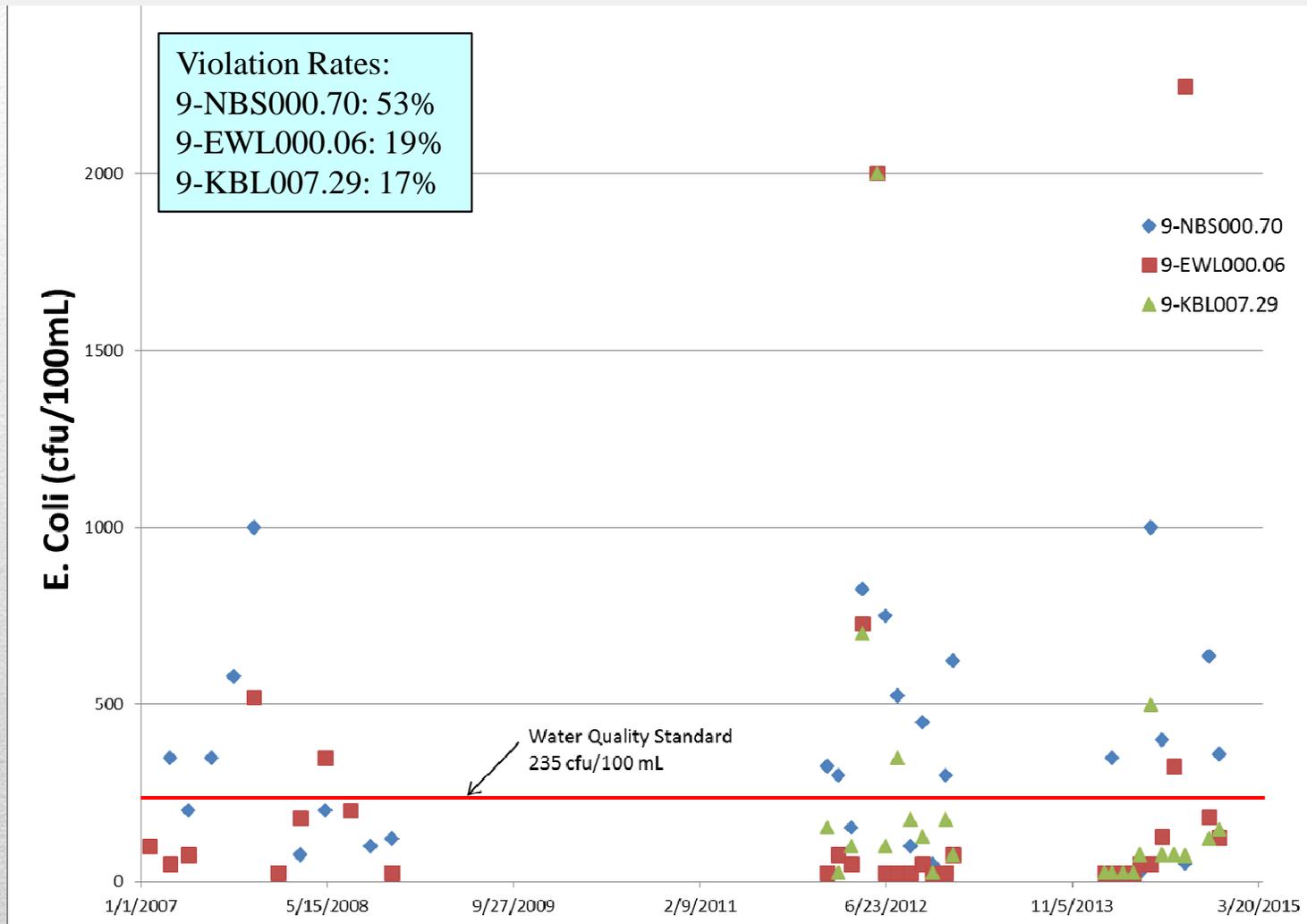


# Bacteria Concentrations: Town Creek (TNC) and Walker Creek (WLK)

Violation Rates:  
9-TNC000.53: 63%  
