

Government Working Group Meeting #2 and Steering Committee Meeting

Upper Roanoke River Watershed Cleanup Plan: North Fork and South Fork Roanoke Rivers Watershed (Part II)

16 March 2016, 1:30 p.m. Blacksburg Library

Our Task

Include all stakeholders in developing a plan to install Best Management Practices (BMPs) that will reduce levels of bacteria and sediment entering the Roanoke River watershed.

Primary Roles of Government Working Group and Steering Committee

- Assist in determining types and extent of BMPs needed
- Reviewing costs for each BMP
- Identify economic incentives/hardships with each BMP
- Identify technical and financial resources to carry out implementation plan
- Report findings to Steering Committee

Goals of Meeting

- Discuss Agricultural and Residential Working Group findings
- Review and provide comments to estimates of implementation measures by subwatershed that will result in reductions in bacteria and sediment loads.
- Discuss milestones and implementation staging approach
- Identify potential partnerships and funding sources for implementing clean up measures identified in the plan.

*TMDL Studies establish the goals for sediment and bacteria reduction.
The Clean-up Plan is the “road map” to meet those water quality goals!*

Best Management Practices (BMPs) Discussion

- **Existing Stormwater BMPs:**

- We appreciate the BMP information provided by the localities!
- Table 1 presents the existing stormwater BMP summary for each subwatershed. Reductions quantified from existing BMPs based on the reported drainage areas (conservative approach).
- Table 1 also presents the bacteria and sediment reductions from existing BMPs.

Table 1: Existing Stormwater BMP Summary				
	North Fork Roanoke River		Wilson Creek	
Stormwater BMP	Total	Acres Treated*	Total	Acres Treated*
Bioretention	1	0.34	22	10.837
Detention	5	3.67	40	7.57
Extended Detention	N/A	N/A	3	2
Infiltration	N/A	N/A	1	Not Listed
Manufactured BMP	N/A	N/A	4	1.53
Underground Detention	N/A	N/A	7	5.36
Vegetated Filter Strip	N/A	N/A	1	0.53
Water Quality Grass Swale	N/A	N/A	1	Not Listed
Wet Pond	1	Not Listed	1	Not Listed
Total	7	4.01	80	28.23
Bacteria Reduction From Existing BMPs (cfu/year)	1.10E+11		6.16E+10	
Sediment Reduction From Existing BMPs (ton/year)	0.25		2.01	

*Not all BMPs listed a treated acreage, numbers presented under represent actual coverage of BMPs

- **Proposed Stormwater BMPs:**

- The strategy was to evenly increase the number of BMPs until the needed bacteria reduction was met.
- Bradshaw Creek’s required developed land bacteria reduction is met by implementing a pet waste education program, but for grant funding purposes, a nominal coverage is proposed for each appropriate BMP.
- A higher percentage of raingardens proposed in the subwatersheds of the North and South Fork Roanoke River (more rural and have less medium and high intensity development).
- Urban riparian zones were estimated using the stream and landuse layer in ArcGIS.
- Rain barrels were estimated for 25% of homes in each watershed.

Table 2: Proposed Stormwater BMPs

Stormwater BMP	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Unit	Cost per unit
Bioretention	2	215	375	10	300	acre-treated	\$10,000
Raingarden	2	500	750	10	300	acre-treated	\$5,000
Infiltration Trench	2	215	375	10	300	acre-treated	\$6,000
Manufactured BMP	0	50	50	0	300	acre-treated	\$20,000
Constructed Wetland	2	215	375	10	300	acre-treated	\$2,900
Detention Pond	2	215	315	10	30	acre-treated	\$3,800
Permeable Paver	1	10	20	5	5	acre-treated	\$240,000
Vegetated Swale	2	200	200	10	10	acre-treated	\$18,150
Rain Barrel	307	1223	2190	160	4818	barrel	\$150
Riparian Buffer (Forested)	7	62	108	10	33	acre-treated	\$3,500
Riparian Buffer (Grass/Shrub)	7	62	108	10	33	acre-treated	\$360

- **Proposed Residential Waste Treatment BMPs**

- GIS based analysis was performed using the provided building layers, sewer networks, and stream networks to update the number of houses in each watershed on sewer, septic, and possible straight pipes.
- The data provided by Montgomery County specified whether the building was on septic or sewer. Houses were assumed to be on septic unless noted otherwise in the Montgomery County layer or in the GIS analysis.
- To estimate the number of homes on sewer a GIS analysis was performed using the sewer lines and building layers. Only homes adjacent to a sewer line were considered to be on sewer.
- The buildings layer data was received from Floyd County after the initial analysis. The additional houses in Floyd County counted using this data were assumed to be on septic.
- Straight pipes were estimated using the percentages listed for Montgomery County in the TMDL (0.45% of houses within 200 feet of the stream).

