

**Powell River and Tributaries
(NF Powell, SF Powell, and Butcher Fork)
Watershed Implementation Plan
(Bacteria and Sediment TMDLs)
Technical Report**



Prepared for:

LENOWISCO Planning District Commission

Approved: July 3, 2018

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ACKNOWLEDGMENTS

Steering Committee Members

Working Group Members

Daniel Boone Soil & Water Conservation District

Lonesome Pine Soil & Water Conservation District

Department of Mines, Minerals and Energy (DMME)

Natural Resource Conservation Service (NRCS)

Virginia Department of Conservation and Recreation (VADCR)

Virginia Department of Forestry (DOF)

Virginia Department of Health (VDH)

Virginia Department of Environmental Quality (VADEQ)

Local citizens and stakeholders in the Powell River watersheds

Individual summaries of this document for the Powell River watersheds are also available from the Virginia Department of Environmental Quality.

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EXECUTIVE SUMMARY

The impaired segments in the Powell River watershed are located in Lee and Wise Counties, Virginia. There is also a small portion of the watershed draining across the Tennessee state line. There are ten impaired segments included in this study. Two of the segments are impaired for bacteria. Six of the segments are impaired for violations of the General Benthic Standard (benthic) and, two of the segments are impaired for both bacteria and benthic violations. The impaired segments are on the following streams: Powell River, South Fork Powell River, North Fork Powell River, and Butcher Fork.

These listing were due to violations of the State's water quality standards for fecal bacteria, as well as for the general standard. The fecal bacteria impairment means that the stream does not support the primary contact recreation use including swimming, wading, and fishing due to an increased risk of illness or infection when coming in direct contact with the water. Water quality standards specify that in-stream *E. coli* must not exceed a single sample maximum of 235 cfu/100 mL or a geometric mean of 126 cfu/100 mL. The general standard requires that streams support a healthy and diverse community of aquatic life. Assessments of the benthic macroinvertebrate community indicated that the general standard was not being met. As a result of the impairment listings, and court actions taken against the United States Environmental Protection Agency (USEPA), total maximum daily load (TMDL) studies were developed for the Powell River watersheds and approved by the USEPA. The studies established that the cause of the aquatic life impairment is a high load of sediment. Additionally, the studies established the reduction in fecal bacteria and sediment loads for these watersheds needed to restore them so they would meet water quality standards and fully support both primary contact recreation, and aquatic life.

Virginia law requires expeditious implementation of TMDLs. An Implementation Plan (IP) shows how fully supporting status for impaired waters can be achieved and the pollutant load reductions established in the TMDL studies can thereby be met. In making progress towards the state's requirement to implement TMDLs, a framework was established for reducing fecal bacteria and sediment levels to achieve the water quality goals for the impaired streams.

Review of TMDL Development

MapTech, Inc. was contracted to develop *E. coli* bacteria and benthic TMDLs for the Powell River watersheds. The TMDLs were completed in February 2011. The bacteria TMDLs were approved by the USEPA in March 2011. The benthic (sediment) TMDL was approved at this time as a Phase I TMDL. Further monitoring indicated that the approach taken for the benthic TMDL development was appropriate, and the TMDL was re-submitted as a Phase II TMDL in 2014.

The Powell River watershed TMDLs show that in order to meet the water quality standard for fecal bacteria the reductions shown in **Table ES-1** must be achieved in the listed watersheds. Additionally, eliminating Sanitary Sewer Overflows (SSOs) is identified in the TMDL. However, this was not a significant component of the TMDL. There are no known, ongoing issues with SSOs in the watershed. It should be noted that, while the reductions from the TMDL focus on “Straight Pipes”, any illicit discharge (*e.g.*, failing septic systems) that delivers a load directly to the stream has the same impact as a straight pipe and, as such, should be addressed during implementation.

Table ES-1. Fecal bacteria TMDL reduction scenarios for the Powell River watersheds (measured in Percent Reductions to Existing Bacteria Loads¹.

Watershed	Straight Pipes ²	Residential ³	Livestock Direct	Agricultural (Crop & Pasture)	Wildlife Direct	Forest
Butcher Fork VAS-P18R_BUH01A04	100	0	100	0	0	0
South Fork Powell River VAS-P18R_PLL02A00	100	0	0	0	0	0
North Fork Powell River VAS-P20R_PWL01A00	100	0	0	0	0	0
Powell River ⁴ VAS-P17R_POW01A94	100	0	0	0	0	0

¹ These are the load reductions as represented in the TMDL.

² While the reductions from the TMDL focus on “Straight Pipes”, any illicit discharge (*e.g.*, failing septic systems) that delivers a load directly to the stream has the same impact as a straight pipe and, as such, should be addressed during implementation.

³ Residential represents bacteria loads in runoff from residential and urban areas.

⁴ This portion of the Powell River watershed is primarily upstream of Big Stone Gap, and is referred to as the “Upper” Powell River watershed in the remainder of the document.

The target sediment TMDL load for the Powell River is based on a reference watershed approach. The Upper Clinch River was used as the reference watershed. The target sediment load is the average annual load in metric tons per year (t/yr) from the area-adjusted Upper Clinch River watershed under existing conditions. To reach the TMDL goal (57,535 t/yr) several scenarios were simulated with Generalized Watershed Loading Function (GWLF). The final scenario called for equal reductions across all contributing sources. After adjusting loads, based on the updated land use data, a reduction of 9.0% for sediment load from AML, barren areas, residential areas, disturbed forest, unimproved pastureland, conventional-tillage cropland areas, and streambank erosion in addition to 100% reduction in straight pipe contribution. The Powell River watershed sediment TMDL show that in order to meet the general standard the reductions shown in **Table ES-2** must be achieved.

Table ES-2 Sediment TMDL allocation scenario for the Powell River watershed.

Sediment Source	Existing Powell Loads	Scenario 1 Reductions (Final)	Scenario 1 Allocated Loads
	t/yr	(%)	t/yr
Pervious Area:			
AML	2,342	9.0	2,131
Barren	3,188	9.0	2,901
Row Crop – Low Tillage	142	0	142
Row Crop – High Tillage	2,360	9.0	2,148
Forest	3,654	0	3,654
Disturbed Forest ¹	1,319	9.0	1,200
Commercial	0	0	0
Residential ²	1,112	9.0	1,012
Hay	0	0	0
Unimproved Pasture ³	11,090	9.0	10,092
Improved Pasture	1,747	0	1,747
Impervious Area:			
Commercial- Impervious	282	0	282
Residential- Impervious	98	0	98
Direct Sources:			
Streambank Erosion	11,508	9.0	10,472
Straight Pipes	31	100	0
Permitted Sources:			
DEQ VPDES permits	179	0	179
DMME Mining Permits	502	0	845
Straight Creek Existing Load⁴	18,792	64.58	6,656
Callahan Creek Existing Load⁴	18,664	62.84	6,936
Future Growth			632.94
Margin of Safety			6,392.74
Watershed Total	77,010	25.3	57,521

¹ VADCR refers to this acreage as defined by Virginia Department of Forestry as forest lands that are non-functional following harvesting

² The residential land-use area includes urban areas.

³ VADCR refers to this acreage as unimproved acres of pasture where cattle may pass through but are not fertilized for grazing

⁴ Existing and allocated loads from Straight Creek and Callahan Creek were taken from the already developed TMDLs for the two creeks since they fall within the current study area.

Public Participation

The actions and commitments described in this document were drawn together through input from local citizens, local government representatives, Virginia Departments of Environmental Quality (VADEQ), Virginia Department of Conservation and Recreation

(VADCR), Virginia Department of Health (VDH), Virginia Cooperative Extension (VCE), Department of Mines, Minerals, and Energy (DMME), Natural Resources Conservation Service (NRCS), Virginia Department of Forestry (DOF), the Daniel Boone and Lonesome Pine Soil and Water Conservation Districts, MapTech, Inc. and other organizations. Every citizen and interested party in the watershed is encouraged to become involved in implementing the plan to help restore the health of the Powell River watersheds.

Public meetings were conducted in both Lee and Wise Counties to distribute information and gain feedback from the community. Active participation was solicited in smaller forums called working groups. These groups were comprised of stakeholders with similar concerns (*e.g.*, agricultural, residential, and industrial). Representatives from each working group participated in the Steering Committee, where input from the working groups was reviewed and decisions about the IP were made. Throughout the public participation process, a major emphasis was placed on discussing best management practices (BMPs), BMP specifications, locations of control measures, education, technical assistance, and funding.

Opinions were voiced throughout the public participation meetings regarding what should be included in the Implementation Plan. Most members of the working groups agreed that the cornerstone of the Implementation Plan should be cultivating public involvement and education, and encouraging commitment and partnerships between the citizens in the watershed and government agencies in order to reduce fecal bacteria and sediment pollution in the Powell River watersheds. A final 30-day public comment period was conducted for the final draft of the Implementation Plan.

Assessment of Implementation Action Needs

An array of pollution control measures were laid out, based on their potential for use in these watersheds. All of these measures have potential for application in the watershed. However, in order to get an estimate of costs, a specific set of control measures was enumerated, based on cost effectiveness and likelihood of use in the watershed. This specific set of control measures should not be viewed as a constraint. If other control measures are found to be needed during implementation, then they should be included in

the effort. The quantity or extent of pollution control measures, or BMPs, needed during implementation was determined through spatial analyses of land use and stream-networks, along with regionally appropriate data archived in the VADCR Agricultural BMP Database. As part of this analysis, land use was updated using the 2016 Land Cover Database, produced by Virginia Geographic Information Network (VGIN) and its partners, as well as GIS data from the Department of Mines, Minerals, and Energy (DMME). Additionally, input from local agency representatives and community members were used to verify the analyses. Overall, the needs to meet the TMDLs for the 10-year implementation period were identified and are shown in **Table ES-3**.

Table ES-3 Agricultural, residential/urban, and industrial BMPs needed in the Powell River watershed.

Control Measure	Unit	Butcher Fork (Bac.)	NF Powell River (Bac.)	SF Powell River (Bac.)	Upper Powell River (Bac.)	Powell River (Sed.)
Pasture & Livestock Exclusion						
Livestock Exclusion with riparian buffer (LE-1T, SL-6)	System	9	NA	NA	NA	NA
Livestock Exclusion with reduced setback (LE-2, LE-2T)	System	8	NA	NA	NA	NA
Stream Protection (WP-2T)	System	1	NA	NA	NA	NA
Livestock Exclusion with grazing land management (SL-6, CREP)	System	1	NA	NA	NA	NA
Streamside Fence Maintenance	Ft	2,116	NA	NA	NA	NA
Agricultural Nonpoint						
Improved Pasture Management (SL-6, SL-10T)	Acres	NA	NA	NA	NA	3,600
Conservation Tillage	Acres	NA	NA	NA	NA	90
Residential/Urban						
Septic Tanks Pump-out (RB-1)	System	340	1,144	187	766	NA
Sewer System Connection (RB-2)	System	0	1	0	1	NA
Septic System Repair (RB-3/3R)	System	3	29	3	17	NA
Septic System Installation /Replacement (RB-4/4P)	System	9	82	8	48	NA
Alternative Waste Treatment System Installation (RB-5)	System	3	32	3	19	NA
Rain Garden	Acres-Treated	0	0	0	0	1,000
Infiltration Trench	Acres-Treated	0	0	0	0	1,000
Bioretention Basin	Acres-Treated	0	0	0	0	800
Industrial						
AML/Barren Area Reclamation	Acres-Treated	NA	NA	NA	NA	420
Disturbed Forest Reclamation	Acres-Treated	NA	NA	NA	NA	280
Haul Road Stabilization	Acres-Treated	NA	NA	NA	NA	60
Other BMPs						
Streambank Stabilization	Ft	NA	NA	NA	NA	2,500

Cost/Benefit Analysis

The costs of the above control measures were determined based on the cost of control measures previously installed through the Virginia Cost-Share Program in the Powell River watersheds, and discussions with local agency representatives and working groups. The cost of technical assistance needed to implement the control measures was determined based upon discussions with working group members and technical assistance costs from both ongoing and previous Implementation Plans in similar watersheds. The estimated total cost to install agricultural, residential/urban, and industrial control measures in the Powell River watersheds is \$35,545,956.

The primary benefit of implementation is the reduction of *E. coli* bacteria and sediment in this watershed. With the completion of this Implementation Plan, the risk of illness or infection as a result of direct contact with *E. coli* bacteria through swimming in or drinking water from the streams will decrease significantly. Elimination of straight pipes will not only reduce bacteria, but also human viruses. Streambank protection, provided through exclusion of livestock from streams, will both reduce bacteria levels and lead to improved aquatic habitat. Many sediment reducing practices (e.g. rain gardens, bioretention basins, remediation of barren and AML areas) will reduce peak runoff flows, while reducing sediment loads, which will, in turn, reduce streambank erosion. Additionally, reduction of sediment reduces pollutants that may be sediment-associated. The practices recommended in this document will provide economic benefits to landowners in addition to the anticipated environmental benefits. Specifically, alternative (clean) water sources, exclusion of cattle from streams, and intensive pasture management will improve profitability of farms, while private sewage system installation and maintenance will ultimately save homeowners money by preventing expensive fees and repairs. Keeping cattle in clean, dry areas has been shown to reduce the occurrence of mastitis and foot rot. The VCE (1998a) reports that mastitis costs producers \$100 per cow in reduced quantity and quality of milk produced. While dairy production is not an issue in this watershed, general herd health is, and bacteria (including mastitis-causing bacteria) can be harbored and spread in the environment where cattle have access to wet and dirty areas.

Measurable Goals and Milestones for Attaining Water Quality Standards

Implementation is scheduled to occur in two stages. The first stage involves implementation of the most cost-effective control measures. Once the measures included in this stage are implemented, it is hoped that the level of *E. coli* in these streams will be good enough and that aquatic life will have recovered to remove them from the State's impaired waters list. Stage II describes the remainder of the control measures required to achieve the targeted pollutant load reductions and achieve the reductions called for in the TMDL studies.

Identification of critical areas to be targeted first for BMP installation was accomplished through analysis of geospatial data as well as stakeholder input, to identify where straight pipes are most likely to be needed. Additionally, for sediment control BMPs, targeting is based on the land use distribution.

Stakeholders and Their Role in Implementation

Implementation progress success will be determined by water quality monitoring conducted by VADEQ through the agency's monitoring program. Additionally, BMPS will be tracked in the DEQ BMP Warehouse, if the BMP cannot be tracked in the DCR tracking program or the grantee is not a District.

The Department of Mines, Minerals, and Energy (DMME) - Division of Mined Land Reclamation (DMLR) presently regulates all of the land-disturbing, mining, and reclamation activities from coal-mining operations by issuing Coal Surface Mining Operation (CSMO) permits. DMLR utilizes enforcement action under the Virginia Coal SMCRA and VPDES to effect compliance with the State Water Control Law. The Department of Mines, Minerals, and Energy (DMME) - Division of Gas and Oil's (DGO) responsibilities include the regulation of the effects of gas and oil operations (both on and below the surface), issuance of permits, administration of client assistance programs, inspection of well sites and gathering pipelines, reclamation of abandoned well sites, protection of correlative rights, and promotion of resource conservation practices. The Virginia Department of Forestry (VDOF) inspects logging jobs to ensure that BMPs are being installed by loggers, because there is a zero tolerance for sedimentation in nearby

streams. Together, these agencies have responsibility for the implementation of industrial BMPs.

The Daniel Boone and Lonesome Pine Soil and Water Conservation Districts (SWCDs) will be in charge of initiating contact with farmers and homeowners in the impaired watersheds to encourage the installation of agricultural and residential BMPs. This one-on-one contact will facilitate communication of the water quality problems and the corrective actions needed. The SWCDs' staff will conduct outreach activities in the watersheds to garner the participation and community support necessary to reach implementation milestones, and to make the community aware of the water quality impairments present in the Powell River watersheds and how they may affect local residents. Such activities will include information exchange through newsletters, mailings, field days, organizational meetings, etc. The SWCDs' staff will work with appropriate organizations (such as VCE) to educate the public.

In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. The agencies regulating activities that impact water quality in Virginia include: VADEQ, VADCR, Virginia Department of Agriculture and Consumer Services (VDACS), DMME and VDH.

Achieving the goals of this IP (*i.e.*, improving water quality and removing these waters from the Section 303(d) list) is dependent on stakeholder participation – not only the local citizens needing agricultural control measures or residential waste treatment facilities, but also all citizens living in the watershed. It must be acknowledged first that there is a water quality problem, and changes must be made as needed in operations, programs, and legislation to address these pollutants. Local citizens can become involved by properly maintaining their septic systems, becoming water quality monitoring volunteers and volunteering to distribute information and educate others at public events.

