

Upper Roanoke River TMDL Implementation Plan



THE Louis Berger Group, INC.



Agenda

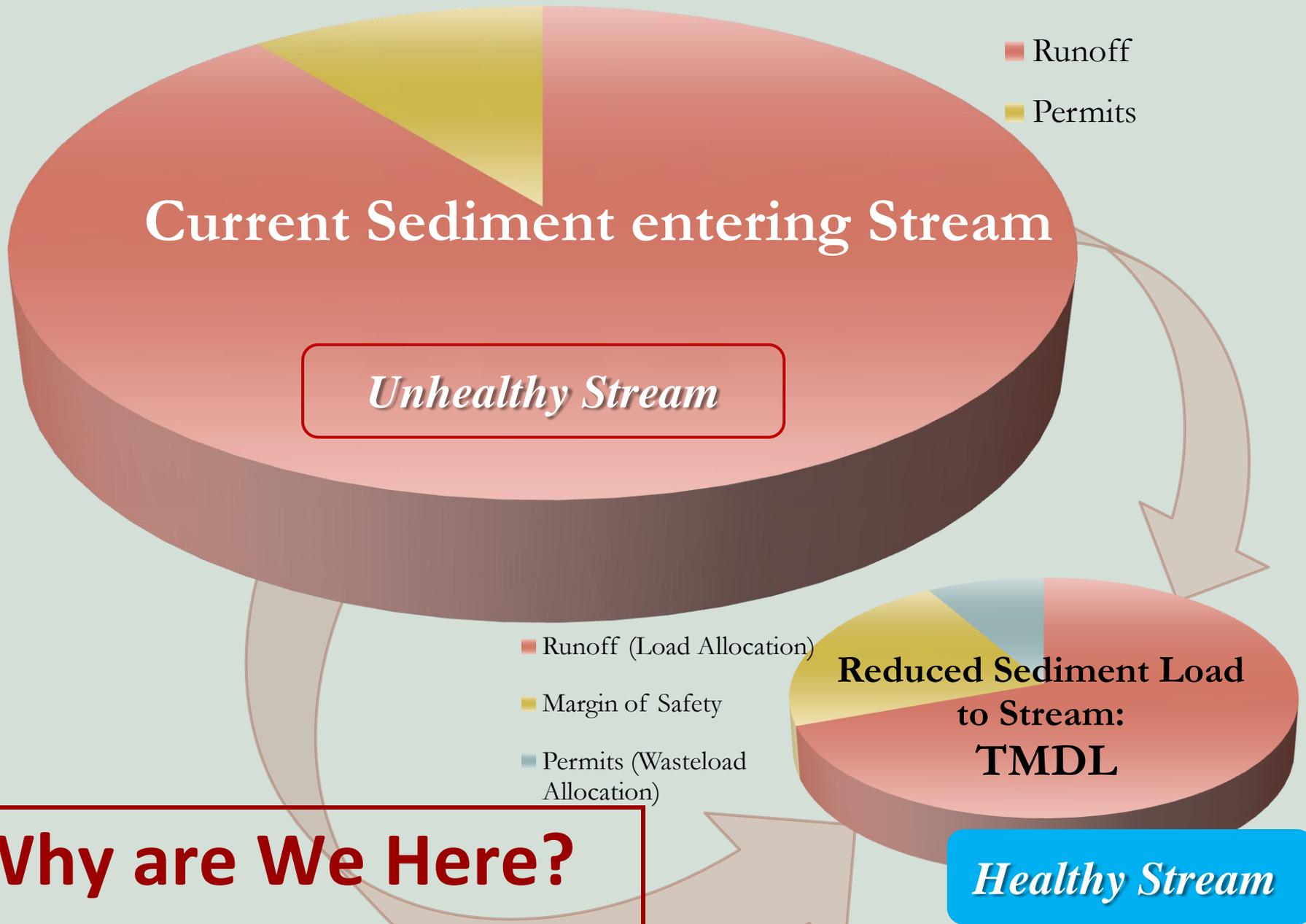
- Welcome and Introductions
- Meeting Guidelines
- Why are we here?
- Upper Roanoke River watershed TMDL Implementation Plan
 - Study Area – Subwatersheds & Impairments
 - State Requirements of a TMDL IP
 - Components of a TMDL IP
 - Review of TMDL Studies & Updates
 - Existing Best Management Practices (BMPs)
 - Potential control Actions
 - Public and Stakeholder Participation
- Next Steps and Feedback

Why are We Here?