Table 3: Revised Sewage Disposal Methods

BMP	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total
Total Homes on Septic	584	2030	4163	305	708	7790
Total Homes on Sewer	0	299	589	0	1080	1968
Number of Failing Septics (3% failure rate) ¹	18	61	125	9	21	234
Straight Pipes (0.45% of households within 200ft of Streams) ¹	1	2	6	0	1	10

¹Source: Bacteria TMDLs for Wilson Creek, Ore Branch and the Roanoke River Watersheds (VADEQ 2006)

- Discuss the estimates in Table 4 for proposed number of potential sewer connections.
- Working groups indicated that the sewer treatment plant(s) in Montgomery County are at capacity. This could have an effect on how many sewer connections are proposed in South Fork Roanoke River subwatershed.
- Bradshaw Creek and Unimpaired North Fork Roanoke River are too rural for any sewer connections.

Table 4: Proposed Sewage Disposal BMPs (systems)

BMP	Percent of Total Systems	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total
Total Septic Pumpout (RB-1)	10%	58	203	416	31	71	779
Sewer Connection (Target Area's and RB-2)	Variable	N/A			N/A		0
Total Septic Repair (RB-3)	70%	12	43	87	6	15	163
Total Septic Install /Replace (RB-4/RB-4P)	25%	6	17	37	2	6	68
Total Alternative Waste Treatment System (RB-5)	5%	1	3	6	1	1	12

- **Pet Waste BMPs**

- ArcGIS was used to determine locations of pet friendly hotels, schools, and recreational areas that could be prime locations for pet waste stations.
- Each pet waste station costs at \$4,180, which covers the cost of maintenance for a period of five years.
- Each pet waste education program costs at \$5000.

Table 5: Proposed Pet Waste BMPs (units)

BMP	Pet Waste Education Campaign*	Pet Waste Station	
		Existing	Proposed
Bradshaw Creek	1		0
North Fork Roanoke River	1		3
South Fork Roanoke River	1		5
Unimpaired North Fork Roanoke River	0		0
Wilson Creek	1		14
Total	4		22

Table 6. Proposed Pet Waste Station Locations

Subwatershed	Location Type	Location
North Fork Roanoke River	Hotel	Super 8 Christiansburg
		Quality Inn Christiansburg
	Park	Wayside Park
South Fork Roanoke River	Hotel	Interstate Overnight RV Park
		Days Inn Christiansburg
	Neighborhood	Boggs Mountain Loop-Weeping Willow Ln
	Park	Eastern Montgomery Park
	Restaurant	Cracker Barrel
Wilson Creek	Apartment	Cascades Point Apartments
		The Mill at Blacksburg Apartments
		Cedarfield Apartments and Townhomes
	Hotel	Shayona Inn
		Econo Lodge
		Days Inn Blacksburg
		Comfort Inn Blacksburg
	Park	Mid-County Park - parking lot
		Ellet Valley Recreational Area
		Cedar Hill Park
		Nellies Cave
		Sunrise Park
		Golden Hills Disc Golf Course at MidCounty Park
	Trail	Mid-County Park - nature trail loop system

- Existing Agricultural BMPs

- Agricultural BMPs installed since the TMDLs study were quantified using the Virginia Department of Conservation and Recreation's (VADCR) Agricultural Cost-Share Database.

Table 7. Existing Agricultural BMPs - South Fork Roanoke River

Existing Agricultural BMP	Bradshaw Creek			North Fork Roanoke River			South Fork Roanoke River		
	Total Acres Installed	Total Acres Benefited	Stream Length Installed (ft)	Total Acres Installed	Total Acres Benefited	Stream Length Installed (ft)	Total Acres Installed	Total Acres Benefited	Stream Length Installed (ft)
Cropland BMPs									
Harvestable Cover Crop/Small Grain cover crop for Nutrient Management (SL-8)	-	-	-	-	-	-	288.3	-	-
Pasture BMPs									
Aforestation of erodible crop and pastureland (FR-1)	-	-	-	-	-	-	1.5	-	-
CREP Riparian Forest Buffer Planting	-	-	-	26.5	182.6	-	0.4	-	-
Permanent vegetative cover on critical areas (SL-11)	-	-	-	-	-	-	1.3	-	-
Stream Exclusion BMPs									
Livestock Exclusion with Reduced Setback	-	-	-	-	-	-	-	1	3,947
Stream Exclusion With Grazing Land Management	-	45.6	1,260	-	472.9	26,197	-	737.8	29,228
Stream Stabilization									
Streambank Stabilization - Length (feet)	-	-	-	-	25.5	1,119	-	-	-
Bacteria Reduction From Existing BMPs (cfu/year)	2.04E+10			1.57E+12			6.87E+11		
Sediment Reduction From Existing BMPs (ton/year)	1			29			51.5		

- **Proposed Cropland BMPs:**

- While it was established there is no manure spreading on cropland in the watershed (i.e. no bacteria reductions needed), there is still a sediment reduction to be met from cropland.
- The general approach to cropland BMPs was to apply continuous no-till on an area of land, and in combination, have a small grain cover crop, and propose 5% of cropland have permanent vegetative cover, utilize sod waterway and cropland buffer/field borders each (for a total of 15% of cropland under these practices).