Potential Funding Sources

Potential funding sources available during implementation were identified during plan development. Sources may include, but are not limited to:

- Federal Clean Water Act Section 319 1 Funds
- Community Development Block Grant Program (CDBG)
- Regional Conservation Partnership Program (RCPP)
- USDA Conservation Reserve Program (CRP)
- USDA Conservation Reserve Enhancement Program (CREP)
- USDA Environmental Quality Incentives Program (EQIP)
- Clean Water State Revolving Fund (CWSRF)
- Virginia Agricultural Best Management Practices Cost-Share Program (VACS)
- Virginia Agricultural Best Management Practices Tax Credit Program
- Virginia Agricultural Best Management Practices Loan Program
- Virginia Small Business Environmental Assistance Fund Loan Program
- Virginia Water Quality Improvement Fund (WQIF)
- Southeast Rural Community Assistance Project (SE/R-CAP)
- National Fish and Wildlife Foundation (NFWF)
- USEPA Environmental Education Grant Funding Opportunity
- Coalfield Water Development Fund (CWDF)
- Abandoned Mine Land Fund
- RECLAIM funding
- Riparian Tax Credit with DOF
- Forest Stewardship Program (FSP)
- PL-566 (Specific to NF Powell River)

1. INTRODUCTION

1.1 Background

The Clean Water Act (CWA) that became law in 1972 requires that all U.S. streams, rivers, and lakes meet certain water quality standards. The CWA also requires that states conduct monitoring to identify polluted waters or those that do not meet standards. Through this required program, the state of Virginia has found that many stream segments do not meet state water quality standards for protection of the six beneficial uses: fish consumption, recreation/swimming, shellfish consumption, aquatic life, wildlife, and public water supply (drinking water).

When streams fail to meet standards, Section 303(d) of the CWA and the U.S. Environmental Protection Agency's (EPA) Water Quality Management and Planning Regulation (40 CFR Part 130) both require that states develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL is a "pollution budget" for a stream. That is, it sets limits on the amount of pollution that a stream can tolerate and still maintain water quality standards. In order to develop a TMDL, background concentrations, point source loadings, and non-point source loadings are considered. A TMDL accounts for seasonal variations and must include a margin of safety. Through the TMDL process, states establish water-quality based controls to reduce pollution and meet water quality standards.

Once a TMDL is developed and approved by EPA, measures must be taken to reduce pollution levels in the stream. Virginia's 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA) states in section 62.1-44.19:7 that the "Board shall develop and implement a plan to achieve fully supporting status for impaired waters". The TMDL Implementation Plan (IP) describes control measures, which can include the use of better treatment technology and the installation of best management practices (BMPs), to be implemented in a staged process.

Multiple locations within the Powell River watershed are impaired with regard to either fecal bacteria (*E. coli*) or the General Standard (benthic), or both. The specific impairments are described in later sections of this document.

The detrimental effects of bacteria in food and water supplies have been documented repeatedly. On August 8, 1994, the Virginia Department of Health (VDH) was notified that campers and counselors at a Shenandoah Valley summer camp developed severe gastrointestinal illness. It was confirmed that *E. coli* 0157:H7, a type of fecal bacteria commonly found in the intestines of humans and animals, was the causative agent (CDC, 1995).

In Franklin County, Virginia, a 1997 outbreak of illness involving three children was attributed to *E. coli* (0157:H7) in Smith Mountain Lake. The children came in contact with the bacteria while swimming in the lake, and a two-year-old child almost died as a result of the exposure (Roanoke Times, 1997a, 1997b, 1998b).

In August 1998, seven children and two adults at a day-care center in rural Floyd County were infected with *E. coli* (0157:H7). Upon investigation, two of the property's wells tested positive for total coliform (Roanoke Times, 1998a, 1998c). On June 6, 2000, Crystal Spring, (Roanoke, Virginia's second largest water source) was shut down by the VDH for *E. coli* contamination (Roanoke Times, 2000).

These are not isolated cases. Throughout the United States, the Centers for Disease Control estimates that at least 73,000 cases of illness and 61 deaths per year are caused by *E. coli* 0157:H7 bacteria (CDC, 2001). Other fecal pathogens (*e.g.*, *E. coli* 0111) are responsible for similar illnesses. In addition, the presence of other bacterial and viral pathogens is indicated by the presence of *E. coli*. Whether the source of contamination is human or livestock waste, the threat of these pathogens appears more prevalent as both populations increase. As stakeholders, we must assess the risk we are willing to accept and then implement measures to safeguard the public from these risks.

The General Standard is meant to protect the health of aquatic life, and also to serve as a fallback monitoring program to identify problems that are not detected by the ambient monitoring system (*e.g.*, pollutant discharges that are intermittent in occurrence, isolated incidents of pollutant discharge, and discharge of pollutants that are not normally measured through the ambient monitoring system). The health of the aquatic life is measured through assessment of the benthic macroinvertebrate community, which is integral to the food chain

that supports higher-level organisms. An unhealthy aquatic community, will impact local and downstream fisheries. Additionally, an aquatic community that is already impacted will not be a good indicator of pollutant problems in the stream.

1.2 Powell River Watershed Impairments

The Powell River TMDL study area (**Figure 1.1**) included five (5) TMDL water bodies North Fork Powell River, South Fork Powell River, the Powell River, Butcher Fork, and Wallen Creek. There were four separate impaired segments of the Powell River and three separate impairments on the South Fork Powell River, making a total of 10 impaired segments included in the TMDL study. Since completion of the study, additional monitoring has led to the removal (de-listing) of some of these segments from the impaired waters list, and the listing of additional impaired segments that were nested into the existing TMDLs. Specifically, Wallen Creek (VAS-P22R_WAL01A00) and 2 segments on the Powell River (VAS-P19R_POW03A00, VAS-P21R_POW02A02) were delisted for bacterial impairments. These two segments of the Powell River remain in this study, due to exceedances of the General (Benthic) Standard. Additionally, a segment in the headwaters of the Powell River (VAS-P17R_POW03C14) was listed for not supporting the General (Benthic) Standard, and is included (“nested”) in this study.

There is a resulting total of ten impaired segments included in this study. Two of the segments are impaired for bacteria. Six of the segments are impaired for not supporting the General (Benthic) Standard. And, two of the segments are impaired for both bacteria and benthic exceedances. In the sections below each impaired stream segment is described. Refer to **Figure 1.2** for a map showing all of the impaired segments. Refer to **Table 1.1** for a listing of the impairments.

While the benthic impairments are nested and impacted by activities in the entire study area (**Figure 1.3**), the bacteria impairments are limited to the TMDL watersheds shown in **Figure 1.4**. Each TMDL watershed correlates to a TDML equation and an allocated load.

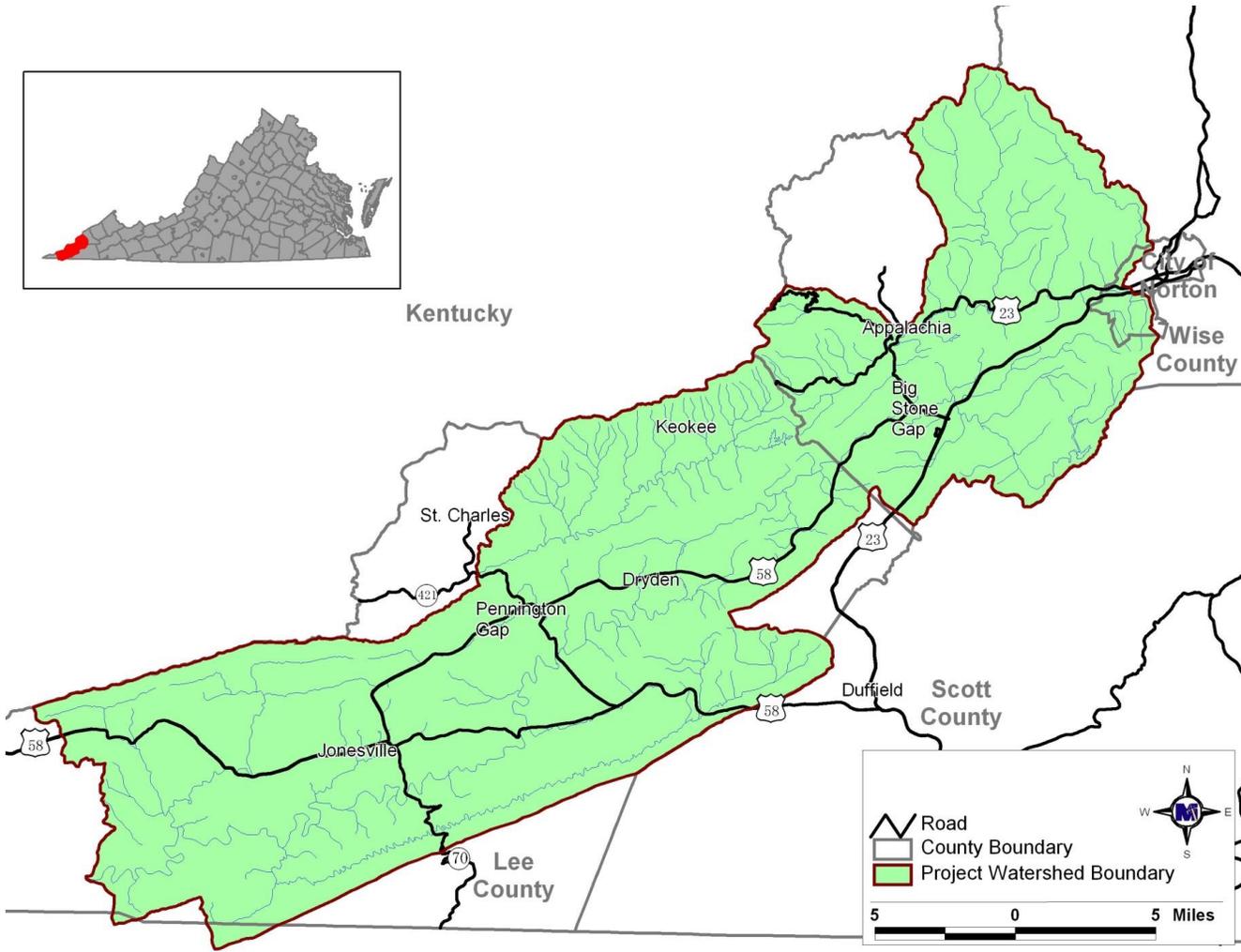


Figure 1.1 The Powell River watershed study area.

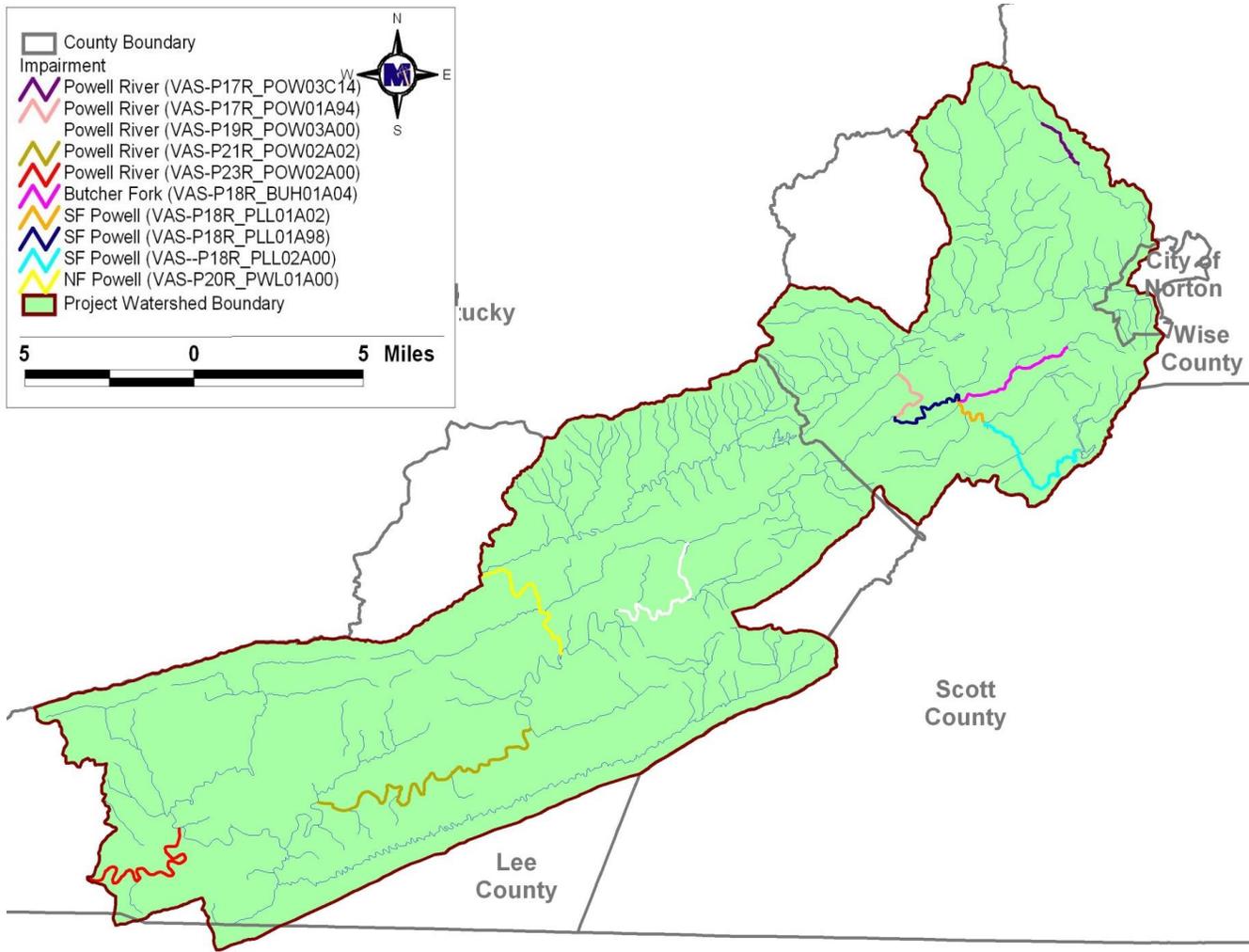


Figure 1.2 The impaired segments in the Powell River watershed.

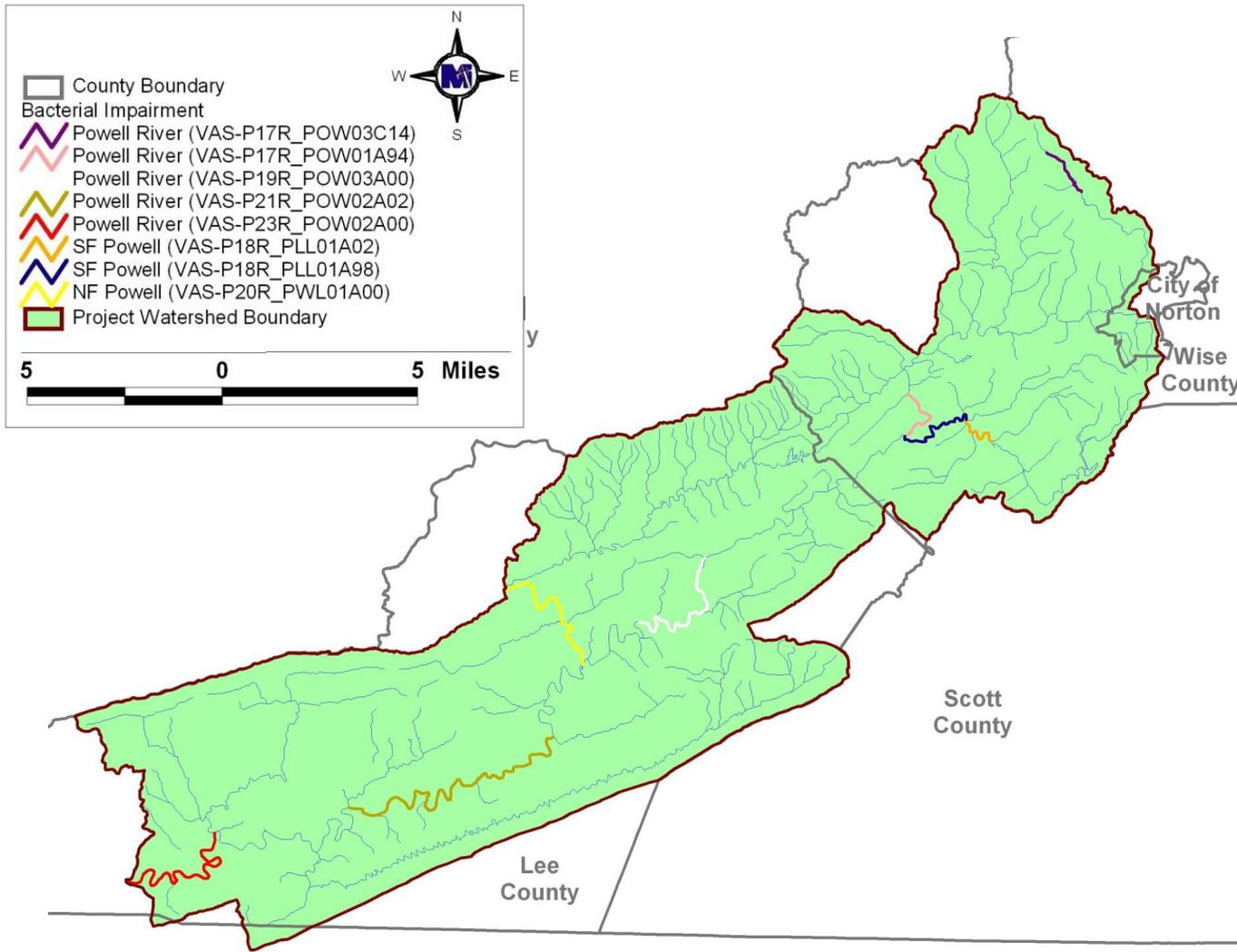


Figure 1.3 The sediment impaired segments in the Powell River watershed.