- Clean up the Upper Roanoke River watershed!
- Healthy watersheds are important!
 - Protect human health
 - Prevent flood damage & clean-up costs
 - Increase property values
 - Encourage revenue-generating recreational opportunities
 - Lower drinking water treatment costs
 - Reduces drought effects

Why are We Here?



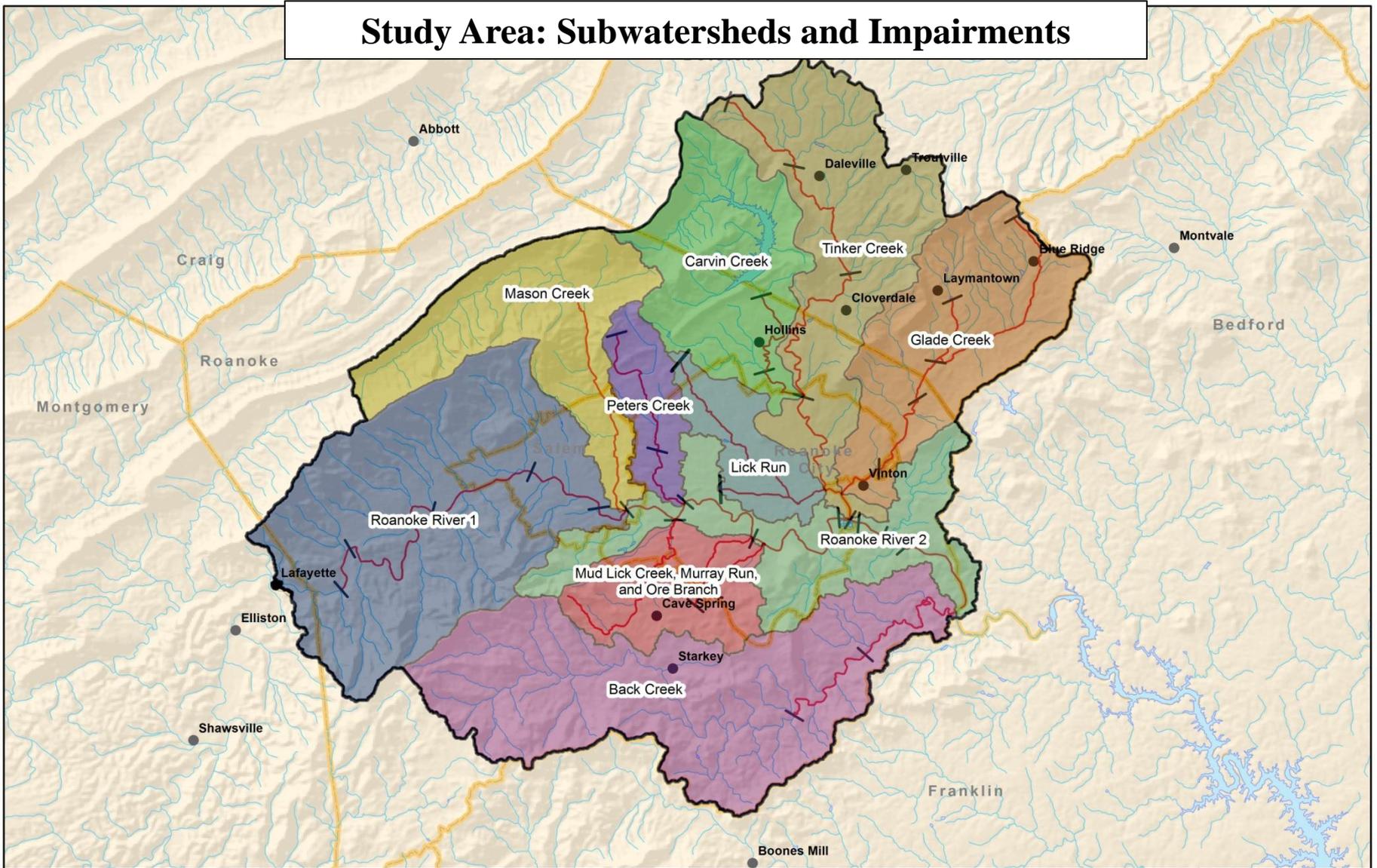


**Why are We Here?
TMDLs!**

Upper Roanoke River TMDL Implementation Plan

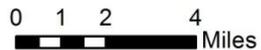
- *TMDL Implementation Plan developed for the Upper Roanoke to address bacteria and sediment impairments*
- *Document that identifies actions and strategies that will be carried out to achieve the pollutant load reductions defined in the TMDL study*
- *Serves as a guide for future implementation efforts*