9-WLK044.06: 25%  
9-WLK060.32: 19%

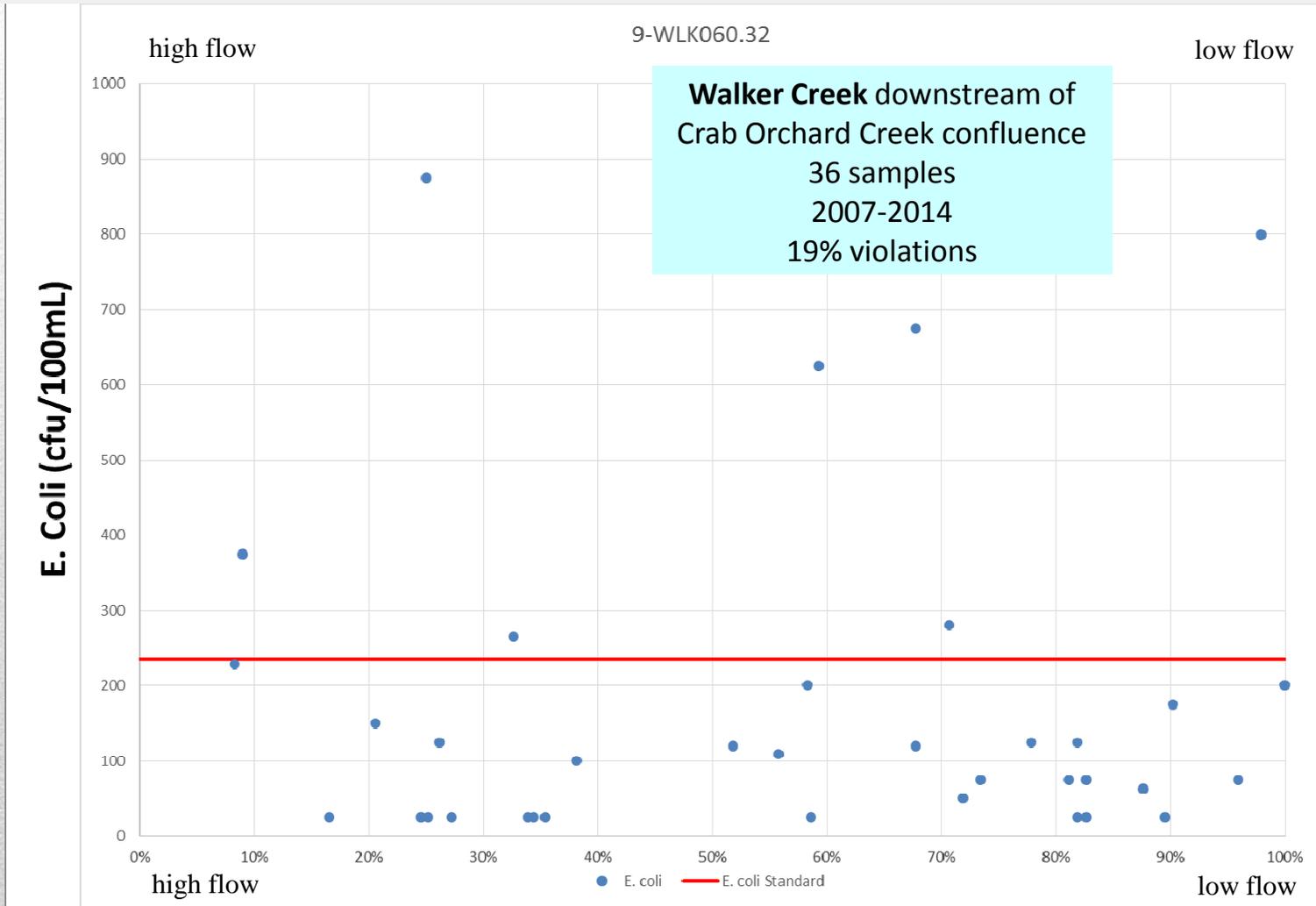


# Bacteria Concentrations: Nobusiness Creek (NBS), East Wilderness Creek (EWL) and Kimberling Creek (KBL)





# Bacteria Concentrations over the different Flow Conditions Walker Creek (WLK)

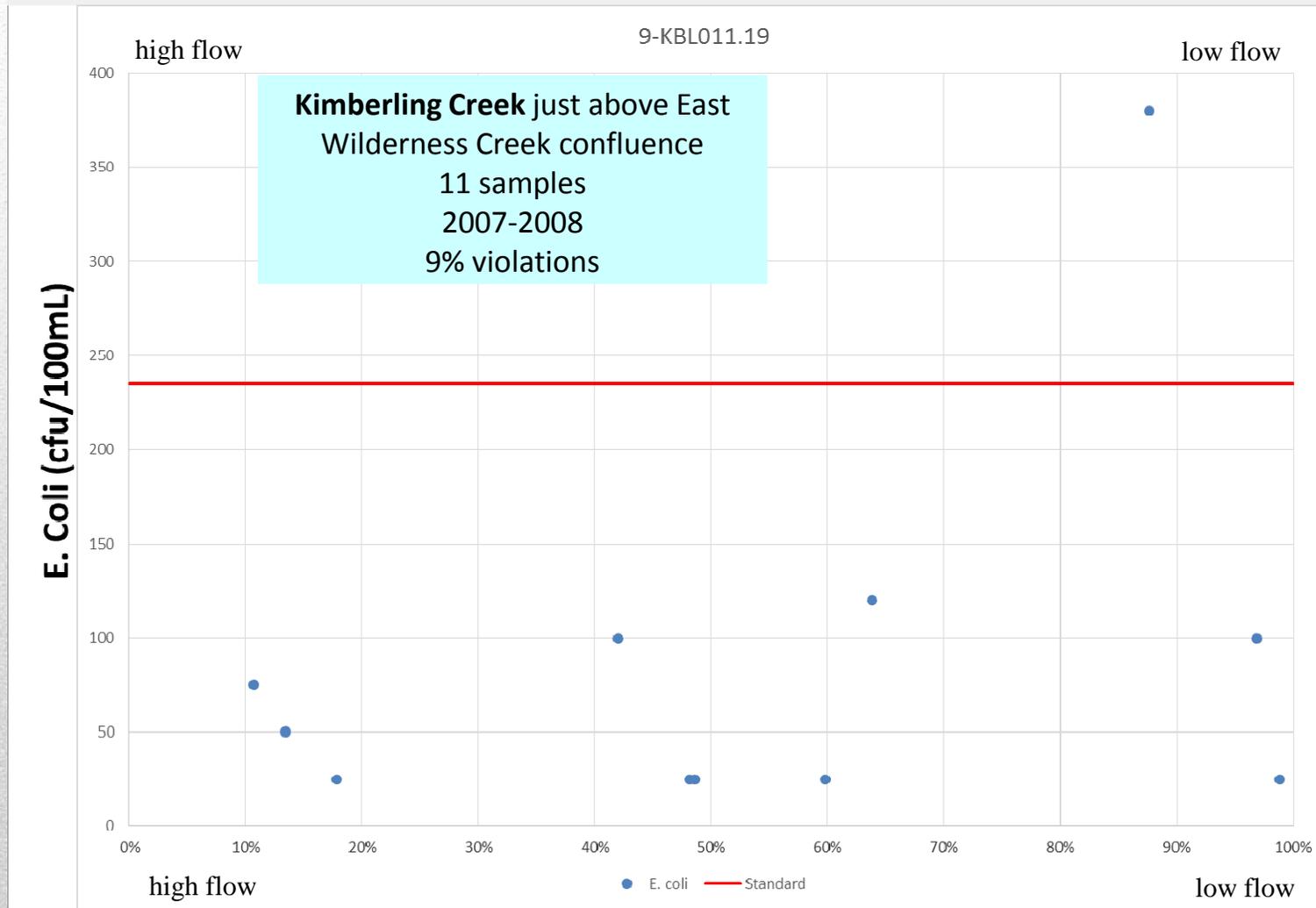