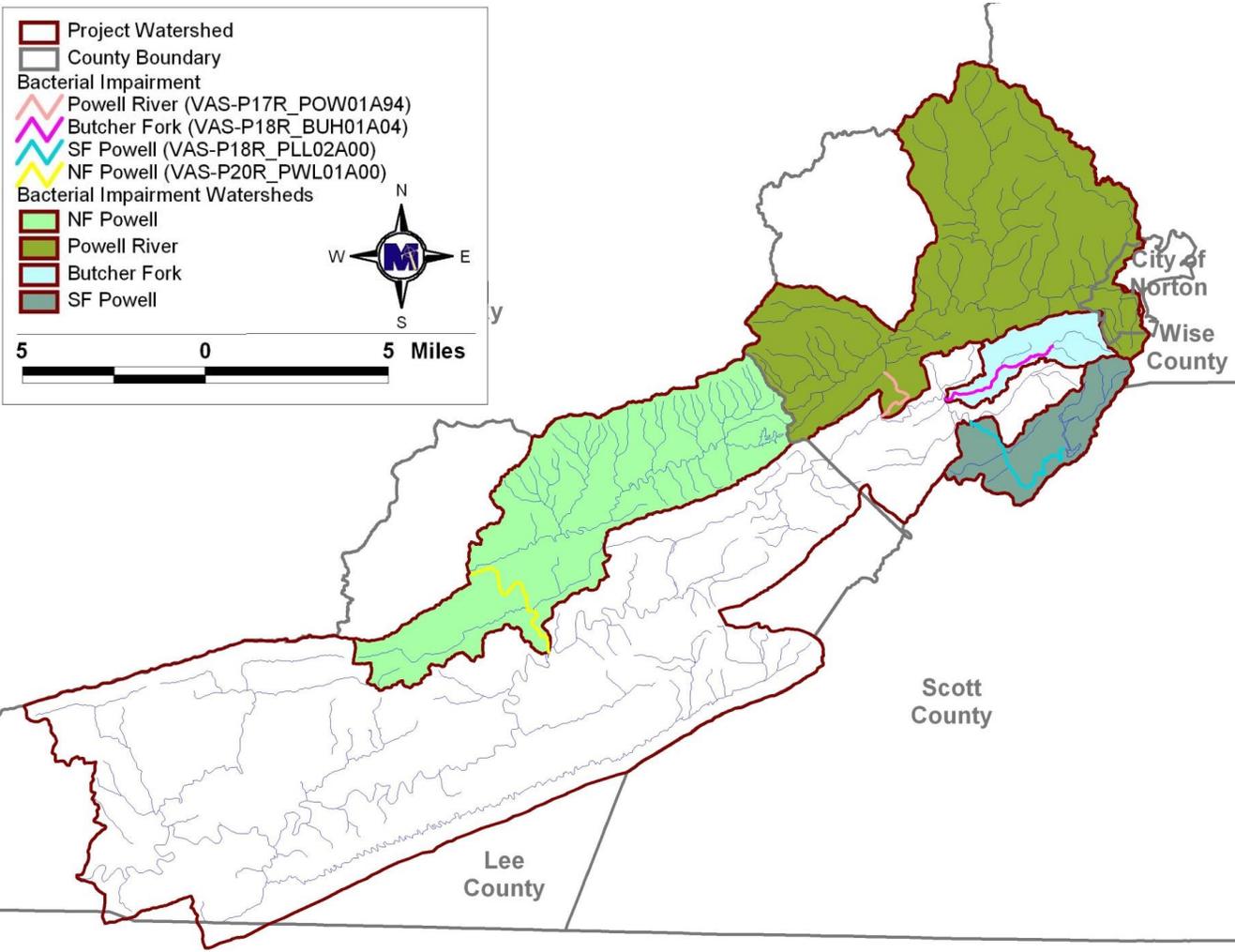


Figure 1.4 The bacteria impaired segments in the Powell River watershed.

Table 1.1 Impairments within the Powell River watershed included in this study.

Stream Name Impairment ID	Impairment(s) Contracted	Initial Listing Year	2014 River Miles	2014 Listing Violation%	Impairment Location Description
Butcher Fork VAS-P18R_BUH01A04	<i>E. coli</i>	2004	4.96	6BBUH000.76, 22%	Headwaters to South Fork Powell River confluence.
South Fork Powell River VAS-P18R_PLL02A00	<i>E. coli</i>	2004	6.45	6BPPL006.38, 33% 6BPPL004.24, 50% 6BPPL002.55, 33% 6BPPL000.27, 22%	Big Cherry Reservoir to Beaverdam Creek.
South Fork Powell River VAS-P18R_PLL01A02	Benthic	2004	1.97	N/A	Beaverdam Creek to Butcher Fork.
South Fork Powell River VAS-P18R_PLL01A98	Benthic	1998	3.83	N/A	Butcher Fork to the Powell River.
North Fork Powell River VAS-P20R_PWL01A00	Benthic, <i>E. coli</i>	1996, 2004	6.05	6BPWL001.49, 27% 6BPWLL004.10, 45%	Straight Creek confluence to Powell River confluence.
Powell River VAS-P17R_POW03C14	Benthic	2014	1.57	N/A	Headwaters of the mainstem, south of Divides Ridge.
Powell River VAS-P17R_POW01A94	Benthic, <i>E. coli</i>	1996	2.71	6BPOW179.20, 47%	Roaring Branch confluence to Dakota St. in Big Stone Gap, VA.
Powell River VAS-P19R_POW03A00	Benthic	2004	6.62	N/A	Poor Valley Creek confluence to Public Water Supply.
Powell River VAS-P21R_POW02A02	Benthic	2012	12.74	N/A	Station Creek confluence to Town Creek confluence.
Powell River VAS-P23R_POW02A00	Benthic	2002	8.47	N/A	Hardy Creek confluence to Yellow Creek confluence.

EC - Based on the instantaneous *E. coli* standard of 235 cfu/100mL

1.2.1 Butcher Fork (VAS-P18R_BUH01A04)

Butcher Fork in Wise County, VA flows southwest into the South Fork Powell River. Its headwaters are near Norton, VA and its outlet is between Big Stone Gap and East Stone Gap, VA.

Butcher Fork, from the headwaters to the confluence with the South Fork Powell River, was initially listed in 2004 as impaired for not supporting the recreation/swimming use. Monitoring at station 6BBUH000.76 showed 22% exceedance of the state standard for *E. coli* bacteria in the most recent assessment.

1.2.2 South Fork Powell River (VAS-P18R_PLL01A98)

The South Fork Powell River in Wise County, VA has its headwaters near Norton, VA, flows through the Big Cherry Reservoir, then flows through East Stone Gap, VA and flows around the south of Big Stone Gap, VA before emptying into the Powell River.

This segment of South Fork Powell River was listed as impaired on the 1998 303(d) list by EPA. This segment, from the Butcher Fork confluence to the outlet at the Powell River, continues to not support the aquatic life use.

1.2.3 South Fork Powell River (VAS-P18R_PLL01A02)

This impaired segment was added to the 2004 impaired waters list for not supporting the aquatic life use. This impaired segment extends from the confluence with Beaverdam Creek upstream and ends at the confluence with Butcher Fork downstream. Biological monitoring at 6BPLL004.49 in 1999 showed South Fork Powell River as moderately impaired. This segment continues to not support the aquatic life use.

1.2.4 South Fork Powell River (VAS-P18R_PLL02A00)

South Fork Powell River from the Big Cherry Reservoir to Beaverdam Creek was listed as not supporting the recreation/swimming use starting in 2004. Monitoring at stations 6BPLL006.38, 6BPLL004.24, 6BPLL002.55, and 6BPLL000.27 showed 33%, 50%, 33%, and 22% exceedance, respectively, of the state standard for *E. coli* bacteria in the most recent assessment.

1.2.5 North Fork Powell River (VAS-P20R_PWL01A00)

The North Fork Powell River in Lee County, VA has its headwaters near the Wise County border. It flows southwest, parallel to the Powell River, then flows through Pocket, VA and abruptly curves south through Pennington Gap, VA before emptying into the Powell River.

A small segment of the North Fork Powell River, 3.94 miles, from the Straight Creek confluence to the Cane Creek confluence was initially listed in 1996 as impaired for not supporting the aquatic life use and the recreation/swimming use. Four biological samples have resulted in moderate impairment ratings. The biological monitoring station in Pennington Gap shows poor habitat, high embeddedness, moderate deposition, and sub-optimal habitat diversity. This segment was again listed as impaired on the 1998 list.

In the 2002 assessment, the impaired segment length of the North Fork Powell River was increased to 6.03 miles and extended from the Straight Creek confluence to the Powell River. This segment was only listed as impaired for not supporting the aquatic life use.

In the 2004 303(d) list, the North Fork Powell River was, once again, listed as impaired for not supporting the aquatic life use and the recreation/swimming use. Water monitoring in 2004 at station 6BPWL001.49 resulted in 4 samples out of 18 samples exceeding the bacteria standard.

The 2006 assessment resulted in the same segment of North Fork Powell River listed as impaired for not supporting both the aquatic life use and the recreation/swimming use. Bacteria concentrations in water samples at stations 6BPWL001.49 and 6BPWL004.10 exceeded the bacteria standard 8 out of 20 and 2 out of 12 times, respectively. Biological surveys during 2003 and 2004 at 6BPWL004.40 indicated the North Fork Powell River is slightly impaired.

The segment is currently listed as 6.05 miles in length. It remains designated as not supporting the aquatic life use and the recreation/swimming use. This is based on benthic sampling in 2013, and bacterial monitoring that shows 27% and 45% exceedances of the bacterial standard, at stations 6BPWL001.49 and 6BPWL004.40, respectively.

1.2.6 Powell River (VAS-P17R_POW03C14)

This segment, in the headwaters of the Powell River, is located north of Norton, in Wise County. It was listed in 2014 as impaired for the aquatic life use (benthic). It was nested into the existing General Standard TMDL.

1.2.7 Powell River (VAS-P17R_POW01A94)

This segment of the Powell River is in Wise County, VA, flows through Appalachia, VA, then between Little Stone Mountain and Stone Mountain following US-23. This segment of the Powell River was initially listed on the 1996 303(d) list for not supporting the recreation/swimming use. Exceedances of the bacteria standard of 58% of the samples were observed at station 6BPOW180.78. This segment remained on the 1998 list.

This segment was listed on the 2002 303(d) list for not supporting both the aquatic life use and the recreation/swimming use. The segment length was updated to 2.62 miles of stream. Data from the biological monitoring station 6BPOW180.72 showed a moderate impairment rating. Water samples from station 6BPOW180.78 resulted in 4 bacteria standard violations out of 36 samples.

The listing did not change during the 2004 assessment, stating this segment was not supporting the aquatic life use and the recreation/swimming use. Water samples showed 11 out of 41 exceedances of the bacteria standard at station 6BPOW180.78. The moderately impaired rating remained.

This segment remained listed on the 2006 303(d) list for not supporting both the aquatic life use and the recreation/swimming use. Two water monitoring stations, 6BPOW179.20 and 6BPOW180.762, both showed exceedances of the bacteria standard, 44% and 58%, respectively. The biological survey in 2003 resulted in a slightly impaired rating.

The segment, now reported with a length of 2.71 miles, remains on the 303(d) list for not supporting both of the stated uses. Sampling at 6BPOW179.20 continues to show exceedances of the bacteria standard (47%). The most recent biological survey in 2013 shows continued impairment.

1.2.8 Powell River (VAS-P19R_POW03A00)

The next downstream segment of the Powell River included in this study extends from the confluence with Poor Valley Creek to the upper end of the public water supply (river mile 161.62). This segment of the Powell River is in Lee County, VA, flows near Dryden, VA, and ends approximately 1.3 miles below the Clear Spring Branch confluence.

The 6.38-mile segment was initially listed on the 2004 303(d) list as impaired for not supporting both the aquatic life use and the recreation/swimming use. Water sampling at station 6BPOW165.78 resulted in 5 bacteria exceedances out of 46 samples. Biological monitoring at station 6BPOW166.92 resulted in a moderately impaired rating.

The length of this segment was updated to 6.37 miles in the 2006 list. The segment was listed again for not supporting both the aquatic life use and the recreation/swimming use. The Powell River at station 6BPOW165.78 had 3 water samples that exceeded the bacteria standard out of 25 samples.

This segmented now reported with a length of 6.62 miles, has been removed from the 303(d) list for exceedances of the bacteria standard (2012), but remains on the list for not supporting the aquatic life use. Benthic sampling in 2013 indicated that the segment remains impaired.

1.2.9 Powell River (VAS-P21R_POW02A02)

This segment of the Powell River extends from the confluence with Station Creek to the confluence with Town Creek. This segment of the Powell River is in Lee County, VA and was originally listed as impaired on the 2006 303(d) list for not supporting the recreation/swimming use. Water samples collected at station 6BPOW138.91 resulted in 3 exceedances of the bacteria standard out of 19 samples. However, it was delisted for bacteria in 2012, and listed for not supporting the aquatic life use in 2012. The aquatic life (benthic) impairment was nested into the existing TMDL in 2012.

1.2.10 Powell River (VAS-P23R_POW02A00)

The most downstream segment of the Powell River included in this study extends from the confluence with Hardy Creek to the confluence with Yellow Creek (8.47 miles). This segment of the Powell River is in Lee County, VA near the Tennessee border.

The segment was initially listed on the 2002 303(d) list as impaired for not supporting the aquatic life use. Biological monitoring at station 6BPOW120.12 resulted in a moderately impaired rating. This segment was listed again on the 2004 and 2006 lists, and remains on the impaired list, after additional sampling in 2010.

1.3 Land Use

Nine land uses were identified in the watershed, for modeling the TMDL. These land use categories have been maintained for the Implementation Plan, but the distribution has been updated, using the 2016 Land Cover Database, produced by Virginia Geographic Information Network (VGIN) and its partners, as well as GIS data from the Department of Mines, Minerals, and Energy (DMME). The implementation plan land use data developed for the watershed are shown in **Table 1.2** and **Figure 1.5**. These data were consolidated, as shown in **Table 1.2**, for the purpose of modeling. **Table 1.3** shows how the land use analysis changed from TMDL development, based on this update.

Based on these changes, it was determined that there would be no change to the bacteria model, since the needed reductions in the TMDL were applied to direct loads (i.e., straight pipes and livestock direct deposition), and none of the changes would have an impact on these loads or the required reductions. However, since changes were made to the land areas contributing to the sediment loads, the sediment model was adjusted accordingly (as described in Section 3.1.3.1).

Table 1.2 Updated land use distribution and associated categories for modeling in the Powell River watershed.

Land Use Category	HSPF Category	GWLF Category	Area (ac)	Comp. (%)
Water	Water	Water	1,254	< 1%
Imp. - Extracted	Residential	Residential	3,258	1%
Imp. - Local Datasets	Commercial	Commercial	2,803	1%
Barren	Barren	Barren	549	< 1%
Forest	Forest	Forest	157,703	61%
Tree	Residential	Residential	12,821	5%
Shrub/Scrub	Forest	Forest	2,764	1%
Harvested/Disturbed	Forest	Disturbed Forest	3,146	1%
TurfGrass	Residential	Residential	9,172	4%
Pasture	Pasture	Pasture	40,173	16%
Cropland	Cropland	Cropland	1,125	< 1%
Woody Wetland	Forest	Forest	718	< 1%
AML	AML	AML	4,085	2%
Active Mining - Disturbed	Barren	Active Mining	4,839	2%
Active Mining - Regraded	Barren	Active Mining	747	< 1%
Active Mining - Reveg.	Forest	Forest	11,463	4%
Total			256,620	100%

Table 1.3 Comparison of land use categories used in developing the TMDL and the updated data.