Study Area: Subwatersheds and Impairments



Legend

- Impaired Segments
- Study Area
- County
- Waterbodies
- Streams and Rivers
- Cities
- Back Creek
- Carvin Creek
- Glade Creek
- Lick Run
- Mason Creek
- Mud Lick Creek, Murray Run, and Ore Branch
- Peters Creek
- Roanoke River 1
- Roanoke River 2
- Tinker Creek



VA INDEX MAP



State Requirements of a TMDL IP

The TMDL IP must include:

- 1. List of corrective actions, associated costs and benefits to address the impairment**
- 2. Measurable goals and milestones and the date of expected achievement of water quality objectives**

The TMDL IP is a requirement of Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (§62.1-44.19:4 through 19:8 of the Code of Virginia), or WQMIRA

Components of a TMDL IP

- **Review of TMDL Studies**
- **Identification of Existing and Recommended Control Actions**
 - **BMPs, educational programs, regulatory authority, incentives**
- **Project timeline and costs**
 - **Implementation goals**
 - **Implementation milestones**
- **Cost/Benefit Analysis**
- **Roles and responsibilities**
- **Funding opportunities**
- **Monitoring plan to assess progress**
- **Public and Stakeholders Participations**

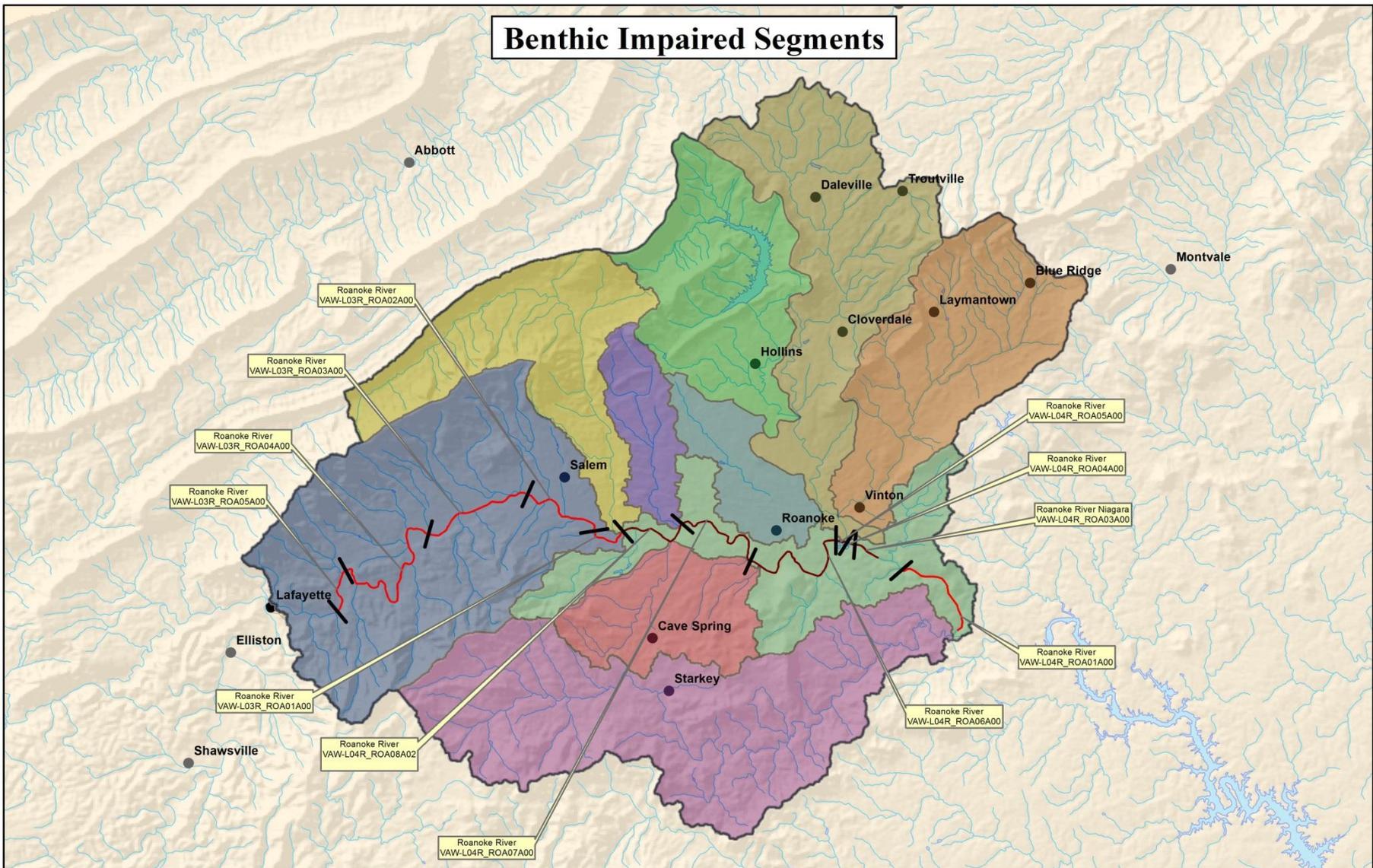
Revision to Current Conditions - Bacteria

