



Beaver Creek Fecal Bacteria TMDL Development

First Public Meeting
December 3, 2009



NATURAL RESOURCE SOLUTIONS
THROUGH *Science* AND *Engineering*

December 3, 2009

2

A Joint Effort

- Virginia's Region 2000
Local Government Council
- City of Lynchburg
- Virginia's Department of
Environmental Quality



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Fecal Bacteria TMDL

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Why are we here tonight?

- Fecal Bacteria in Beaver Creek

- What's Fecal Bacteria?

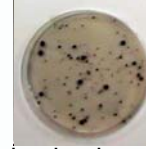
- Bacteria associated with feces from warm blooded animals (fecal coliform, *E. coli*)

- Why should we care?

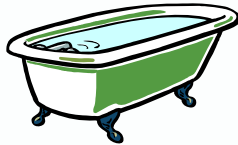
- Pathogens (including some strains of *E. coli*)
- Parasites


- Water Quality Standard


- Swimming & Fishing Use
- Instantaneous: 235 cfu/100 ml *E. coli*
- Monthly Geometric Mean: 126 cfu/100 ml *E. coli*




How much are we talking about?



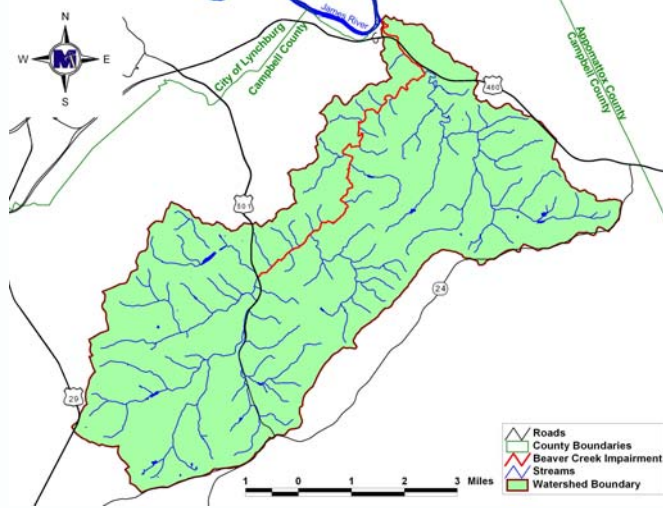
 = 1 cup

 = 1 Tbsp

 = 1 tsp



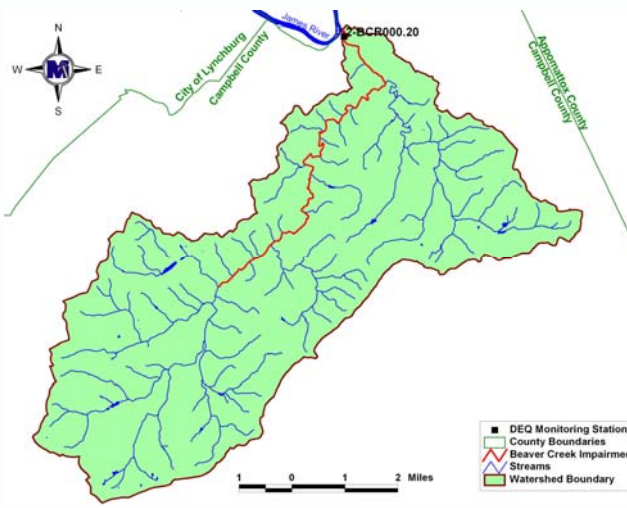
Impaired Segment



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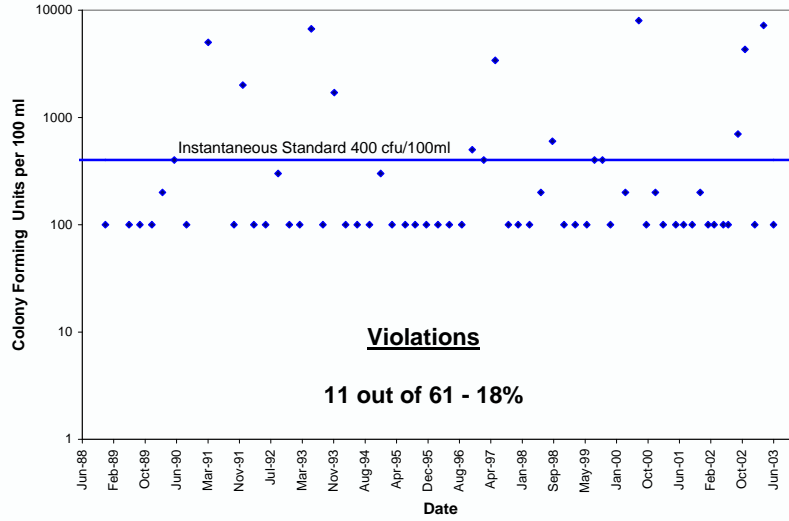
DEQ Listing Station