Table 8: Proposed Cropland BMPs (acres-installed)

BMP	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total (acres-installed)	Cost Per systems
Continuous No-Till (SL-15)	41	253	662	51	26	1,033	\$100
Small Grain Cover Crop (SL-8)	48	283	452	57	30	869	\$30
Permanent Vegetative Cover on Cropland (SL-1)	2	15	39	3	2	61	\$175
Sod Waterway (WP-3)	2	15	39	3	2	61	\$1,600
Cropland Buffer/Field Borders (CP-33 and WQ-1)	2	15	39	3	2	61	\$1,000

- **Proposed Livestock Exclusion BMPs:**

- Livestock exclusion systems were determined through GIS analysis using aerial imagery, stream networks, landuse and discussions with SWCD personnel
- To distribute the proposed length of exclusion systems, the distributions from Part I (10% CREP, 75% SL-6/SL-6T/LE-1T, 5% SL-6A/LE-2T/WP-2T) were used.
- The numbers presented in Table 7 represent the lengths necessary to achieve the reductions in livestock direct loads.

Table 9: Proposed Livestock Exclusion BMPs (systems)

BMP	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total Systems	Cost Per systems
CREP Livestock Exclusion (CRSL-6)	3	10	10	3	1	27	\$27,000
Livestock Exclusion with Grazing Land Management (SL-6/SL-6T and LE-1T)	24	76	77	21	10	208	\$21,000
Small Acreage Grazing System (SL-6AT)	2	5	5	1	1	14	\$9,000
Livestock Exclusion with Reduced Setback (LE-2/LE-2T)	2	5	5	1	1	14	\$17,000
Stream Protection/Fencing (WP-2/WP-2T)	2	5	5	1	1	14	\$21,000

- **Proposed Pasture BMPs:**

- Vegetative cover on critical areas was proposed for 5% of pastureland in Bradshaw Creek and Unimpaired North Fork, 20% in North and South Fork, and 10% in Wilson Creek.
- Reforestation of erodible pasture was proposed for 5% of pastureland in Bradshaw Creek and Unimpaired North Fork, and 10% in North Fork, South Fork, and Wilson Creek.
- The varying percentages reflect the bacteria and sediment reductions required in the respective subwatersheds.
- Then, pasture management was applied to the remaining unconverted land.
- When bacteria reductions could not be met with the BMPs listed above, an acreage of wet detention ponds was proposed.

Table 10. Proposed Pastureland BMPs (acres-installed)

BMP	Bradshaw Creek	North Fork Roanoke River	South Fork Roanoke River	Unimpaired North Fork Roanoke River	Wilson Creek	Total (acres- installed)	Cost Per acre install
Vegetative Cover on Critical Areas (SL-11)	36	1,472	1,724	41	145	3,418	\$1,200
Reforestation of Erodible Pasture (FR-1)	37	818	958	43	81	1,937	\$560
Pasture Management (EQIP 528, SL-10T, SL-9, SL-7)	353	7,360	8,622	411	727	17,472	\$75
Wet Detention Ponds*	0	3,800	1,720	0	477	5,997	\$150

*acres-treated

- **Stream Restoration BMPs:**

- A sediment reduction of 14,045 tons/year was required from instream erosion. This value was determined by the percentage of the benthic watershed this implementation plan is covering.
- The sediment reduction requires 90,613 feet of stream restoration throughout the second Roanoke River TMDL IP study area, based on the reduction rate of 310 lbs/ft/year.
- Distribution of the load by stream miles in each subwatershed can achieve the restoration values.

Table 11. Planned and Proposed Stream Restoration

Subwatershed	Total Estimated Stream Length for Restoration (Feet)	Planned, Ongoing, Completed Projects (feet)	Additional Proposed Stream Restoration (feet)
Bradshaw Creek	9,844	0	9,844
North Fork Roanoke River	22,793	6,785	16,008
South Fork Roanoke River	48,140	0	48,140
Unimpaired North Fork Roanoke River	6,063	0	6,063
Wilson Creek	3,773	0	3,773
Total	90,613	0	90,613