Sediment TMDL			
Land Use Category	TMDL %	New %	Change
AML	4%	2%	-2.4%
Water	<1%	<1%	0.3%
Residential	7%	5%	-2.3%
Commercial	<1%	1%	0.4%
Forest	61%	72%	11.7%
Disturbed Forest	3%	1%	-1.3%
Unimproved Pasture	7%	8%	0.1%
Improved Pasture	8%	8%	0.1%
Hay	5%	<1%	-5.2%
Barren	1%	<1%	-0.8%
Row Crop – Low Till.	<1%	<1%	0.0%
Row Crop – High Till.	<1%	<1%	0.3%
Active Mine	3%	2%	-1.0%

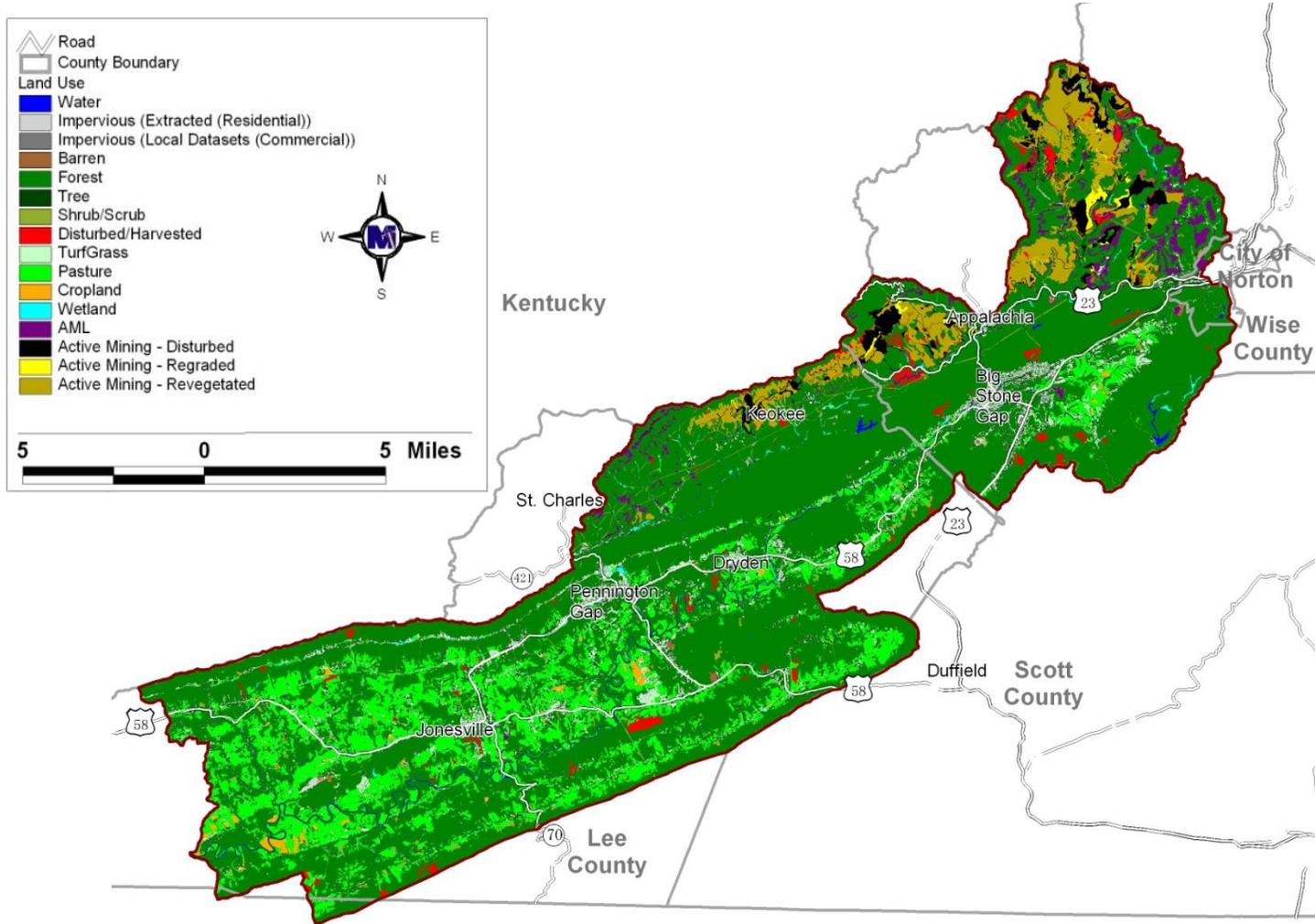


Figure 1.5 Land uses in the Powell River watershed study area.

In developing this IP, elements from both state and federal guidance were incorporated, and the recommended guidelines from Virginia's 2017 *Guidance Manual for Total Maximum Daily Load Implementation Plans* were followed. Specific state and federal requirements of an IP are described in Chapter 2 of this document.

Once developed, the Virginia Department of Environmental Quality (VADEQ) will send the TMDL Implementation Plan to the State Water Control Board (SWCB) for approval as the plan for implementing the pollutant allocations and reductions contained in the TMDLs. Also, VADEQ will request SWCB authorization to incorporate the TMDL Implementation Plan into the appropriate Water Quality Management Plan (WQMP) in accordance with the CWA's Section 303(e). In response to a Memorandum of Understanding (MOU) between USEPA and VADEQ, VADEQ also submitted a draft Continuous Planning Process to USEPA in which VADEQ commits to regularly updating the WQMPs. Thus, the WQMPs will be, among other things, the repository for all TMDLs and TMDL Implementation Plans developed within a river basin.

1.4 Applicable Water Quality Standards

According to 9 VAC 25-260-5 of Virginia's State Water Control Board *Water Quality Standards*, the term "water quality standards" means "...provisions of state or federal law which consist of a designated use or uses for the waters of the Commonwealth and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the State Water Control Law and the federal Clean Water Act".

As stated in Virginia state law 9 VAC 25-260-10 (Designation of uses),

A. *All state waters, including wetlands, are designated for the following uses: recreational uses, e.g., swimming and boating; the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g., fish and shellfish.*



E. *At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under §§ 301(b)(1)(A) and (B) and*

306 of the Clean Water Act and cost-effective and reasonable best management practices for nonpoint source control.

1.4.1 Applicable Criteria for Bacteria Impairments

Based on the USEPA recommendation that all states adopt an *E. coli* or *enterococci* standard for fresh water and *enterococci* criteria for marine waters by 2003, Virginia adopted its current *E. coli* and *enterococci* standard in January 2003, and it was updated in 2009. USEPA has pursued the states' adoption of these standards because there is a strong correlation between the concentration of these organisms (*E. coli* and *enterococci*) and the incidence of gastrointestinal illness. *E. coli* and *enterococci* are both bacteriological organisms that can be found in the intestinal tract of warm-blooded animals. These organisms indicate the presence of fecal contamination. The criteria which were used in developing the bacteria TMDLs that are the subject of this study are outlined in Section 9 VAC 25-260-170 and read as follows:

- A. *The following bacteria criteria (colony forming units (CFU)/100 ml) shall apply to protect primary contact recreational uses in surface waters, except waters identified in subsection B of this section:*

E.coli bacteria shall not exceed a monthly geometric mean of 126 CFU/100 ml in freshwater.

Enterococci bacteria shall not exceed a monthly geometric mean of 35 CFU/100 ml in transition and saltwater.

- 1. See 9VAC25-260-140 C for boundary delineations for freshwater, transition and saltwater.*
- 2. Geometric means shall be calculated using all data collected during any calendar month with a minimum of four weekly samples.*
- 3. If there are insufficient data to calculate monthly geometric means in freshwater, no more than 10% of the total samples in the assessment period shall exceed 235 E.coli CFU/100 ml .*
- 4. If there are insufficient data to calculate monthly geometric means in transition and saltwater, no more than 10% of the total samples in the assessment period shall exceed enterococci 104 CFU/100 ml.*

5. *For beach advisories or closures, a single sample maximum of 235 E.coli CFU/100 ml in freshwater and a single sample maximum of 104 enterococci CFU/100 ml in saltwater and transition zones shall apply.*

The criterion used in developing the bacteria TMDLs included in this study is the geometric mean of 126 cfu per 100 mL.

1.4.2 Applicable Criterion for Benthic Impairments

The **General Standard**, as defined in Virginia state law 9 VAC25-260-20, states:

- A. *All state waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.*

The General Standard is implemented by VDEQ through assessment of the benthic macroinvertebrate community. Stream segments in the Powell River watershed were assessed based on application of the Virginia Stream Condition Index (VSCI). Using the VSCI, the health of the benthic macroinvertebrate community is typically assessed through measurement of eight biometrics (**Table 1.4**) that measure different aspects of the community's overall health. Surveys of the benthic macroinvertebrate community performed by VDEQ are assessed at the family taxonomic level.

Each sample collected at a target station is measured against eight core metrics that when calculated into one number is known as the Virginia Stream Condition Index (VSCI) (Burton, 2003). The VSCI index number is then compared against the impairment threshold of 60, which is based upon a statistical separation of stressed and reference quality sites (e.g., a score greater than or equal to 60 is non-impaired and <60 is impaired).

Table 1.4 Components of the VSCI Assessment

Biometric	Benthic Health ¹
EPT Taxa	↑
Total Taxa	↑
% Ephemeroptera	↑
% Plecoptera plus Trichoptera less Hydropsychidae	↑
% Chironomidae	↓
% Top 2 Dominant Taxa	↓
HBI (Family Biotic Index)	↓
% Scrapers	↑

¹ An upward arrow indicates a positive response in benthic health when the associated biometric increases

1.4.3 Wildlife Contributions

In some streams for which TMDLs have been developed, water quality modeling indicates that even after removal of all sources of *E. coli* (other than wildlife), the stream will not attain standards. TMDL allocation reductions of this magnitude are not realistic and do not meet USEPA's guidance for reasonable assurance. Based on the water quality modeling, many of these streams will not be able to attain standards without some reduction in wildlife. However, Virginia and USEPA are not proposing the reduction of wildlife to allow for the attainment of water quality standards. This is obviously an impractical action. While managing over-populations of wildlife remains as an option to local stakeholders, the reduction of wildlife or changing a natural background condition is not the intended goal of a TMDL. In such a case, after demonstrating that the source of *E. coli* contamination is natural and uncontrollable by effluent limitations and BMPs, the state may decide to re-designate the stream's use for secondary contact recreation or to adopt site specific criteria based on natural background levels of *E. coli*. The state must demonstrate that the source of *E. coli* contamination is natural and uncontrollable by effluent limitations and BMPs through a Use Attainability Analysis (UAA). All site-specific criteria or designated use changes must be adopted as amendments to the water

quality standards regulations. Watershed stakeholders and USEPA will be able to provide comment during this process.

1.5 Project Methodology

The overall goal of this project is to begin the process of restoring water quality in the Powell River impaired stream segments.

The key components of the staged Implementation Plan are discussed in detail in the following sections: State and Federal Requirements for Implementation Plans, Review of TMDL Development, Process for Public Participation, Assessment of Needs, Measurable Goals and Milestones, and Implementation.

In fulfilling the state's requirement for the development of a TMDLIP, a framework has been established for reducing *E. coli* and sediment levels and achieving the water quality goals for the Powell River impaired segments for which TMDL allocations were developed. With successful completion of the IP, Virginia will be well on the way to restoring the impaired waters and enhancing the value of this important resource. Additionally, an approved IP improves the localities' chances for obtaining monetary assistance during implementation.

2. STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLANS

There are a number of state and federal requirements and recommendations for TMDL-IPs. The goal of this chapter is to clearly define what they are and explicitly state if the "elements" are a required component of an approvable IP or are merely a recommendation that should be covered in a thorough IP. This chapter has three sections that discuss a) the Water Quality Monitoring, Information, and Restoration Act (WQMIRA) requirements that must be met in order to produce an IP acceptable and approvable by the Commonwealth, b) the USEPA recommended elements of IPs, and c) the required IP components in Section 319 guidance.

2.1 State Requirements

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. WQMIRA directs the SWCB to "develop and implement a plan to achieve fully supporting status for impaired waters." An Implementation Plan (IP) shows how fully supporting status for impaired waters can be achieved and the pollutant load reductions established in the TMDL studies can thereby be met. In order for IPs to be approved by the Commonwealth, they must meet the requirements as outlined by WQMIRA. WQMIRA requires that IPs include the following:

- date of expected achievement of water quality objectives,
- measurable goals,
- necessary corrective actions, and
- associated costs, benefits, and environmental impact of addressing the impairments.

2.2 Federal Recommendations

Section 303(d) of the CWA and current USEPA regulations do not require the development of implementation strategies. The USEPA does, however, outline the minimum elements of an approvable IP in its 1999 *Guidance for Water Quality-Based Decisions: The TMDL Process*.

The listed elements include:

- a description of the implementation actions and management measures,
- a time line for implementing these measures,
- legal or regulatory controls,
- the time required to attain water quality standards, and
- a monitoring plan and milestones for attaining water quality standards.

It is strongly suggested that the USEPA recommendations be addressed in the IP, in addition to the required components as described by WQMIRA.

2.3 Section 319 Fund Eligibility Requirements

The USEPA develops guidelines that describe the process and criteria used to award CWA Section 319 nonpoint source grants to States. The guidance is subject to revision and the most recent version should be considered for IP development. The “Supplemental Guidelines for the Award of Section 319 Nonpoint Source Grants to States and Territories in FY 2003” identifies the following nine elements that must be included in the IP to meet the 319 requirements (DCR 2012):

1. Identify the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan;
2. Estimate the load reductions expected to achieve water quality standards;
3. Describe the NPS management measures that will need to be implemented to achieve the identified load reductions;
4. Estimate the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the watershed-based plan;
5. Provide an information/education component that will be used to enhance public understanding of the project and encourage the public’s participation in selecting, designing, and implementing NPS management measures;
6. Provide a schedule for implementing the NPS management measures identified in the watershed-based plan;
7. Describe interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented;
8. Identify a set of criteria for determining if loading reductions are being achieved and if progress is being made towards attaining water quality standards; if not, identify the criteria for determining if the watershed-based plan needs to be revised; and
9. Establish a monitoring component to evaluate the effectiveness of the implementation efforts.

3. REVIEW OF TMDL DEVELOPMENT

MapTech, Inc. was contracted to develop *E. coli* bacteria and Aquatic Life (benthic) TMDLs for the Powell River watersheds. The TMDLs were completed in February 2011. The bacteria TMDLs were approved by the USEPA in March 2011. The benthic (sediment) TMDL was approved at this time as a Phase I TMDL. Further monitoring indicated that the approach taken for the benthic TMDL development was appropriate, and the TMDL was re-submitted as a Phase II TMDL in 2014. The TMDL documents are posted at the Virginia Department of Environmental Quality website, www.deq.virginia.gov. The *E. coli* and sediment load reductions called for in the TMDL studies were reviewed to determine the water quality goals and associated pollutant reductions that would need to be addressed through the development of the Implementation Plan.

3.1 Water Quality Modeling

In order to understand the implications of the load allocations determined during TMDL development, it is important to understand the modeling methods used in the analysis.

3.1.1 Fecal Bacteria Modeling

The USGS Hydrologic Simulation Program - Fortran (HSPF) water quality model was used as the modeling framework to simulate hydrology and fecal coliform fate and transport for the bacteria TMDL allocations. The water quality endpoint used for determining the necessary reduction to *E. coli* loads was the monthly geometric mean standard (126 cfu/100 mL), with an implicit margin of safety.

Nine (9) individual point sources are permitted to discharge to surface water bodies in the Powell River watershed study area through the Virginia Pollutant Discharge Elimination System (VPDES). These are listed in **Table 3.1**. Permitted point discharges that may contain pathogens associated with fecal matter are required to maintain an *E. coli* concentration below 126 cfu/100mL, the current standard. One method for achieving this goal is chlorination. Chlorine is added to the discharge stream at levels intended to kill pathogens. The monitoring method for ensuring the goal is to measure the concentration

of total residual chlorine (TRC) in the effluent. Typically, if minimum TRC levels are met, bacteria concentrations are reduced to levels well below the standard.

Table 3.2 shows 36 domestic general permits within the Powell River watershed study area. These permits allow treated residential wastewater to be discharged to surface waters. All of these permitted systems discharge water and bacteria to the streams.