- The original TMDLs used the NLCD 1992 landuse data
 - There has been changes in landuse which could affect bacteria loading to the Roanoke River and its tributaries
- Unit-Area Loads (UAL) were determined for each landuse category.
- Using the NCLD 2006 landuse dataset (most currently available) the existing and allocated loads were calculated using the UALs
- Adjust the NPS allocations (LA) and reductions to insure that the 2006 total bacteria allocated load (TMDL) is the same for each subwatershed as the one developed during the TMDL study using the 1992 NLCD data
- MS4s allocation loads for each municipality based on the contributing urbanized area in each impaired subwatershed

Nesting Approach - Bacteria

- **There are 14 bacteria impaired segments which need to be nested into the Roanoke River Bacteria TMDL**
- **Existing and Allocated Loads were estimated for nested impairments by running the calibrated/validated HSPF model using the original 1992 landuse for each nested subwatershed.**
- **The NLCD 2006 Landuse dataset was then used to estimate loads to better capture today's revisions using a UAL approach (similar to established TMDL load revisions)**

Benthic Impaired Segments



Legend

- Established Benthic TMDLs
- Nested Benthic Impairments
- Study Area
- Cities
- Waterbodies
- Streams and Rivers
- Back Creek
- Carvin Creek
- Glade Creek
- Mason Creek
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VA INDEX MAP



Revision to Current Conditions - Benthic

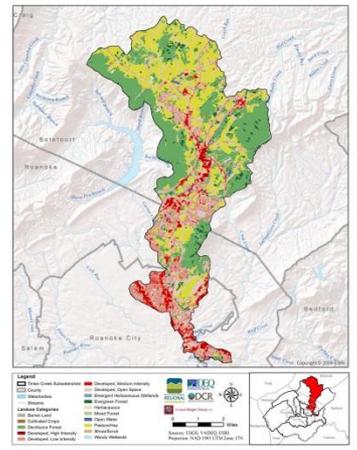
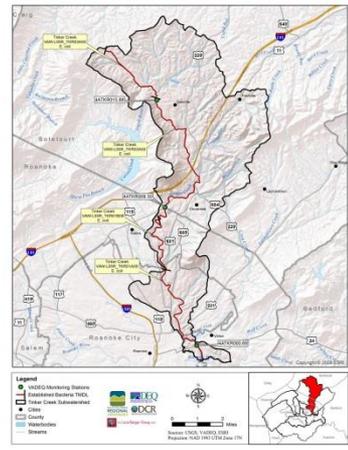
- Original TMDL identified sediment as the primary stressor to the benthic community
- GWLF was used to model the sediment loading to the watershed
- A reference watershed approach was used to establish the numeric TMDL endpoint
- The original TMDLs used the NLCD 1992 landuse data
 - Changes in landuse could affect sediment loading to the Roanoke River and its tributaries, primarily increases in urban development
- Used a Unit-Area Load approach and the NLCD 2006 landuse data to estimate sediment loads to the Roanoke River Watershed