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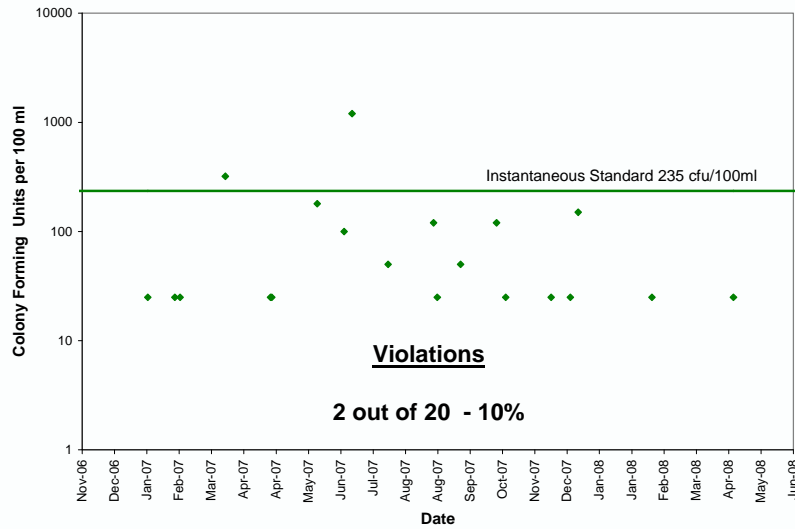
Monitored Fecal Coliform Concentrations



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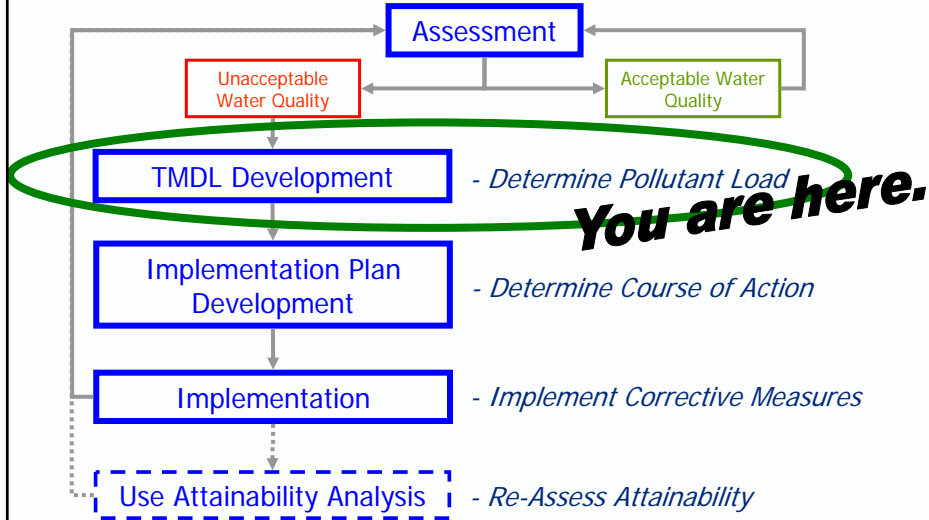
Monitored E. Coli Concentrations



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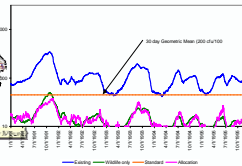
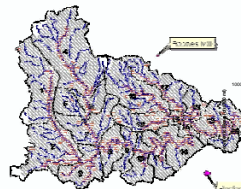
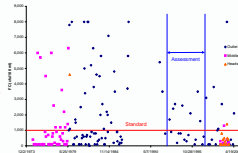
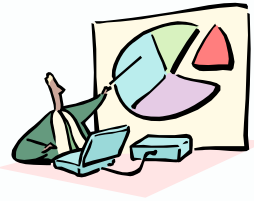
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TMDL Process

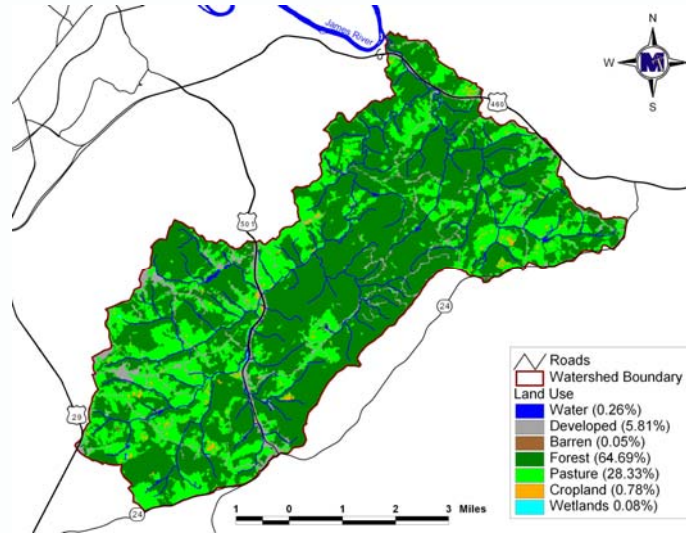


Major Components of the TMDL Report Development

- Source Assessment
- Modeling
 - Hydrology
 - Water Quality
 - Load Allocation
- Public Participation