There are no VPDES Animal Feeding Operations (AFOs) or Virginia Pollution Abatement (VPA) facilities in the study area.

Table 3.1 Summary of VPDES permitted point sources permitted for fecal bacteria control in the Powell River watershed study area.

Permit	Receiving Stream(s)	Facility Name	Permitted for FC Control
VA0020940	Powell River	Big Stone Gap Regional WWTP	Yes
VA0029599	Powell River, North Fork	Pennington Gap STP	Yes
VA0052311	South Fork Powell River	Big Stone Gap Water Treatment Plant	No
VA0052337	Ben’s Branch	Appalachia Water Treatment Plant	No
VA0053023	Powell River	Pennington Gap Water Treatment Plant	No
VA0060798	Mill Branch	Wise County Public Schools – Appalachia E S STP	Yes
VA0063941	Station Creek	Dot Mobile Home Park STP	Yes
VA0075515	Powell River	Lee County Public Service Authority – Cross Creek	Yes
VA0089397	Powell River	Lee County PSA - Hickory Flats WWTP	Yes

Table 3.2 Single family home permits in the Powell River watershed study area.

Permit	Receiving Stream	Facility Type
VAG400227	Butcher Fork	Private Residence
VAG400016	Butcher Fork	Private Residence
VAG400383	Pigeon Creek	Private Residence
VAG400392	Powell River	Private Residence
VAG400395	Beaverdam Creek	Private Residence
VAG400505	Powell River	Private Residence
VAG400089	Thacker Branch	Private Residence
VAG400253	Wildcat Creek	Private Residence
VAG400049	South Fork Powell River	Private Residence
VAG400347	Beaverdam Creek UT	Private Residence
VAG400517	Powell River	Private Residence
VAG400373	Butcher Fork	Private Residence
VAG400135	Bear Branch	Private Residence
VAG400151	Wildcat Creek	Private Residence
VAG400166	Butcher Fork	Private Residence
VAG400275	Butcher Fork	Private Residence
VAG400281	Wildcat Creek	Private Residence
VAG400228	Butcher Fork	Private Residence
VAG400099	Beaverdam Creek	Private Residence
VAG400117	Crab Orchard Creek	Private Residence
VAG400128	Butcher Fork	Private Residence
VAG400462	Butcher Fork	Private Residence
VAG400470	Beaverdam Creek	Private Residence
VAG400169	Beaverdam Creek	Private Residence
VAG400748	Beaverdam Creek UT	Private Residence
VAG400640	Powell River	Private Residence
VAG400389	Butcher Fork	Private Residence
VAG400601	Butcher Fork	Private Residence
VAG400670	Beaverdam Creek	Private Residence
VAG400642	Butcher Fork	Private Residence
VAG400711	South Fork Powell River	Private Residence
VAG400355	Butcher Fork	Private Residence
VAG400685	Beaverdam Creek	Private Residence
VAG400429	Butcher Fork	Private Residence
VAG400432	Beaverdam Creek	Private Residence
VAG400715	Thacker Branch	Private Residence

Both urban and rural nonpoint sources of *E. coli* bacteria were considered in water quality modeling. Sources included residential sewage treatment systems, land application of waste, livestock, wildlife, and domestic pets. Loads were represented either as land-based loads (where they were deposited on land and available for wash off during a rainfall event) or as direct loads (where they were directly deposited to the stream). Land-based nonpoint sources are represented as an accumulation of pollutants on land, where some portion is available for transport in runoff. The amount of accumulation and availability for transport vary with land use type and season. The model allows a maximum accumulation to be specified. The maximum accumulation was adjusted seasonally to account for changes in die-off rates, which are dependent on temperature and moisture conditions. Some nonpoint sources, rather than being land-based, are represented as being deposited directly to the stream (*e.g.*, animal defecation in the stream, and straight pipes). These sources are modeled similar to point sources as they do not require a runoff event for delivery to the stream.

3.1.2 *E. coli* Model Allocations

Several model runs were made investigating scenarios that would meet the monthly geometric mean TMDL goal of 126 cfu/100mL (includes an implicit margin of safety). The final load reductions are shown in **Table 3.3**. Additionally, eliminating Sanitary Sewer Overflows (SSOs) was identified in the TMDL. However, this was not a significant component of the TMDL. There are no known, ongoing issues with SSOs in the watershed.

The final allocation scenario calls for a 100% reduction of human straight pipes in all of the bacteria impacted watersheds and a 100% reduction of direct in-stream loading from livestock in the Butcher Fork watershed. Failed septic systems are also considered to have a 100% reduction because state law requires that failing septic systems and straight pipes be corrected.)

Table 3.3 Fecal bacteria load reductions allocated during TMDL development for the Powell River watershed (measured as Percent Reductions to Existing Bacteria Loads¹)

Watershed	Straight Pipes²	Residential³	Livestock Direct	Agricultural (Crop & Pasture)	Wildlife Direct	Forest
Butcher Fork	100	0	0	0	0	0
South Fork Power River	100	0	0	0	0	0
North Fork Powell River	100	0	0	0	0	0
(Upper) Powell River ⁴	100	0	0	0	0	0

¹ These are the load reductions as represented in the TMDL.

² While the reductions from the TMDL focus on “Straight Pipes”, any illicit discharge (*e.g.*, failing septic systems) that delivers a load directly to the stream has the same impact as a straight pipe and, as such, should be addressed during implementation.

³ Residential represents bacteria loads in runoff from residential and urban areas.

⁴ This portion of the Powell River watershed is primarily upstream of Big Stone Gap. It was referred to as the Powell River watershed in the TMDL, but it is referred to as the “Upper” Powell River watershed in the remainder of the document, in order to distinguish it from the larger Powell River watershed, which has a sediment reduction addressed in this Implementation Plan.

3.1.3 Sediment Modeling

Excessive sedimentation is considered the primary cause of the listed benthic impairment in the Powell River. This is based on the total suspended solids (TSS) concentrations and the poor habitat score for embeddedness and substrate. Embeddedness is an indication of significant fine sediment accumulation in the riffle area of a stream. Abandoned mine land, residential/commercial runoff, logging, streambank erosion, and agricultural activity are the most likely sources of sediment.

The Generalized Watershed Loading Function (GWLF) model (Haith et al., 1992) was used to model sediment for the Powell River. Since there is no state standard for sediment, a reference watershed approach was used to establish the water quality endpoint for the TMDL allocation. Using this approach, a similar, but non-impaired, watershed was selected and modeled to determine the acceptable load of sediment the Powell River could assimilate while maintaining water quality standards. The reference watershed for the Powell River was the Upper Clinch River in Russell and Tazewell counties, Virginia.

3.1.3.1 Sediment Allocations

The target TMDL load for the Powell River is the average annual load in metric tons per year (t/yr) from the area-adjusted Upper Clinch River watershed under existing conditions. To reach the TMDL goal (57,535 t/yr) several scenarios were simulated with GWLF (Table 3.4). The final scenario called for equal reductions across all contributing sources. After adjusting loads, based on the updated land use data, a reduction of 9.0 % for sediment load is needed from AML, barren areas, residential/urban areas, disturbed forest, unimproved pastureland, conventional-tillage cropland areas, and streambank erosion in addition to 100% reduction in straight pipe contribution.

Table 3.4 TMDL allocation scenario for the Powell River watershed.

Sediment Source	Existing Powell Loads	Scenario 1 Reductions (Final)	Scenario 1 Allocated Loads
	t/yr	(%)	t/yr
Pervious Area:			
AML	2,342	9.0	2,131
Barren	3,188	9.0	2,901
Row Crop – Low Tillage	142	0	142
Row Crop – High Tillage	2,360	9.0	2,148
Forest	3,654	0	3,654
Disturbed Forest ¹	1,319	9.0	1,200
Commercial	0	0	0
Residential	1,112	9.0	1,012
Hay	0	0	0
Unimproved Pature ²	11,090	9.0	10,092
Improved Pasture	1,747	0	1,747
Impervious Area:			
Commercial- Impervious	282	0	282
Residential- Impervious	98	0	98
Direct Sources:			
Streambank Erosion	11,508	9.0	10,472
Straight Pipes	31	100	0
Permitted Sources:			
DEQ VPDES permits	179	0	179
DMME Mining Permits	502	0	845
Straight Creek Existing Load³	18,792	64.58	6,656
Callahan Creek Existing Load³	18,664	62.84	6,936
Future Growth			632.94
Margin of Safety			6,392.74
Watershed Total	77,010	25.3	57,521

¹ VADCR refers to this acreage as defined by Virginia Department of Forestry as forest lands that are non-functional following harvesting

² VADCR refers to this acreage as unimproved acres of pasture where cattle may pass through but are not fertilized for grazing

³ Existing and allocated loads from Straight Creek and Callahan Creek were taken from the already developed TMDLs for the two creeks since they fall within the current study area.

3.2 Implications of TMDL and Modeling Procedure on Implementation Plan Development

The major implication in the development of these TMDLs is that reductions in bacterial loads are required to achieve the water quality standard. All uncontrolled discharges and leaking sewer lines must be identified and corrected; additionally livestock must be excluded from

streams in the Butcher Fork watershed. The sediment load reductions identified are fairly low, and therefore seem very achievable.

However, there are subtler implications as well. Implicit in the requirement for 100% correction of uncontrolled discharges is the need to maintain all functional septic systems. Additionally, it was pointed out by stakeholders that failing residential sewage treatment systems that are in close proximity to creeks will act as straight pipes and should be addressed by this Implementation Plan. Also, it was recognized that part of the land area, identified as “residential” in the TMDL, might better be characterized as “urban”. As such, urban BMPs should be considered in this Implementation Plan.

4. PUBLIC PARTICIPATION

Public participation was an integral part of the TMDL Implementation Plan development, and is critical to promote reasonable assurances that the implementation activities will occur. Attendance was encouraged through email, newspaper announcements, phone calls and notices sent to the Virginia Register.

4.1 Public Meetings for the Powell River Watersheds

Two sets of public meetings were held for the project. The first set of public meetings were held at the Pennington Gap Community Center, in Pennington Gap, VA, on April 11, 2017, and at the Big Stone Gap Town Hall, in Big Stone Gap, VA, on April 13, 2017. The meetings were publicized in the *Virginia Register*, and were attended by thirty-two (32) people, including, citizens, government agents and one consultant. Information delivered to the public at the meetings included a general description of the TMDL process, a more detailed description of TMDL development and IP development, and a solicitation for participation in working groups.

The second set of public meetings was held on February 6, 2018 and February 8, 2018, at the Pennington Gap Community Center, in Pennington Gap, VA, and at the Big Stone Gap Visitor Center, in Big Stone Gap, VA, respectively. The primary purpose of these meeting was to present the final TMDL Implementation Plan. A presentation was given describing the Implementation Plan using major components as an outline: review of TMDL development, public participation, assessment of needs, cost/benefit analysis, and implementation. The meetings were followed by a 30-day comment period. All necessary revisions to the document, based on public comment were completed.

In addition to the public meetings, a steering committee, and specialized working groups (agricultural, residential, and industrial) were assembled from communities of people with common concerns regarding the TMDL process. Because of the watershed size, 2 meetings were held for the residential and agricultural working groups. The working groups served as the primary arena for seeking public input on implementation actions to be included in the plan, associated costs and outreach methods. The steering committee reviewed the draft of

this document, including reports from each of the working groups and helped to guide the overall development of the Implementation Plan. A representative of the Virginia Department of Environmental Quality (VADEQ) directed each working group and steering committee meeting in order to facilitate the process and integrate information collected from the various communities.

The role of the working groups was to review implementation from the perspective of the group, identify any obstacles (and solutions) related to BMP implementation, and to provide input on the BMPs to include in the plan. Further, these groups helped to identify existing programs and technical resources that may enhance implementation efforts, and to propose additional programs that would support implementation.

All meetings conducted during the course of the TMDLIP development are listed in **Table 4.1**. The minutes from each of the working groups and the steering committee are included in Appendix A. Individuals on local and state levels representing agricultural, residential, and industrial interests devoted many work-hours to attending meetings.

4.2 Summary

Varied opinions were voiced throughout the public participation meetings regarding the IP process. Most members of the working groups agreed that the cornerstone of the IP is cultivating public involvement and education, and encouraging commitment and partnerships among the citizens and government agencies in the watershed in order to reduce pollution. An assertion of individual responsibility provides a foundation for building partnerships among citizens, businesses, interest groups, and government agencies. It can also cultivate voluntary implementation and long-term support for reducing pollutant levels and restoring water quality in the Powell River watersheds.

Table 4.1 Meetings held pertaining to the Powell River watersheds TMDL Implementation Plan development.

Date	Meeting Type	Location	Attendance
April 11, 2017	Public Meeting	Pennington Gap Community Center Pennington Gap, VA	14
April 13, 2017	Public Meeting	Big Stone Gap Town Hall Big Stone Gap, VA	18
May 16, 2017	Agricultural Working Group	Council Chambers Appalachia, VA	4
May 18, 2017	Agricultural Working Group	Daniel Boone SWCD Office Jonesville, VA	7
May 22, 2017	Industrial Working Group	DMME Office Big Stone Gap, VA	11
May 23, 2017	Residential Working Group	Big Stone Gap Town Hall Big Stone Gap, VA	3
May 24, 2017	Agricultural Working Group	Lonesome Pine SWCD Office Clintwood, VA	4
May 25, 2017	Residential Working Group	Pennington Gap Community Center Pennington Gap, VA	5
June 6, 2017	Residential Working Group (VDH)	Wise County Health Department Office Wise, VA	2
January 18, 2018	Steering Committee	Big Stone Gap Visitor Center Big Stone Gap, VA	10
February 6, 2018	Final Public Meeting	Pennington Gap Community Center Pennington Gap, VA	13
February 8, 2018	Final Public Meeting	Big Stone Gap Visitor Center Big Stone Gap, VA	12

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5. ASSESSMENT OF IMPLEMENTATION ACTION NEEDS

An important part of the Implementation Plan is the identification of specific best management practices (BMPs) and associated technical assistance needed to improve water quality in the watersheds. Since this plan is designed to be implemented by landowners on a voluntary basis, it is necessary to identify management practices that are both financially and technically realistic and suitable for this particular community. As part of this process, the costs and benefits of these practices must be examined and weighed. Once the best practices have been identified for implementation, the BMPs needed to meet the water quality goals established during the TMDL study are quantified.

5.1 Identification of Control Measures

Potential control measures or best management practices (BMPs), their associated costs and efficiencies, and potential funding sources were identified through review of the TMDL, input from working groups, and literature review. Control measures were assessed based on cost, availability of existing funds, reasonable assurance of implementation, and water quality impacts. Some control measures were indicated or implied by the TMDL allocations, while others were selected through a process of stakeholder review and analysis of effectiveness in these watersheds. These measures are discussed in **Sections 5.1.1** and **5.1.2**, respectively.

5.1.1 Control Measures Implied by the TMDL

The reductions in fecal bacteria identified by the TMDL studies dictated some of the control measures that must be employed during implementation. In order to meet the reductions in direct bacteria deposition from livestock, some form of stream exclusion is necessary. Fencing is the most obvious choice. However, the type of fencing, its distance from the stream bank, and the most appropriate management strategy for the fenced pasture are less obvious. The 100% reduction in loads from straight pipes, failing septic systems, sewer leaks, and sewer overflows is a pre-existing legal requirement as well as a result of the TMDL. This reduction indicates that all illicit discharges (*i.e.*, straight pipes and cross-connections) in the watersheds should be corrected, and that all onsite sewage treatment systems (OSTS) (*e.g.*, septic systems and alternative waste treatment systems) and sewer infrastructure must be maintained in proper working condition.

While it is recognized that farmers will want to minimize the cost of fencing and the amount of pasture lost, any fencing installed through the use of cost-share programs should follow established NRCS specifications. This is particularly relevant, where sediment reductions in runoff from pasture are required.

An alternative water source will typically be required where pasture is fenced off from streams. The main criterion is that the system be dependable. Water systems alone (*i.e.*, with no streamside fencing) have been shown to reduce the amount of time cattle spend in the stream by as much as 50 to 80%. This is not a large enough reduction to meet all of the TMDLs. Ideally, all fencing, even that which is installed solely at the landowner's expense, should be placed at least 35-ft from the stream. The wide buffer helps to reduce bacteria, as well as sediment loads in runoff. The incorporation of effective buffers could reduce the need for more costly control measures.