Nesting Approach - Benthic

- **There are 6 impaired segments which need to be nested into the Roanoke River Benthic TMDL**
- **Existing and Allocated Loads were estimated for nested impairments using the calibrated/validated GWLF model using the original 1992 landuse.**
- **The endpoint loads used a non-impaired reference watershed (upstream of the benthic impairments)**
- **The NLCD 2006 Landuse dataset was then used to estimate loads to better capture today's revisions using a UAL approach (similar to bacteria TMDL load revisions)**

Review of the TMDL Studies

- Subwatershed basis
- Impairments
- Land Use Distribution
- Existing Conditions Pollutant loads
- Recommended Load Reductions by Source
- Existing BMP Summary
- Potential Implementation Actions



Impairment Summary

Assessment Unit	Stream Name	Length (miles)	Boundaries	Cause
VAW-LOS_R_TKR01A00	Tinker Creek	5.34	Tinker Creek mainstem from its confluence with the Roanoke River upstream to the mouth of Carvin Creek	Eisenerichia coli
VAW-LOS_R_TKR01B06	Tinker Creek	6.54	Tinker Creek mainstem from the Carvin Creek mouth upstream to the confluence of Buffalo Creek	Eisenerichia coli
VAW-LOS_R_TKR02A00	Tinker Creek	4.34	Tinker Creek mainstem from the mouth of Buffalo Creek upstream to the Roanoke City diversion tunnel located just upstream of the USGS stream gaging station	Eisenerichia coli
VAW-LOS_R_TKR03A00	Tinker Creek	3.12	Tinker Creek mainstem from the Roanoke City diversion tunnel to Carvin Cove on upstream to its headwaters	Eisenerichia coli

Land Use Distribution (NLCD 2006)

Land Use Category	Area	
	Acres	Percent
Developed	9,171.3	35.8%
Agriculture	7,245.6	28.3%
Forest	9,068.3	35.4%
Water/Wetlands	50.5	0.2%
Other	58.6	0.2%
Total	25,594.4	100.0%

Existing and Allocated Bacteria Loads

Land Use/Source	Total Annual <i>E. coli</i> Loads (cfu/yr)		Percent Reduction (%)
	Existing Load	Allocation Load	
Land Based Non-point			
Developed	5.04E+14	7.87E+12	98.4%
Agriculture	3.54E+15	5.57E+12	99.8%
Forest	2.68E+14	1.06E+13	96.1%
Water/Wetlands	7.68E+11	3.02E+10	96.1%
Other	1.57E+12	2.47E+10	98.4%
Direct Non-point			
Livestock Direct	1.85E+13	0.00E+00	100.0%
Wildlife Direct	4.12E+12	1.05E+12	75.0%
Failed Septic, Straight Pipes and Sewer Overflows	1.91E+14	0.00E+00	100.0%
Point Source	0.00E+00	0.00E+00	0.0%
MS4s	1.02E+15	1.62E+13	98.4%
Total	5.55E+15	4.12E+13	99.3%

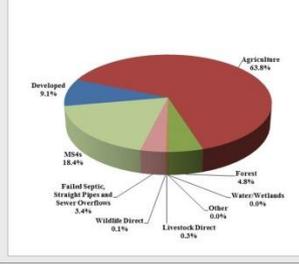
Existing BMPs - Agricultural and Stormwater

Agricultural BMP	Count	Acres Treated	Streamlength Protected (ft)
CRFP Grazing land protection	1	1.7	763
CRFP Riparian Forest Buffer Planting	3	9.0	N/A
Harvestable Cover Crop	1	47.4	N/A
Nutrient Management Plan Implementation and Record Keeping	3	36.0	N/A
Permanent Vegetative Cover on Cropland	2	10.1	N/A
Protective cover for specialty crops	1	13.7	N/A
Riparian Buffer Rem.	3	9.0	N/A
Small Grain cover crop for Nutrient Management	24	326.4	N/A
Stream Exclusion With Grazing Land Management	6	174.9	2,913
Streambank protection (Geocog)	1	6.0	5,600
Total	45	634	12,276