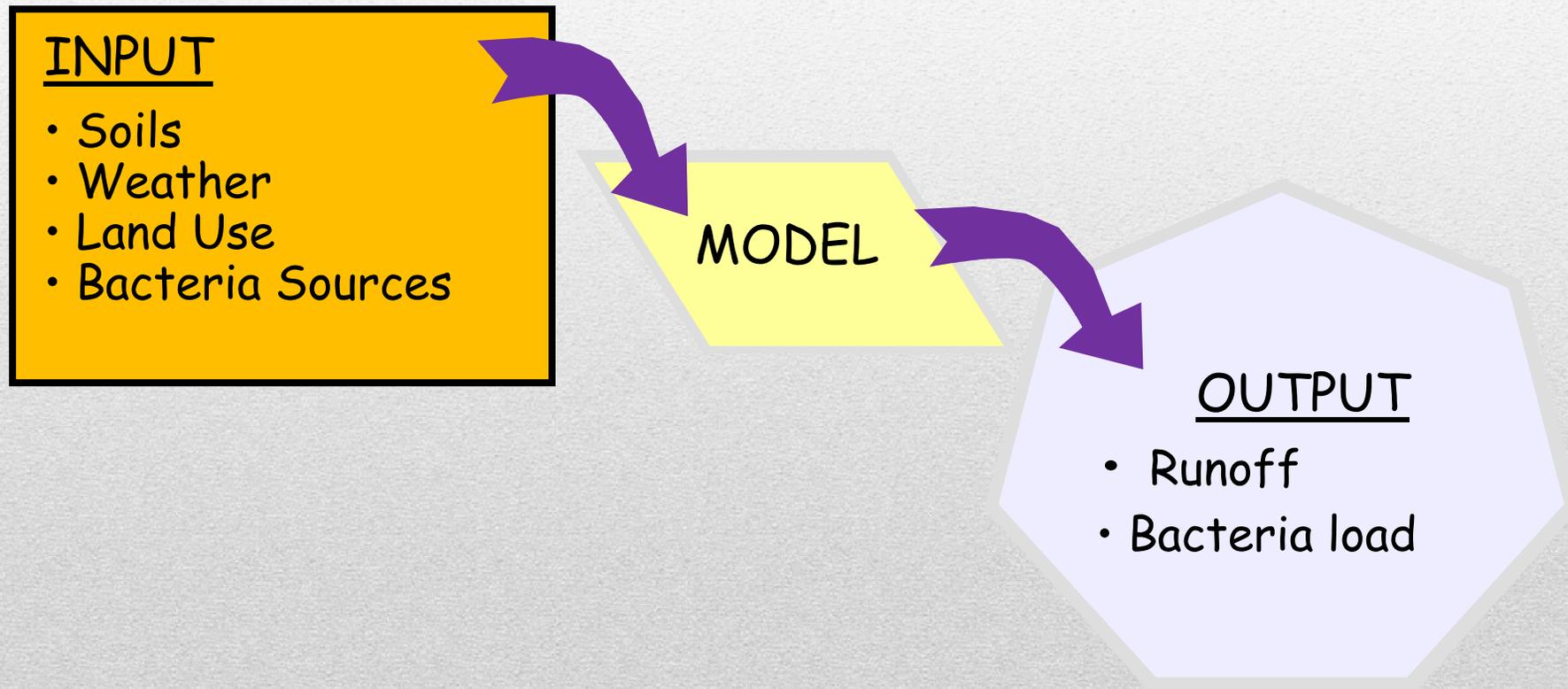
## Bacteria Concentrations over the different Flow Conditions Kimberling Creek (KBL)