From an environmental perspective, the best management scenario would be to exclude livestock from the stream bank 100% of the time and establish permanent vegetation in the buffer area. This prevents livestock from eroding the stream bank, provides a buffer for capturing pollutants in runoff from the pasture, and establishes (with the growth of streamside vegetation) one of the foundations for healthy aquatic life. From a livestock-production perspective, the best management scenario is one that provides the greatest profit to the farmer. Obviously, taking land (even a small amount) out of production is contrary to that goal. However, a clean water source has been shown to improve milk production and weight gain. Clean water will also improve the health of animals (*e.g.*, cattle and horses) by decreasing the incidence of waterborne illness and exposure to swampy areas near streams. Additionally, intensive pasture management, which becomes possible with an alternative water source, has been shown to improve overall farm profitability and environmental impact. From a part-time farmer's perspective, the best management scenario is one that requires minimal input of time. This would seem to preclude intensive pasture management. However, those farmers who have adopted an intensive pasture-management system typically report that the additional management of the established system amounts to "opening a gate and getting out of the way" every couple of days. Additionally, the efficient use of the pasture often means that fewer supplemental feedings are necessary. Among both part-time and full-time farmers there are individuals who are hesitant to allow streamside vegetation to grow unrestricted because of aesthetic preferences or because they have spent a lifetime preventing this growth. However, given

the reductions needed in pollutant delivery to the stream, a vegetated buffer would be beneficial. For planning purposes, it was assumed that a vegetated buffer would be established in conjunction with stream fencing.

Eliminating Sanitary Sewer Overflows (SSOs) was identified in the TMDL. However, this was not a significant component of the TMDL, and there are no known, ongoing issues with SSOs in the watershed. Correction of sewer overflows and leaks is an ongoing effort of the entities charged with the maintenance and operation of these systems. The options identified for correcting illicit discharges and failing septic systems included: repair of an existing septic system, installation of a septic system, connection to a sewer system and installation of an alternative waste treatment system. Additionally, a septic pumpout program was recommended, to aid in identifying problems.

5.1.2 Control Measures Selected through Stakeholder Review

In addition to the control measures that were directly indicated by the TMDL, a number of measures were needed to control sediment from land-based bacteria sources. Various scenarios were developed that began with implementation of the measures indicated by the TMDL. Next, practices that require the control or treatment of runoff are the primary tools available. One such BMP is improved pasture management. The improved pasture management BMP is considered an enhancement of a grazing land management system. Along with the infrastructure provided by a grazing land management system, improve pasture management includes:

- Maintenance of an adequate forage height (suggested 3-inch minimum grass height) during growing season.
- Application of lime and fertilizer according to soil test results.
- Mowing of pastures to control woody vegetation.
- Distribution of manure through managed rotational grazing.
- Reseeding after severe drought if necessary.

Currently, pasture management is implemented through the USDA EQIP program as prescribed grazing (528) and as a BMP in TMDL implementation project areas funded by DEQ. Funding is available as an incentive payment per acre when used in conjunction with the livestock exclusion systems and is considered an enhancement to grazing management. Employing pasture

management can produce significant economic gains to producers at a very low investment cost. Input from local stakeholders indicated that the best available cost-share BMP for promoting pasture improvement were stream exclusion practices (e.g., SL-6), which include funding for improved pasture management systems.

Stakeholders also identified some specific instances of streambank erosion in urban areas that should be addressed by the Implementation Plan. And, as stated in Chapter 3, it was recognized that residential sewage treatment systems that are failing in close proximity to a stream will have the same effect as a straight pipe. These instances could potentially be addressed by a system repair, rather than a full installation.

The final set of control measures identified and the efficiencies used in this study to estimate needs are listed in **Table 5.1**.

Table 5.1 Potential control measure costs and efficiencies.

Type Description	Bacteria Reduction Efficiency	Sediment Reduction Efficiency	Ref.	Unit	Unit Cost
<i>Agricultural BMPs</i>					
Livestock Exclusion with riparian buffers (LE-1T, SL-6)	100%	100%	1	system	\$20,600
Livestock Exclusion with reduced setback (LE-2, LE-2T)	100%	100%	1	system	\$11,500
Livestock Exclusion with grazing land mgnt (CREP/SL-6)	100%	100%	1	system	\$20,000
Stream Protection (WP-2T)	100%	100%	1	system	\$3,400
Improved pasture management (SL-6)	50%	50%	3,5	acre	\$453
Conservation Tillage	74%	74%	5, 9	acre	\$100
<i>Residential/Urban BMPS</i>					
Septic Tank Pump-Out (RB-1)	5%	N/A	2	system	\$400
Septic System Installation/Replacement (RB-4/4P)	100%	100%	1,2	system	\$6,500
Sewer System Connection (RB-2)	98%	100%	1,3	system	\$700
Alternative Waste Treatment System (RB-5)	98%	100%	1,2	system	\$20,000
Septic System Repair (RB-3/3R)	100%	N/A	1,3	system	\$3,500
Rain Gardens	85%	85%	8	acre-treated	\$3,000
Infiltration Trench	90%	90%	7,4	acre-treated	\$6,000
Bioretention Basins	85%	85%	6,5	acre-treated	\$19,000
<i>Industrial BMPS</i>					
AML/Barren Area Reclamation	N/A	95%	9	acre-treated	\$10,000
Disturbed Forest Reclamation	N/A	95%	9	acre-treated	\$300
Haul Road Stabilization	N/A	85%	9	acre-treated	\$700
<i>General BMPS</i>					
Stream Bank Stabilization	N/A	2.55 lbs/yr	3	feet	\$700

1. Removal efficiency is defined by the practice.

2. VADCR and VADEQ TMDL Implementation Plan Development Guidance Manual

3. Commonwealth of Virginia. 2005. Chesapeake Bay Nutrient and Sediment Reduction Tributary Strategy. www.naturalresources.virginia.gov/Initiatives/TributaryStrategies/

4. Schwab, G.O., D.D. Fangmeier, W.J. Elliot, R.K. Frevert. 1992. Soil and Water Conservation Engineering, 4th Edition. Wiley.

5. Bacteria efficiency estimated based on sediment and nutrient efficiency

6. US EPA. "Storm Water Technology Fact Sheet Bioretention." (1999): 8.

7. US EPA. "Storm Water Technology Fact Sheet Infiltration Trench." (1999): 7

8. Hunt, William F, Jonathan T Smith, and Jon Hathaway. City of Charlotte Pilot BMP Monitoring Program, Mal Marshall Bioretention Final Monitoring Report. City of Charlotte, 2007.

9. Estimated, based on modeled outputs.

5.2 Quantification of Control Measures

An array of pollution control measures have been laid out, based on their potential for use in these watersheds. All of these measures have potential for application in the watershed. However, in order to get an estimate of costs, a specific set of control measures was enumerated, based on cost effectiveness and likelihood of use in the watershed. This specific set of control measures should not be viewed as a constraint. The quantity of control measures recommended during implementation was determined through spatial analyses, and modeling alternative implementation scenarios, as well as requests from working group members. Spatial analyses included the processing of data that included land use, census data, stream networks, and elevation, along with data archived in the VADCR Agricultural BMP Database and TMDL development documents. The map layers and archived data were combined to establish the number of control measures recommended overall, in each watershed, and in each subwatershed, where appropriate. Estimates of the amount of on-site treatment systems, sewer connections, streamside fencing and number of full livestock exclusion systems were made through these analyses. The quantities of additional control measures were determined through modeling alternative scenarios and applying the related reduction efficiencies to their associated loads.

Implicit in the TMDL is the need to avoid increased delivery of pollutants from sources that have not been identified as needing a reduction, and from sources that may develop over time, as implementation proceeds.

5.2.1 Agricultural Control Measures

5.2.1.1 Livestock Exclusion BMPs

To estimate fencing requirements, the stream network was overlaid with land use. Stream segments that flowed through or adjacent to land-use areas that had a potential for supporting cattle (*e.g.*, improved pasture) were identified. If the stream segment flowed through the land-use area, it was assumed that fencing was required on both sides of the stream, while if a stream segment flowed adjacent to the land-use area, it was assumed that fencing was required on only one side of the stream. These assumptions were further refined to account for existing BMPs. Perennial streams were included in this process. Land uses included cattle operations, and pasture. Not

every land-use area identified as pasture has livestock on it at any given point in time. However, it is assumed that all pasture areas have the potential for livestock access.

The fencing needs were estimated in a two-step process. Since all livestock need to be excluded from the streams in the Butcher Fork watershed to meet the bacteria TMDL, the analysis was performed on Butcher Fork first. A map of potential streamside fencing required for the Butcher Fork watershed is shown in **Figure 5.1**. The total estimate of 7.8 miles (41,057 feet) of streamside fence would be required to exclude all livestock that are quantified in the TMDL from streams in the Butcher Fork watershed. There is, however, an existing 1.6 miles (8,503 feet) of streamside fencing, leaving a need for 6.2 miles (32,554 feet).

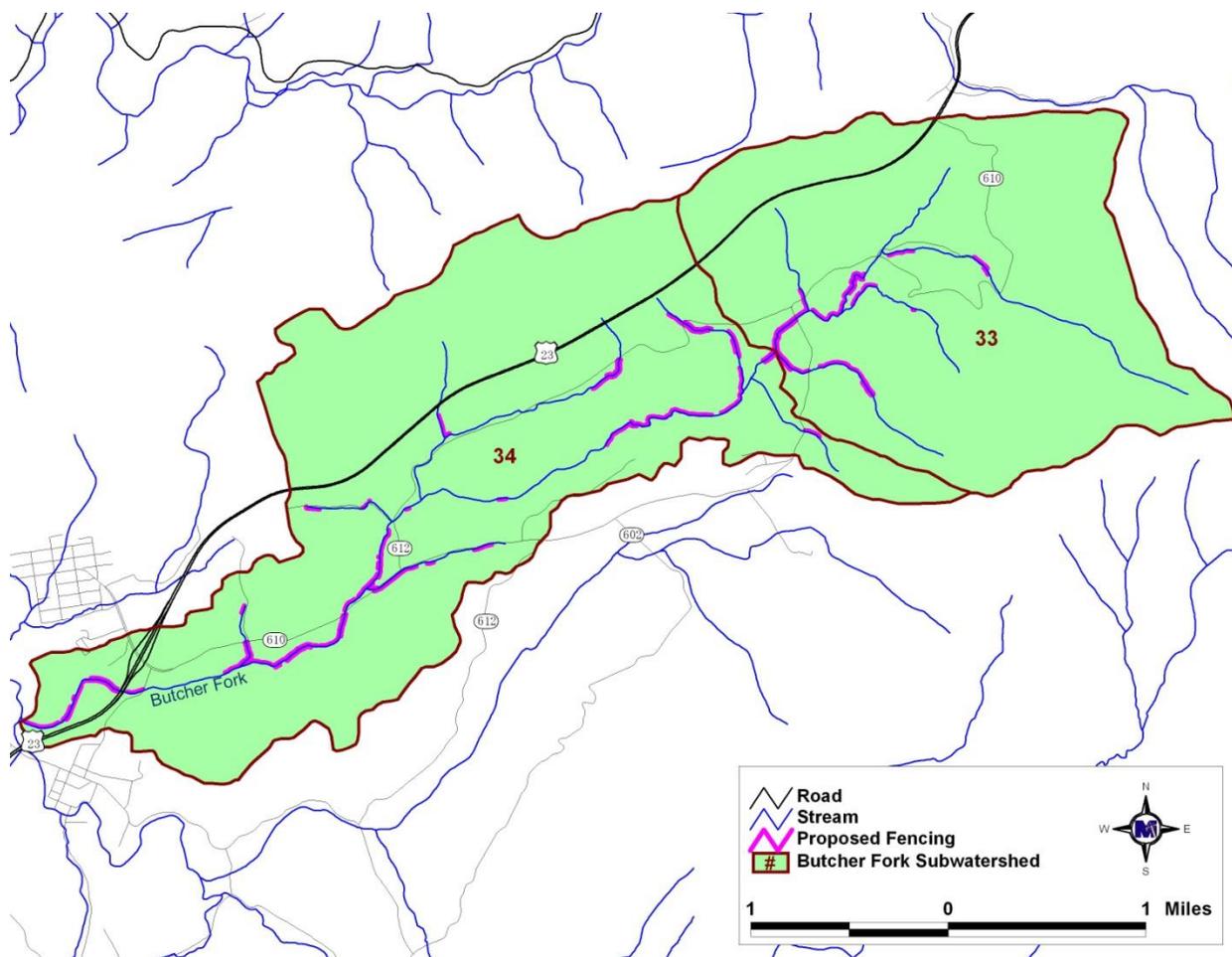


Figure 5.1 Potential streamside fencing for streams in the Butcher Fork watershed.

The second step in the process was to analyze the remaining Powell River watershed areas for potential livestock exclusion practices. Although livestock exclusion was not identified specifically in the bacteria TMDLs for the remaining areas, livestock access to streams is a primary driver of streambank erosion in the watershed. This analysis indicated that there is potential for 95.3 miles (503,107 feet) of streamside fencing in the remaining areas of the watershed. Of this potential, 46.8 miles (247,151 feet) are already fenced, leaving 48.9 miles (255,956 feet) available for potential livestock exclusion practices. Based on the modeled assessment, human activity accounts for approximately 80% of the sediment load from streambank erosion in the Powell River watershed. Of this, roughly half is due to livestock access. In order to achieve the 9% reduction in streambank erosion that is needed for the sediment TMDL, approximately 23.2 miles of streambank would need to be fenced off throughout the watershed (in addition to the need in Butcher Fork). Over twice this amount has already been fenced in the Powell River watershed, so no additional livestock exclusion is needed, outside of the Butcher Fork watershed, to provide the required reduction in sediment loads from streambank erosion. However, any additional streambank protection, through livestock exclusion, would be beneficial to water quality, and would speed the restoration process. Additionally, as discussed earlier in this chapter, input from local stakeholders indicated that the best available cost-share BMP for promoting pasture improvement were stream exclusion practices (e.g., SL-6), which include funding for improved pasture management systems.

The VADCR Agricultural BMP Database was utilized to determine typical characteristics of full livestock exclusion systems (e.g., streamside fencing length per practice) so that the number of different systems needed could be accurately estimated. The database was queried for information on BMPs in these watersheds that exclude livestock from the stream. Based on these data, the average length of streambank protected by a system is 1,700 ft. The particular livestock-exclusion BMPs that will be promoted through this Implementation Plan are grazing land protection systems (LE-1T, LE-2 and LE-2T) and stream protection systems (WP-2T). The LE-1T system includes streamside fencing, cross fencing, an alternative watering system, and a 35-ft buffer from the stream (the LE-2, LE-2T system includes the same items as the LE-1T but only requires a 10-ft buffer). It was estimated that 47% of livestock exclusion systems would be accomplished through

the installation of LE-1T, SL-6 and CREP/SL-6 systems. The (LE-1T) offers 85% cost share and is only available in targeted TMDL watersheds with Implementation Plans. The LE-2 and LE-2T offer 50% cost share. The WP-2T systems include streamside fencing, hardened crossings, and a 35-ft buffer from the stream. The WP-2T practice is only available in TMDL-targeted implementation areas. This practice includes an up-front cost share payment of 50 cents per linear foot of fence installed to assist in covering anticipated fencing maintenance costs. In cases where a watering system already exists, a WP-2T system is a more appropriate choice. Despite the additional payment for maintenance costs, this practice is sometimes viewed as less desirable, because it does not provide cost share for the installation of a well. This was reflected in the number of WP-2 systems noted in the Ag BMP Database. Consequently, it was estimated that only 1% of fencing would be accomplished using the WP-2T practice. Fencing through the Conservation Reserve Enhancement Program (CREP) is an option in the watershed provided a 35-ft setback is used. The Conservation Reserve Program (CRP) is an alternative for landowners who do not want to install a 35-ft buffer; this program requires only a 20-ft buffer.

To establish the total number of livestock exclusion systems necessary to achieve full implementation, systems were calculated by dividing the potential pasture streamside fencing required by the average streamside fencing length per system. The breakdown of number of exclusions systems that are expected to be LE-1T, LE-2, LE-2T, SL-6 or WP-2T is based on historical use of these practices in the Powell River and neighboring watersheds and input from the Agricultural Working Group. **Table 5.2** shows the livestock exclusion requirements for the Butcher Fork watershed.

It was estimated that 7.5 % of all fencing length would need to be replaced during the length of the project. Based on fencing already installed as well as required by this plan, total fencing amounts to 21,616 feet in the Powell River watersheds. These maintenance costs were split between the two stages.

Table 5.2 Estimation of number of full exclusion systems required in the Butcher Fork watersheds.