Stormwater BMP

Stormwater BMP	Count	Reported Area Treated* (acres)
Detention Pond	27	353.0
Retention Pond	6	20.4
Infiltration Basin	3	Not Listed
Porous Pavement	1	0.2
Underground Detention	2	2.2
Total	39	375.8

*Not all BMPs reported area treated



- Potential Implementation Actions to Reduce Bacteria**
- Improved Pasture Management
 - Waste Storage Facilities
 - Livestock Exclusion from Streams
 - Riparian Buffer Creation/Expansion
 - Stormwater Controls
 - Septic System Repair/Replacement
 - Educational Programs
 - Pet Waste Disposal Systems

Existing BMPs – Stormwater

City of Salem

Stormwater BMP	Total	Reported Area Treated* (acres)
Detention	51	684.9
Infiltration	1	1.3
Underground Storage	3	22.6
Total	55	708.8

*Not all BMPs reported area treated

Botetourt County

Stormwater BMP	Total	Reported Area Treated* (acres)
Detention	1	56

Town of Vinton

Stormwater BMP	Total	Reported Area Treated* (acres)
Bioretention Facility	2	1.9
Detention Pond	12	222.1
Retention Pond	14	59.2
Underground Facility	20	8.9
Total	48	292.2

Roanoke City

Stormwater BMP	Total	Reported Area Treated* (acres)
Bio-Retention	5	No Data
Detention Pond	73	50.6
Extended Detention	3	3.0
Filtterra/Stormfilter	2	0.7
Infiltration Trench	8	1.1
Parking Lot Detention	3	0.8
Porous Pavement	1	0.2
Retention Pond	1	5.6
Underground Detention	20	12.8
Underground Infiltration	1	No Data
Total	117	74.8

*Not all BMPs reported area treated

Roanoke County

Stormwater BMP	Total	Acres Treated
Bioretention	3	25.3
Bioretention Filter	1	13.4
Detention	11	127.6
Detention Basin	40	1,914.8
Extended Detention	3	25.2
Extended Detention Basin	1	29.2
Filtterra	1	2.6
Infiltration	1	1.9
Manufactured Unit	6	5.8
Porous Pavement	1	15.9
Sediment Forebay	3	1,211.6
Sinkhole	3	56.3
Underground Detention	4	6.8
Wet Pond	6	74.5
Total	84	3,510.9

Existing BMPs – Agricultural

Agricultural BMP	Back Creek			Glade Creek			Roanoke River 2			Tinker Creek		
	Count	Area Treated	Streamlength Protected (ft)	Count	Area Treated	Streamlength Protected (ft)	Count	Area Treated	Streamlength Protected (ft)	Count	Area Treated	Streamlength Protected (ft)
Alternative Water System	1	25	N/A	6	243	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CREP Grazing land protection	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	2	763
CREP Riparian Forest Buffer Planting	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	9	N/A
Harvestable Cover Crop	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	47	N/A
Nutrient Management Plan Implementation and Record Keeping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	36	N/A
Permanent Vegetative Cover on Cropland	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	10	N/A
Protective cover for specialty crops	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	14	N/A
Riparian Buffer Rent	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3	9	N/A
Small Grain cover crop for Nutrient Management	N/A	N/A	N/A	N/A	N/A	N/A	2	16	N/A	24	326	N/A
Stream Exclusion With Grazing Land Management	N/A	N/A	N/A	1	30	1,800	N/A	N/A	N/A	6	175	5,913
Streambank protection (fencing)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	6	5,600



Identification of Control Actions

- Develop aerial imagery maps for each subwatershed section
- Include existing controls
- Identify potential/preliminary controls
- Working Group Members identify and recommend additional controls
- When needed, perform site visits

Potential Control Actions

1. Controls at the Source

Pollution Prevention: Sanitary Sewer Overflows, Illicit Discharges, Septic Systems, Improper Pet Waste Disposal