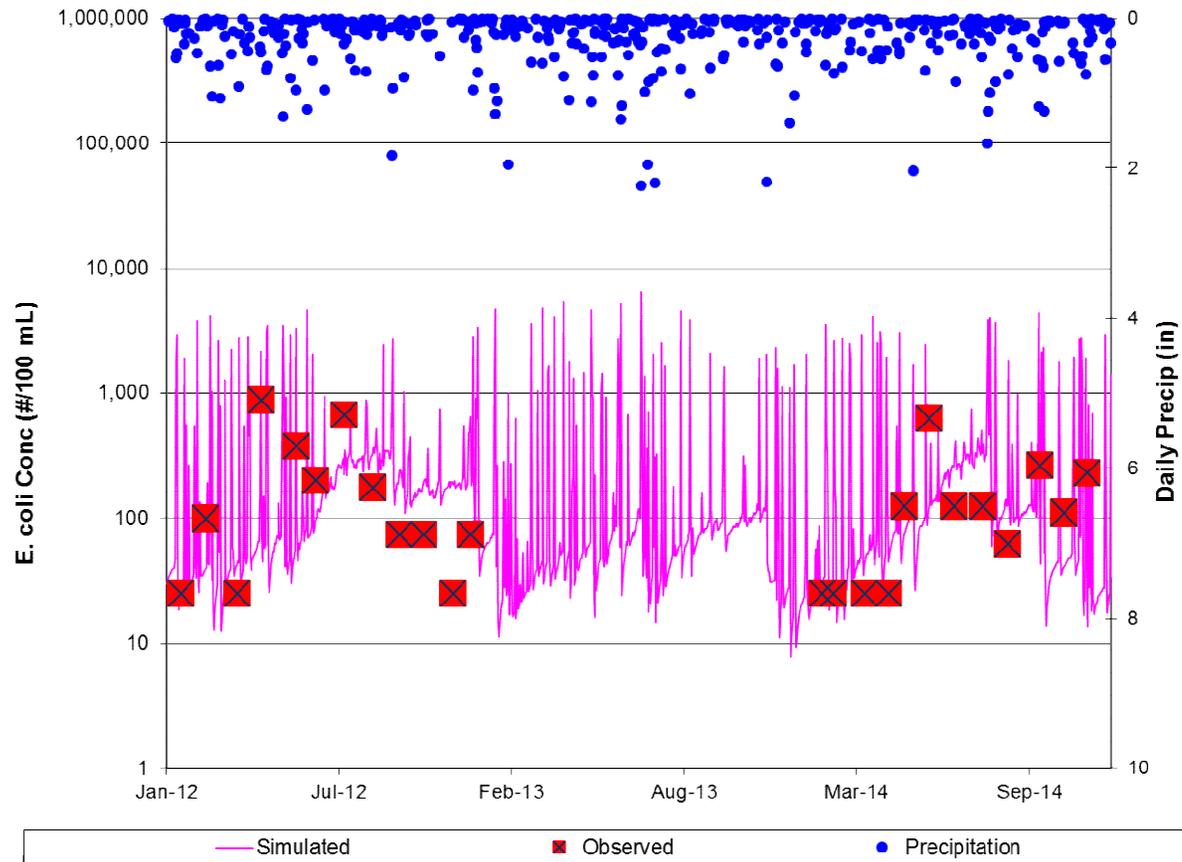




# Model Process

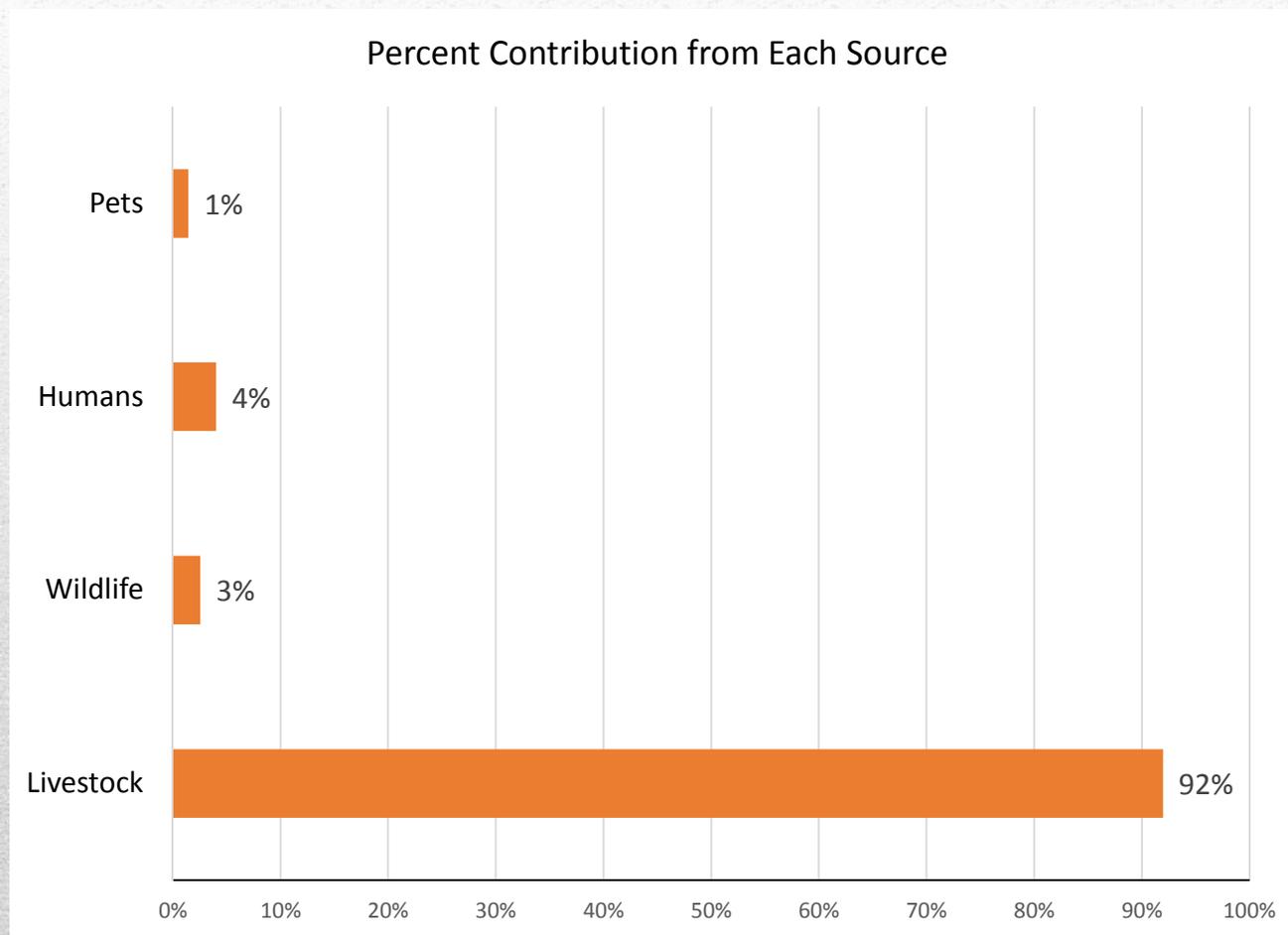


# Bacteria Calibration Walker Creek 9-WLK060.32



Stream	Water Quality Monitoring Station	Geometric Mean		Exceedance of Single Sample Maximum Criterion (235 cfu/100 ml)	
		Observed	Simulated	Observed	Simulated
Walker Creek	9-WLK060.32	100	105	21	23