TMDL Watershed	LE-1T , SL-6 Systems	LE-2, LE-2T Systems	SL-6 /CREP Systems	WP-2T Systems
Butcher Fork	9	8	1	1

Note: Values rounded up to the nearest whole number

5.2.1.2 Land-Based BMPs

The Powell River sediment TMDL requires reductions to land-based agricultural loads. Specifically, a reduction of 9.0% of the load from un-improved pasture and conventional tillage cropland is needed. Part of this reduction is achieved through the stream buffer created when livestock are fenced out of the stream. These buffers will act as filters, trapping bacteria and sediment before it runs into the stream. When considering the effectiveness of a vegetated buffer in trapping pollutants, it is important to consider the area that will be draining to the buffer. For modeling purposes, it was assumed that a typical buffer would be capable of receiving and treating runoff from an area four times its width. For example, a buffer that was 35 feet wide and 1,000 feet long would treat runoff from an area that was 140 feet wide and 1,000 feet long. Beyond four times the buffer width, it was assumed that the runoff would be in the form of channelized flow rather than the sheet flow that a buffer can filter.

The remaining reduction can be achieved through implementation of the BMPs in **Table 5.3**. One category of practices that is expected to have a substantial impact on water quality improvement is improved pasture management. Improved pasture management, or rotational grazing, consists of cross fencing, which allows farmers to move cattle around pastureland more efficiently. Less trampling and less overgrazing keep vegetation on the ground, which holds soil, nutrients, and manure in place.

Conservation tillage involves continuous no-till practices, which reduces erosion and fertilizer use. The practice may involve renting or buying new equipment, a concern that is offset by funding to cover the initial cost for farmers who qualify for federal cost-share programs. Another added benefit for farmers is the reduction in fuel and labor costs, in addition to the improved soil quality and moisture retention which lead to increased yields.

Table 5.3 Agricultural land-based BMPs required to meet the Powell River Sediment TMDL.

Control Measure	Unit	# of Units
Improved Pasture Management (SL-6, SL-10T)	Acres	3,600
Conservation Tillage	Acres	90

5.2.2 Residential/Urban Control Measures

5.2.2.1 BMPs to Correct Failing Septic Systems and Straight Pipes

All straight pipes must be identified and corrected during implementation since a 100% load reduction from these sources was deemed necessary to meet the TMDL goal. In addition correction of failing septic systems is a legal requirement and will benefit water quality. Failing septic systems that are in close enough proximity to a stream to deliver a continuous load of sewage have the same level of impact as a straight pipe, and should be addressed with the same urgency in order to implement the results of the TMDL. **Table 5.4** shows the number of failing septic systems and straight pipes estimated in the TMDL for each watershed.

Table 5.4 Estimated residential waste treatment systems in the Powell River watershed bacteria impairments.

TMDL Watershed	Houses with Septic Systems	Potential Failing Septic Systems	Straight Pipes
Butcher Fork	340	76	15
NF Powell River	1,144	521	144
SF Powell River	187	46	14
Upper Powell River	766	661	85
Total	2,437	1,304	258

The following BMPs have been identified to correct failing septic systems and straight pipes: septic system repairs (RB-3/3R), septic system replacement (RB-4/4P), connect to public sewer system (RB-2), and alternative waste treatment systems (RB-5). Since the TMDL only identified

a need to correct straight pipes, and since public input suggests that the number of straight pipes was over-estimated, the quantity of BMPs (and associated cost) was based only on correcting straight pipes. It was estimated that 20% of these situations could be corrected through repair of an existing system, 57% could be replaced with conventional septic systems and 22% would be corrected with alternative wastewater treatment systems. It was also estimated that as few as 1% would be able to connect to a public sewer system (**Table 5.5**). Additionally, septic pump-out programs have been shown to aid in identifying septic problems and raising awareness of issues related to residential sewage.

Table 5.6 shows the total estimate of needs for correcting straight pipes in the TMDL watersheds.

Table 5.5 Percentages of corrective actions needed to address straight pipes.

Item	Straight Pipes
Repair	20%
Replacement	57%
Alternative system	22%
Sewer system hook up	1%
Total	100%

Table 5.6 BMPs recommended to correct straight pipes and failing septic systems in the Powell River watershed.

Control Measure	VA Cost-Share Practice No.	Butcher Fork	NF Powell River	SF Powell River	Upper Powell River
Septic Systems Pump-Out	RB-1	340	1,144	187	766
Sewer System Connection	RB-2	0	1	0	1
Septic System Repair	RB-3/3R	3	29	3	17
Septic System Installation /Replacement	RB-4, RB-4P	9	82	8	48
Alternative Treatment System Installation	RB-5	3	32	3	19

5.2.2.2 Land-Based BMPs

The Powell River watershed TMDLs require reductions to residential/urban land-based or nonpoint sources (NPS). Specifically, there is a need to control sediment in runoff from these

lands using structural practices, throughout the Powell River watershed. These practices include rain gardens, bioretention basins, and infiltration trenches. In regard to controlling sediment, all of these practices operate in the same way and with similar efficiency. Essentially, the runoff water is retained and allowed to seep into the ground, slowing the delivery to the stream. This process allows the pollutant (sediment) to settle out of the runoff stream. Rain gardens are generally designed for smaller scales, and are more appropriate for residential settings, where runoff from rooftops, driveways, and yards is controlled. Bioretention basins and infiltration trenches are generally used for larger scale projects that are needed in more commercial or urbanized areas. In the Powell River watershed, there is a need to treat 2,800 acres of residential/urban land with one of these practices.

5.2.3 Industrial BMPs

Resource extraction (coal mining and gas well drilling) companies in the Powell River watershed are regulated by the Department of Mines, Mineral and Energy (DMME). They are required to follow environmental and safety regulations in order to prevent negative impacts on the environment and human health. One such regulation is the placement of retention ponds to collect all runoff water from active surface mining sites. These ponds must be designed to hold runoff from a 10 year 24 hour storm. Depending on the permit, there are regulations for flow, pH, and concentrations for iron (Fe), manganese (Mn), total suspended solids (TSS), and chloride in the outfalls and/or nearby streams. Mining sites are inspected regularly. More information can be found at <https://www.dmme.virginia.gov/>. Each company must pay a bond up front for each permit, which is held until the active site is sufficiently reclaimed. If not, the money is forfeited over to DMME and they reclaim the land.

Gas well drilling companies are required to install sumps or ponds to collect runoff from gas well areas. The roads leading to the wells must be maintained and must have water bars to divert water from the roadway. Construction typically lasts 60 days and grass is planted on and along the road and around the well site. Gas well companies also must pay bonds for reclamation that can be forfeited if reclamation is not adequate. More information can be found at <https://www.dmme.virginia.gov/DMME/LawsRegs.shtml#gasoil>; Section 25-150-260 contains the erosion, sediment control and reclamation regulations and Section 25-150-270 deals with stormwater management.

The Virginia Department of Forestry (VDOF) is in charge of regulating any logging operations of commercial or private entities. A logging company must call the VDOF to report that they are going to harvest an area within 3 days of starting. A VDOF representative inspects the site before, during (typically every 30 days), and after harvesting. There is a zero tolerance for sedimentation in nearby streams; if the VDOF thinks there is sedimentation possible, the loggers must have measures in place to prevent sediment travel within 10 days of a citation. Some BMPs recommended on logging areas are not harvesting trees near streams (leaving a vegetated stream buffer), water bars, hardened stream crossings (*i.e.*, culverts, bridges), and seeding and mulching bare areas upon completion. More information of logging BMPs can be found at <http://www.dof.virginia.gov/water/index.htm>. If BMPs are not in place, special orders are handed to the company; fines are then assessed based on the extent of the disturbance and any prior citations. This money is channeled into an education fund used to train loggers in environmental practices.

5.2.3.1 Land-Based Control Measures

The Powell TMDL requires 9% reductions to sediment loads from disturbed forest areas, AML, and barren areas that don't appear to be associated with either AML or forest harvesting. In order to meet these requirements, the BMPs in Table 5.7 are recommended. A staged approach to implementation is described in Chapter 6 of this document.

Table 5.7 Land-based BMPs required to meet the Powell River Sediment TMDL.

Control Measure	Units	Needed
Reclamation of Abandoned Mine Land	Acre	420
Reclamation of Disturbed Forest	Acre	280
Haul Road Stabilization	Acre	60

5.2.4 Other BMPs

While a specific set and quantity of BMPs have been described here, based on the TMDL modeling, it is recognized that other BMPs are available, and additional BMPs may become available during implementation. Three BMPs that have been identified, but not included in the quantification are Retention Ponds, Vegetated Buffers, and Streambank Stabilization not associated with livestock exclusion. All of these BMPs have been shown to be effective in

reducing the load of the pollutants of concern in this study. With regard to streambank stabilization, 2,500 feet of streambank in urban areas were identified by stakeholders through the public participation process, as needing restoration/stabilization. This effort was included in the enumeration of BMPs. No specific application was identified for the other 2 BMPs in these watersheds. That, however, does not negate the possibility that a suitable application for these BMPs will be found. Additionally, it was pointed out during the Steering Committee Meeting that there may be locations in the watershed where failing stormwater infrastructure is causing sediment loads. These situations may need to be addressed, in order to achieve good water quality. Because a staged approach to implementation is being proposed and, ultimately, improved water quality is the goal, additional approaches to water quality improvement should be encouraged.

5.3 Technical Assistance and Education

Stakeholders agree that technical assistance and education is key to getting people involved in implementation. There must be a proactive approach to contact farmers and residents to articulate exactly what the TMDL means to them and what practices will help meet the goal of improved water quality. The working groups recommended several education/outreach techniques, which will be utilized during implementation. Outreach at County Fairs has been successful in other watersheds in the past. There are also opportunities for joint events with the Virginia Cooperative Extension Service. A program should be established to educate septic and alternative waste system installers on the maintenance requirements expected of the homeowner because many installers are not aware of the maintenance required. It was determined during working group meetings that much of this work could be accomplished through existing agency structures.

The following tasks associated with agricultural, residential and industrial programs were identified:

Agricultural Programs

1. Make contact with landowners in the watershed to make them aware of implementation goals, cost-share assistance, and voluntary options that are beneficial.
2. Provide technical assistance for agricultural programs (*e.g.*, survey, design, layout, and approval of installation).
3. Develop educational materials & programs.
4. Organize educational programs (*e.g.*, County Fair, presentations at joint VCE events or club events).

5. Distribute educational materials (*e.g.*, informational articles in FSA or Farm Bureau newsletters, and local media).
6. Handle and track cost-share.
7. Assess and track progress toward BMP implementation goals.
8. Coordinate use of existing agricultural programs and suggest modifications where necessary.

Residential/Urban Programs

1. Identify straight-pipes and failing septic systems (*e.g.*, contact landowners in older homes, septic pump-out program).
2. Identify areas where structural BMPs (*e.g.*, rain gardens, infiltration trenches, and bioretention basins) could be installed.
3. Handle and track cost-share.
4. Develop educational materials & programs.
5. Organize educational programs (*e.g.*, demonstration septic pump-outs, nutrient management, pet waste control).
6. Distribute educational materials (*e.g.*, informational pamphlets on TMDLIP and on-site sewage disposal systems).
7. Assess progress toward implementation goals.

Industrial Programs

1. Identify AML features that should be addressed during implementation.
2. Work with DMLR personnel to identify potential avenues for remediation.
3. Develop educational materials that can be handed out by DMME and VDOF personnel.
4. Distribute educational materials.
5. Correspond with DMME, VDOF, and Division of Gas and Oil (DGO) to encourage and track BMP installation.
6. Assess progress toward implementation goals.

Based on input from the working groups, it was determined that the Technical Assistance needed for implementing this IP could be supplied by existing agency personnel. For instance VADEQ personnel can develop literature regarding the TMDL and potential control measures. This information can be distributed through SWCDs, DMME, DGO, and VDOF permitting and educational programs (*e.g.*, the SHARP Logger Program). Additional work would include identification of AML features through review of aerial photography and site visits, identification of potential avenues for remediation, and tracking progress toward implementation. The SWCDs agreed to manage the agricultural and residential programs. Existing staff will work on the BMPs identified in this plan.

5.4 Cost Analysis

5.4.1 Agricultural Control Measures

Streamside fencing through or adjacent to pasture with potential livestock access was translated and quantified into full livestock exclusion systems as described in Section 5.2.1.1. The costs for the LE-1T, LE-2, LE-2T, SL-6, CREP/SL-6, WP-2T, and SL-10T systems were estimated based on the cost of systems already in place in the Powell River and neighboring watersheds.

The total cost of livestock exclusion systems includes not only the costs associated with fence installation, repair, and maintenance; but also the cost of taking land (*e.g.*, 35-ft buffer area) out of production (this cost is not included in cost estimates in this IP). The cost of fence maintenance was identified as a deterrent to participation. Financial assistance possibilities for maintaining fences include an annual 25% state tax credit for fence maintenance. Additionally, the streambank protection (WP-2T) cost-share practice will be available as part of the implementation project and provides an upfront incentive payment to maintain stream fencing. The cost per foot for streamside fence maintenance is estimated at \$3.50/ft.

The remaining costs outlined in **Table 5.8** were determined through literature review, analysis of the Virginia Agricultural BMP Database, and discussion with stakeholders. The number and type of practices that have been installed in each watershed were determined through discussions with local personnel, VDEQ personnel, and data from the Virginia Agricultural BMP Database.

Table 5.8 Agricultural control measure costs and needs in all of the Powell River TMDL watersheds.

Control Measure	Unit	Cost (\$) per Unit	Total Units	Total Cost
Livestock Exclusion				
Livestock Exclusion with riparian buffer (LE-1T, SL-6)	System	\$20,600	9	\$185,400
Livestock Exclusion with reduced setback (LE-2, LE-2T)	System	\$11,500	8	\$92,000
Livestock Exclusion with grazing land mgnt (CREP/SL-6)	System	\$20,000	1	\$20,000
Stream Protection (WP-2T)	System	\$3,400	1	\$3,400
Fence Maintenance	Ft	\$3.50	21,616	\$75,656
Subtotal:				\$376,456
Agricultural Nonpoint Controls				
Improved Pasture Management (SL-6)	Acre	\$453	3,600	\$1,630,800
Conservation Tillage	Acre	\$100	90	\$9,000
Subtotal:				\$1,639,800
Total:				\$2,016,256

5.4.2 Residential/Urban Control Measures

Following recommendations from local stakeholders, it was estimated that 20% of straight pipes would actually be failing systems in close proximity to streams that could be repaired (\$3,500), 57% would be replaced with conventional septic systems (\$6,500) and 22% would be corrected with alternative wastewater treatment systems (\$20,000). Because of unavailability of connections, it was estimated that as few as 1% would be able to connect to a public sewer system (\$700) (**Table 5.5**). Additionally, septic pump-outs (\$400) were estimated for all septic systems in the TMDL watersheds. The remaining costs outlined in **Table 5.9** were determined through literature review, and discussion with stakeholders.

Table 5.9 Residential/Urban control measure costs in the Powell River watershed.

Control Measure	Unit	Cost per Unit	Total Units	Total Cost
Septic Systems Pump-Out (RB-1)	System	\$400	2,437	\$974,800
Sewer System Connection (RB-2)	Connection	\$700	2	\$1,400
Septic System Repair (RB-3/3R)	System	\$3,500	52	\$182,000

Septic System Installation /Replacement (RB-4/4P)	System	\$6,500	147	\$955,500
Alternative Treatment System Installation (RB-5)	System	\$20,000	57	\$1,140,000
Residential Rain Gardens	Acre- Treated	\$3,000	1,000	\$3,000,000
Infiltration Trench	Acre- Treated	\$6,000	1,000	\$6,000,000
Bioretention Basins	Acre- Treated	\$19,000	800	\$15,200,000
Total				\$27,453,700

5.4.3 Industrial Control Measures

The costs outlined in **Table 5.10** were determined through review of available literature and discussion with stakeholders. The estimated cost of implementing all industrial control measures in the Powell River watershed is \$4.33 million. The cost of each of the control measures selected for this IP is highly variable, depending on the specific conditions where the control measure is implemented. The costs listed here are anticipated average costs that are the best estimates available at this time.

Table 5.10 Industrial control measure costs in the Powell River watershed.

Control Measure	Unit	Cost per Unit	Total Units (#)	Total Cost (\$)
Reclamation of Abandoned Mine Lands	acre	\$10,000	420	\$4,200,000
Reclamation of Disturbed Forest	acre	\$300	280	\$84,000
Haul Road Stabilization	acre	\$700	60	\$42,000
Total				\$4,326,000

5.4.4 Other Control Measures

The costs outlined in **Table 5.11** were determined through review of available literature and discussion with stakeholders. The estimated cost of implementing streambank stabilization in urban areas, in the Powell River watershed is \$1.75 million. The cost of each of the control measures selected for this IP is highly variable, depending on the specific conditions where the

control measure is implemented. The costs listed here are anticipated average costs that are the best estimates available at this time.

Table 5.11 Other control measure costs in the Powell River (sed.) watershed.