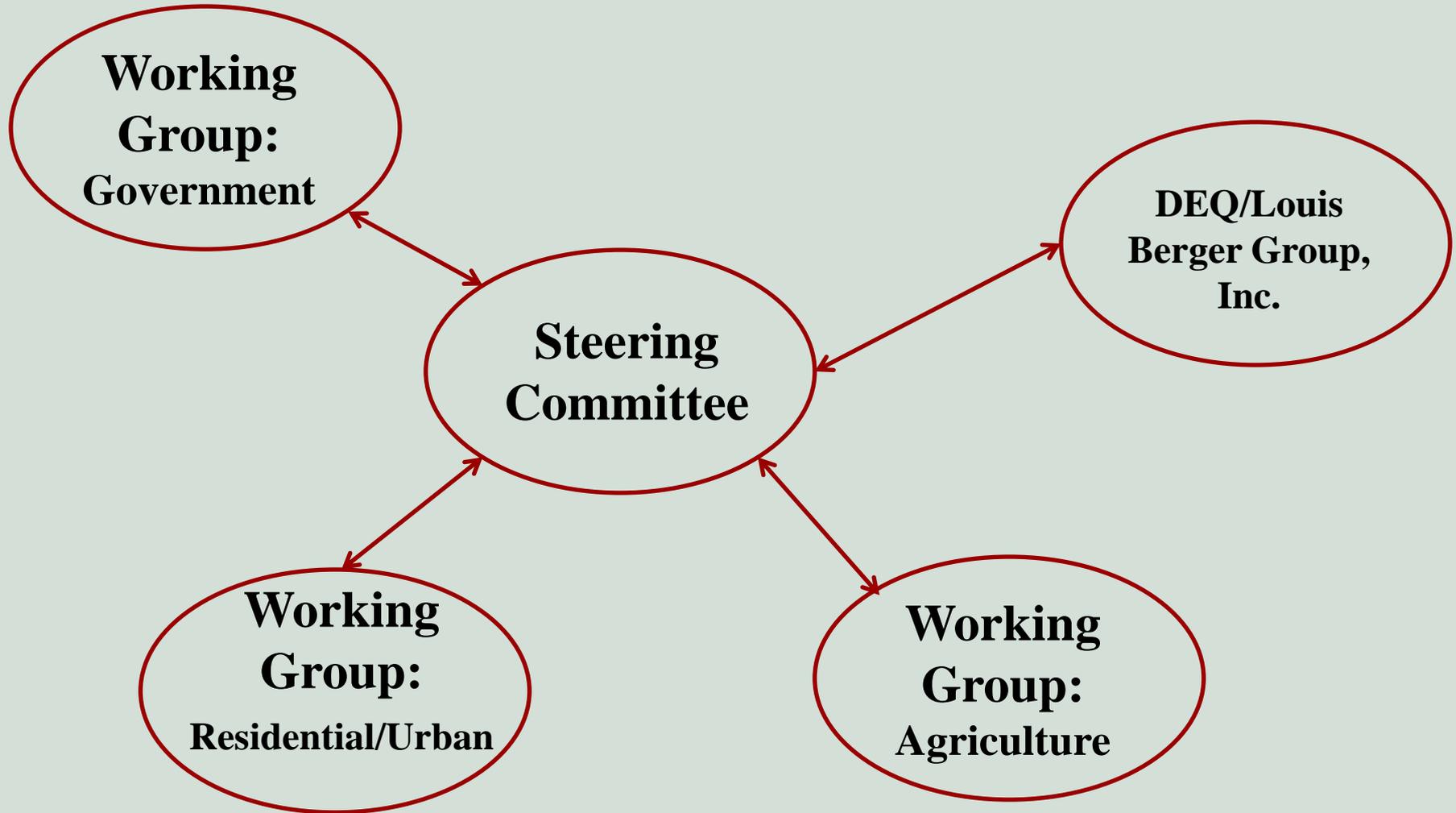
2. In Subwatershed Drainage

Mitigation/Control Measures: Riparian buffers, Exclusion of livestock from streams, Rotational grazing, Waste storage facilities, Cover crops, Streambank stabilization, Grass filter strips, Stormwater controls, Low Impact Development (LID) Measures

3. Outreach/Education/Signage

Indirect Measures: General outreach regarding NPS pollution, directed outreach like Pet-waste campaigns, Signage