Land Use



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Source Assessment

- Permitted discharges
 - Wastewater treatment facilities
 - Other Permitted Discharges
- Human
 - ~~Biosolids~~
 - Failed Septic Systems
 - Straight Pipes
- Pets
- Livestock
- Wildlife



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Permits in the Study Area (2009)

- 1 Permitted Discharge, permitted for control of fecal bacteria
- 0 General Permits for single family homes
- 1 Confined Animal Feeding Operation (CAFO) permit



Human Source

Population, housing units, and onsite treatment system based on U.S. Census

- Failing or Improperly Functioning Septic Systems
 - Effluent reaching ground surface throughout the year
 - Lateral movement continuously to stream
- Straight Pipes
 - Direct continuous input into stream



Human Source (2009)

Population	Housing Units	Housing Units with Sanitary Sewer	Housing Units with Septic Systems	Housing Units with Other
5,552	2,394	210	2,157	27



Pet Source (2009)

- Population/household based on literature values, veterinarians, and animal control
- Translated to housing units based on U.S. Census
- Land-applied



Pet Source (2009)

Cat	Dog
1,215	1,360



Livestock Source

- Population
 - Virginia Agricultural Statistics
 - CAFO Permits

- Distribution of waste
 - Pastured
 - Confined, waste collected, spread
 - Direct deposition to the stream

- Seasonal varying applications



Livestock Population (2008)

Beef Adult	Dairy	Sheep	Swine	Horse	Chicken
1,052	500	160	0	168	0



Wildlife Source

- Population
 - Animal densities from VDGIF biologists
 - Habitat from literature values
- Distribution of waste based on habitat
 - Land-applied
 - Direct deposition to the stream
- Seasonal variations based on migration patterns and food sources



Wildlife Population

Deer	Turkey	Beaver	Raccoon	Muskrat	Duck	Goose
807	38	259	1,653	1,314	27	13



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How do we determine a TMDL?



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Watershed data



TMDL



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Hydrologic Modeling Components

- Climatic data
- Land use
- Topography
- Soils
- Stream channel characteristics
- Point source discharge/withdrawal
- Flow data

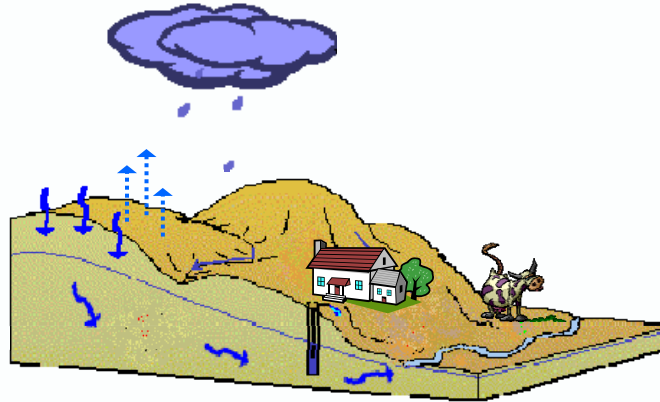


Water Quality Modeling Components

- Sources
 - Fecal production
 - Bacteria densities
 - Distribution
- Delivery Mechanisms
 - Direct
 - Land-applied
- Temporal Variation



Modeling



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And then:

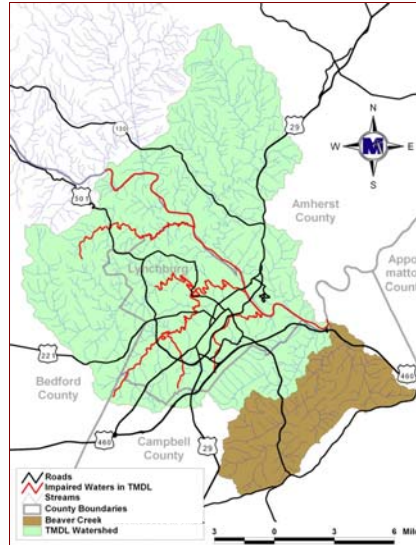
- 2nd Public Meeting (Early 2010)
- Public Review
- Submit to EPA
- State Approval
- Implementation Plan Development
- Implementation



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Related TMDL Work



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