# Existing Conditions in the upper Walker Creek watershed



# What's the deal with the livestock load when the watershed is 75% forested?

		Fecal Bacteria Load
Source	Animal	Equivalent to one Beef Cow
Livestock	Beef Cow	1
	Dairy Cow	0.5
	Goat or Sheep	0.5
	Horse	15
	Poultry	45
Human	Human	3
Pet	Dog	14
Wildlife	Deer	18
	Raccoon	125
	Muskrat	250
	Beaver	31,300
	Duck	3
	Goose	8
	Wild Turkey	67
	Black Bear	250
	Coyote	27
	Wild Hog	0.8

# TMDL Allocations Overview

- Determine what bacteria reductions are needed to meet state water quality standards
- **TMDL allocation scenario**
  - zero (0%) violations of the geometric mean water quality criterion
- **Stage 1 implementation scenario**
  - no more than 10.5% violations of the single sample maximum criterion

# TMDL Allocation Scenarios

(Reduction, %)

Impaired Segment	Livestock Direct to Stream	Pasture	Cropland	Hay land	Straight Pipes and Failing Septic	Residential other than Failing Septic
East Wilderness Creek	80	55	0	10	100	0
Nobusiness Creek	100	60	10	10	100	0
Kimberling Creek	0	0	0	0	100	0
Town Creek	100	70	10	10	100	0
Walker Creek Segment 1	100	97	10	10	100	0
Walker Creek Segment 2	75	45	0	10	100	0
Walker Creek Segment 3	50	50	10	10	100	0

Walker Creek Segment 1 - from the Kimberling Creek confluence, upstream to the Helveys Mill Creek confluence

Walker Creek Segment 2 - from the Helveys Mill Creek confluence upstream to the Crab Orchard Creek confluence

Walker Creek Segment 3 - from the Crab Orchard Creek confluence, upstream to the Rt. 52 crossing north of Walker Mountain

# Final TMDL Equations

$$\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS}$$

Watershed	WLA	LA	MOS	TMDL
East Wilderness Creek	$1.89 \times 10^{11}$	$9.16 \times 10^{12}$	Implicit	$9.35 \times 10^{12}$
Nobusiness Creek	$1.38 \times 10^{12}$	$6.74 \times 10^{13}$		$6.88 \times 10^{13}$
Kimberling Creek	$1.96 \times 10^{12}$	$9.59 \times 10^{13}$		$9.79 \times 10^{13}$
Town Creek	$1.73 \times 10^{12}$	$8.48 \times 10^{13}$		$8.65 \times 10^{13}$
Walker Creek Segment 1	$2.70 \times 10^{12}$	$1.32 \times 10^{14}$		$1.35 \times 10^{14}$
Walker Creek Segment 2	$3.49 \times 10^{12}$	$1.69 \times 10^{14}$		$1.73 \times 10^{14}$
Walker Creek Segment 3	$3.10 \times 10^{11}$	$1.49 \times 10^{13}$		$1.52 \times 10^{13}$

WLA = Waste Load Allocation (point sources + future growth)

LA = Load Allocation (nonpoint sources)

MOS = Margin of Safety

TMDL = Total Maximum Daily Load

# Stage 1 Implementation Scenarios

Impaired Segment	Livestock Direct to Stream	Pasture	Cropland	Hay land	Straight Pipes and Failing Septic	Residential other than Failing Septic
East Wilderness Creek	70	15	0	0	100	0
Nobusiness Creek	100	60	10	10	100	0
Kimberling Creek	0	0	0	0	100	0
Town Creek	98	70	10	10	100	0
Walker Creek Segment 1	15	50	10	10	100	0
Walker Creek Segment 2	40	45	0	0	100	0
Walker Creek Segment 3	35	50	10	10	100	0

## Next Steps :

- ❖ The draft bacteria TMDL report is available for public comment at

<http://www.deq.state.va.us/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment/DraftTMDLReports.aspx>

- ❖ 30-day public comment period for the bacteria TMDL from November 20 – **December 21, 2015**
- ❖ Submit the bacteria TMDL report to the State Water Control Board and EPA for final approval

# Questions?

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