Implementation Plan Participant Interactions

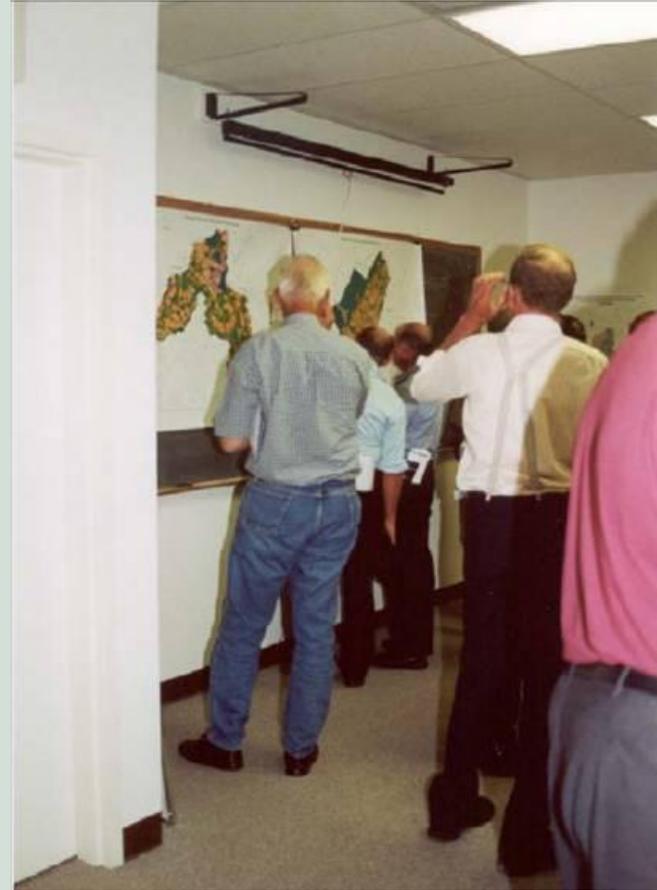


Steering Committee

- Includes:
 - Agencies, local government, SWCD, Stakeholders, Working Group Representatives
- Meet: 2-3 meetings during plan development
- Responsibilities
 - Review technical data
 - Assess input from working groups
 - Address community concerns/suggestions
 - Guide the process
 - Are we getting “representative” inputs?
 - How can the process be improved?

Working Groups

- Include:
 - Agriculture
 - Urban/Residential
 - Government
 - Others?
- Meet
 - 1-2 times each



Government Working Group

- Responsibilities:
 - Identify funding sources
 - Identify available technical resources
 - Identify appropriate “measurable” goals and timelines
 - Identify existing applicable regulatory controls
 - Identify potential parties to be responsible for implementation

Agricultural Working Group

- Responsibilities:
 - Identify potential constraints to implementation
 - Identify alternative funding sources/partnerships
 - Review implementation strategies from an agricultural perspective
 - Identify outreach methods for engaging producers



Urban/Residential Working Group

- Responsibilities
 - Identify possible constraints to implementation
 - Identify methods of outreach to homeowners sewage problems
 - Identify alternative funding sources/partnerships
 - Review implementation strategies from a homeowner's perspective



Next Steps and Feedback

- General Questions
 - Obstacles to Implementation?
 - Unique characteristics or trends in the watershed?
- Public meeting (late May)
 - Goal: Get folks to attend! Divide stakeholders into WGs
 - 1 or 2?
 - Format, Advertising, Location(s)
 - Level of technical information, use of maps
 - Are certain days of the week better than others?
- Other outreach opportunities
 - Watershed tour
 - Survey monkey, Facebook, Local newsletters, publications, etc.?

Project Timeline

April 10, 2013

1st Steering Committee Meeting:

Introduce local agencies, governments, and NGOs to Implementation Process

Mid June Working Group Meetings:

Discuss potential best management practices and Outreach activities

Mid-Late July 2nd Steering Committee Meeting:

Prioritize Best Management Practices, discuss funding sources & timeline

APRIL 2013

MAY 2013

JUNE 2013

JULY 2013

AUGUST 2013

Late May 1st Public Meeting(s) & Working Group Meetings:

Introduce IP to the Community, Working Groups

Early July Working Group Meetings:

Discuss implementation scenarios, cost, funding, and monitoring

Late August Final Public Meeting(s):

Present and discuss final Implementation Plan

Upper Roanoke River TMDL IP Contacts



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