Control Measure	Unit	Cost per Unit	Total Units (#)	Total Cost (\$)
Streambank Stabilization	ft	\$700	2,500	\$1,750,000

5.4.5 Technical Assistance

It was determined by stakeholders that existing personnel would be able to handle the technical assistance needs of this project. However, it requires \$50,000 to support the salary, benefits, travel, training, and incidentals for education of one technical FTE. It was estimated that there was a need for one full-time technical FTE per year, while this is intended to be covered by existing personnel, the cost is included. This allocates 1 FTE for each of the first ten years of implementation for a total of 10 FTE years. At the end of the first ten years, implementation should be complete. The total potential cost to provide technical assistance during implementation is expected to be approximately \$500,000.

5.4.6 Total Estimated Costs

The total estimated cost for the 10 years of implementation in the Powell River watersheds are shown in **Table 5.12**. The costs are divided between the BMPs needed specifically in the four bacteria TMDL watersheds and the BMPs that can be implemented throughout the Powell River watershed to address sediment loads. The Streambank Restoration BMP is included in the Residential/Urban BMPs column, because the work identified by stakeholders is in urban areas.

Table 5.12 Total estimated implementation costs for the Powell River watersheds.

TMDL Watershed	Agricultural BMPs	Res/Urban BMPs	Industrial BMPs	Technical Assistance	Total Cost
Butcher Fork (Bac.)	\$376,456	\$265,000	NA	NA	\$641,456
NF Powell River (Bac.)	NA	\$1,732,800	NA	NA	\$1,732,800
SF Powell River (Bac.)	NA	\$197,300	NA	NA	\$197,300
Upper Powell River (Bac.)	NA	\$1,058,600	NA	NA	\$1,058,600
Powell River (Sed.)	\$1,639,800	\$25,950,000	\$4,326,000	NA	\$31,915,800
Grand Total	\$2,016,256	\$29,203,700	\$4,326,000	\$500,000	\$35,545,956

5.4.7 Estimated Costs by Stage

Following a staged approach, implementation has been divided into two stages, with an effort to concentrate resources in the first stage. The Stage I goals for implementation will focus on correcting straight pipes and failing septic systems, fencing cattle out of the streams, streambank stabilization and improving pasture management. Stage II focuses on continuing these efforts, reclamation of AML and disturbed forest, implementing stormwater controls (i.e., rain gardens, and bioretention basins), and implementing conservation tillage.

For the Powell River watershed impairments, **Table 5.13** shows the estimated cost of installing the recommended agricultural, and residential/urban and industrial BMPs in Stage I. **Table 5.14** shows the estimated costs in Stage II. The Stage I and II costs by subwatershed are presented in Chapter 6.

Factoring in technical assistance costs, the total cost for full implementation in the Powell River watersheds comes to approximately \$36 million.

Table 5.13 Costs to implement Stage I for the Powell River watersheds by TMDL watershed.

TMDL Watershed	Agricultural BMPs	Res/Urban BMPs	Industrial BMPs	Technical Assistance	Total Cost
Butcher Fork (Bac.)	\$189,628	\$117,500	NA	NA	\$307,128
NF Powell River (Bac.)	NA	\$865,000	NA	NA	\$865,000
SF Powell River (Bac.)	NA	\$87,100	NA	NA	\$87,100
Upper Powell River (Bac.)	NA	\$517,900	NA	NA	\$517,900
Powell River (Sed.)	\$819,900	\$875,000	\$21,000	NA	\$1,715,900
Grand Total	\$1,009,528	\$2,462,500	\$21,000	\$250,000	\$3,493,028

Table 5.14 Costs to implement Stage II for the Powell River watersheds by TMDL watershed.

TMDL Watershed	Agricultural BMPs	Res/Urban BMPs	Industrial BMPs	Technical Assistance	Total Cost
Butcher Fork (Bac.)	\$186,828	\$147,500	NA	NA	\$334,328
NF Powell River (Bac.)	NA	\$867,800	NA	NA	\$867,800
SF Powell River (Bac.)	NA	\$110,200	NA	NA	\$110,200
Upper Powell River (Bac.)	NA	\$540,700	NA	NA	\$540,700
Powell River (Sed.)	\$819,900	\$25,075,000	\$4,305,000	NA	\$30,199,900
Grand Total	\$1,006,728	\$26,741,200	\$4,305,000	\$250,000	\$32,052,928

5.5 Benefit Analysis

The primary benefit of implementation is cleaner water in Virginia. Specifically, *E. coli* contamination and sediment loads in the Powell River watersheds will be reduced to meet water quality standards. **Table 5.15** indicates the cost efficiencies of the practices being proposed in this IP. It is hard to gage the impact that reducing *E. coli* contamination will have on public health, as most cases of waterborne infection are not reported or are falsely attributed to other sources. However, because of the reductions required, the incidence of infection from *E. coli* sources through contact with surface waters should be reduced considerably. In addition to allowing the aquatic community to thrive, the control measures that will be implemented to control sediment will also serve to reduce delivery of other pollutants to the stream from upland locations by reducing sediment load in runoff.

Table 5.15 Cost efficiencies of control measures in units removed per \$1,000 in the Powell River watersheds.

	Bacteria (Colonies)	Sediment (kg)
<i>Agricultural</i>		
Grazing Land Protection System (LE-1T, LE-2, LE-2T, SL-6, CREP/SL-6) and Stream Protection System	5.20E+09	311
Improved Pasture Management (SL-6, SL-10T)	3.31E+11	612
Conservation Tillage	NA	23,572
<i>Residential/Urban</i>		
Septic System Repair (RB-3/3R)	5.60E+10	NA
Septic System Installation/Replacement (RB-4/4P)	2.80E+11	NA
Alternative Waste Treatment System Installation (RB-5)	9.10E+10	NA
Sewer System Connection (RB-2)	1.80E+12	NA
Rain Garden	1.50E+10	12
Bioretention Basin	2.30E+09	2
Infiltration Trench	7.70E+09	6
<i>Industrial</i>		
AML Reclamation	NA	50
Disturbed Forest Reclamation	NA	1,413
Haul Road Stabilization	NA	6,832
<i>Other</i>		
Streambank Stabilization	NA	1.66

An important objective of the Implementation Plan is to foster continued economic vitality and strength. This objective is based on the recognition that healthy waters improve economic opportunities for Virginians and a healthy economic base provides the resources and funding necessary to pursue restoration and enhancement activities. The agricultural and residential/urban practices recommended in this document will provide economic benefits to the community, as well as the expected environmental benefits. Specifically, alternative (clean) water sources, exclusion of cattle from streams, improved pasture management, and installation of private septic system and maintenance of existing systems (septic tank pumpouts) will each provide economic benefits to land owners. Additionally, money spent by landowners and state agencies in the process of implementing this plan will stimulate the local economy.

5.5.1 Agricultural Practices

A clean water source has been shown to improve weight gain and milk production in cattle. Fresh clean water is the primary nutrient for livestock with healthy cattle consuming, on a daily basis, close to 10% of their body weight during winter and 15% of their body weight in summer. Many livestock illnesses can be spread through contaminated water supplies. For instance, coccidia can be delivered through feed, water and haircoat contamination with manure (VCE, 2000). In addition, horses drinking from marshy areas or areas where wildlife or cattle carrying Leptospirosis have access tend to have an increased incidence of moonblindness associated with Leptospirosis infections (VCE, 1998b). A clean water source can prevent illnesses that reduce production and incur the added expense of avoidable veterinary bills.

In addition to reducing the likelihood of animals contracting waterborne illnesses by providing a clean water supply, streamside fencing excludes livestock from wet, swampy environments as are often found next to streams where cattle have regular access. Keeping cattle in clean, dry areas has been shown to reduce the occurrence of mastitis and foot rot. The VCE (1998a) reports that mastitis costs producers \$100 per cow in reduced quantity and quality of milk produced. On a larger scale, mastitis costs the U.S. dairy industry about \$1.7 billion to 2 billion annually or 11% of total U.S. milk production. While the spread of mastitis through a dairy herd can be reduced through proper sanitation of milking equipment, mastitis-causing bacteria can be harbored and spread in the environment where cattle have access to wet and dirty areas. Installation of streamside fencing and well managed loafing areas will reduce the amount of time that cattle have access to these areas.

Taking the opportunity to instigate an improved pasture management system in conjunction with installing clean water supplies will also provide economic benefits for the producer. Improved pasture management can allow a producer to feed less hay in winter months, increase stocking rates by 30 to 40% and, consequently, improve the profitability of the operation. With feed costs typically responsible for 70 to 80% of the cost of growing or maintaining an animal, and pastures providing feed at a cost of 0.01 to 0.02 cents/lb of total digestible nutrients (TDN) compared to 0.04 to 0.06 cents/lb TDN for hay, increasing the amount of time that cattle are fed on pasture is clearly a financial benefit to producers (VCE, 1996). Standing forage utilized directly by the grazing animal is always less costly and of higher quality than the same forage harvested with

equipment and fed to the animal. In addition to reducing costs to producers, intensive pasture management can boost profits by allowing higher stocking rates and increasing the amount of gain per acre. Another benefit is that cattle are closely confined allowing for quicker examination and handling. In general, many of the agricultural BMPs recommended in this document will provide both environmental benefits and economic benefits to the farmer.

5.5.2 Residential/Urban Practices

The residential programs, particularly the correction of straight pipes, will play an important role in improving water quality, since human waste can carry with it human viruses in addition to the bacterial and protozoan pathogens that all fecal matter can potentially carry. In terms of economic benefits to homeowners, an improved understanding of on-site sewage treatment systems, including knowledge of what steps can be taken to keep them functioning properly and the need for regular maintenance, will give homeowners the tools needed for extending the life of their systems and reducing the overall cost of ownership. The average septic system will last 20 to 25 years if properly maintained. Proper maintenance includes: knowing the location of the system components and protecting them (e.g., not driving or parking on top of them), not planting trees where roots could damage the system, keeping hazardous chemicals out of the system, and pumping out the septic tank every 3 to 5 years. The cost of proper maintenance, as outlined here, is relatively inexpensive (\$260) in comparison to repairing or replacing an entire system (\$6,500 to \$20,000).

In addition to the benefits to individual landowners, the economy of the local community will be stimulated through expenditures made during implementation, and the infusion of dollars from funding sources outside the impaired areas. Building contractors and material suppliers who deal with septic system pump-outs, private sewage system repair and installation, fencing, and other BMP components can expect to see an increase in business during implementation. Additionally, income from maintaining these systems should continue long after implementation is complete. As will be discussed in greater detail in Chapter 8, a portion of the funding for implementation can be expected to come from state and federal sources. This portion of funding represents money that is new to the area and may stimulate the local economy. In general, implementation will provide not only environmental benefits to the community, but economic benefits as well which, in turn, will allow for individual landowners to participate in implementation.

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6. MEASURABLE GOALS AND MILESTONES FOR ATTAINING WATER QUALITY STANDARDS

Given the scope of work involved with implementing these TMDLs, returning the streams to fully supporting status and de-listing from the Virginia Section 305(b)/303(d) list is expected within 10 years. Described in this section are identification of milestones, timeline for implementation, and the targeting of control measures.

6.1 Milestones Identification

The end goals of implementation are restored water quality of the impaired waters and subsequent de-listing of these impairments from the Commonwealth of Virginia's Section 305(b)/303(d) list within 10 years (see **Table 6.1**). Progress toward end goals will be assessed during implementation through tracking of control measure installations and continued water quality monitoring. Cost-shared agricultural and septic system control measures will be tracked through the Virginia Agricultural Cost-Share Program. Additionally, BMPS will be tracked in the DEQ BMP Warehouse, if the BMP cannot be tracked in the DCR tracking program or the grantee is not a District.

Expected progress in implementation is established with two types of milestones: *implementation milestones* and *water quality milestones*. Implementation milestones establish the amount of control measures installed within certain timeframes, while water quality milestones establish the corresponding improvements in water quality that can be expected as the implementation milestones are met. The milestones described here are intended to achieve full implementation within 10 years.

Following the idea of a staged implementation approach, resources and finances will be concentrated on the most cost-efficient control measures first. For instance, concentrating on eliminating straight pipes, livestock exclusion, and pasture management within the first years may provide the highest return on water quality improvement with less cost to landowners. The Stage I goals for implementation will focus on correcting straight pipes and failing septic systems, fencing cattle out of the streams, improving pasture management, implementing conservation tillage, streambank stabilization and stabilizing haul roads. Stage II focuses on continuing these

efforts, implementing stormwater controls (e.g., rain gardens, and bioretention basins), and additional industrial practices in the Powell River watershed.

It is anticipated that once implementation begins for the Powell River watershed, two milestones will be sought over the next 10 years, informed by pollution source reductions related to the TMDLs (**Table 6.1**). The BMP implementation goals associated with the milestones are listed in **Table** through **Table 6.6**. The first milestone will be five years after implementation begins, whereby some of the more cost-efficient control measures will be installed, with significant reductions in bacteria and sediment anticipated. The hope is that this stage will provide a water quality result that may lead to delisting impairments.

Table 5.13 presents a breakdown of the costs for Stage I. Following Stage I implementation, the steering committee should evaluate water quality improvements and determine how to proceed to complete implementation (Stage II). Costs for Stage II are presented in **Table 5.14**. Based on completing both implementation stages, the final milestone would be achieving the bacteria reductions required by the TMDLs.

Table 6.1 Stage I and Stage II percent reduction scenarios for the Powell River watersheds.

TMDL Watershed	Stage	Straight Pipes/ Septic Repairs	Livestock DD	Pasture, Crop, Barren	AML, Disturbed Forest, Res/Urban	Percent Exceedance of the Single Sample Annual Load Maximum (235 cfu/100 ml)	
Butcher Fork (Bac.)	I	100	52.6	NA	NA	22.47	3.24E+13
	II	100	100	NA	NA	13.28	2.85E+13
NF Powell River (Bac.)	I	50.0	NA	NA	NA	4.83	1.36E+14
	II	100	NA	NA	NA	3.42	1.12E+14
SF Powell River (Bac.)	I	50.0	NA	NA	NA	3.09	1.28E+13
	II	100	NA	NA	NA	1.14	1.06E+13
Upper Powell River (Bac.)	I	50.6	NA	NA	NA	4.02	1.11E+14
	II	100	NA	NA	NA	3.62	8.72E+13
Powell River (Sed.)	I	50	NA	4.5	0.4	NA	59,234
	II	100	NA	9	9	NA	57,521

Table 6.2 Stage I and Stage II implementation goals for Butcher Fork (Bacteria).

Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Livestock Exclusion with riparian buffer (LE-1T, SL-6)	System	4	5
Livestock Exclusion with reduced setback (LE-2, LE-2T)	System	4	4
Stream Exclusion with grazing land mgnt (CREP/SL-6)	System	1	0
Stream Protection (WP-2T)	System	1	0
<i>Residential/Urban</i>			
Septic Systems Pump-Out (RB-1)	System	170	170
Septic System Installation (RB-4)	System	6	6
Sewer System Connection (RB-2)	System	0	0
Alternative Treatment System Installation (RB-5)	System	1	2

Table 6.2 Stage I and Stage II implementation goals for the North Fork Powell River (Bacteria).

Control Measure	Unit	Stage I	Stage II
<i>Residential/Urban</i>			
Septic Systems Pump-Out (RB-1)	System	572	572
Septic System Installation (RB-4)	System	55	56
Sewer System Connection (RB-2)	System	1	0
Alternative Treatment System Installation (RB-5)	System	16	16

Table 6.3 Stage I and Stage II implementation goals for the South Fork Powell River (Bacteria).

Control Measure	Unit	Stage I	Stage II
<i>Residential/Urban</i>			
Septic Systems Pump-Out (RB-1)	System	94	93
Septic System Installation (RB-4)	System	6	5
Sewer System Connection (RB-2)	System	0	0
Alternative Treatment System Installation (RB-5)	System	1	2

Table 6.4 Stage I and Stage II implementation goals for the Upper Powell River (Bacteria).

Control Measure	Unit	Stage I	Stage II
<i>Residential/Urban</i>			
Septic Systems Pump-Out (RB-1)	System	383	383
Septic System Installation (RB-4)	System	33	32
Sewer System Connection (RB-2)	System	1	0
Alternative Treatment System Installation (RB-5)	System	9	10

Table 6.5 Stage I and Stage II implementation goals for the Powell River (Sediment)

Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Improved Pasture Management	Acre-Treated	1,800	1,800
Conservation Tillage	Acre-Treated	45	45
<i>Residential/Urban</i>			
Rain Gardens	Acre-Treated	0	1,000
Infiltration Trench	Acres-Treated	0	1,000
Bioretention Basins	Acre-Treated	0	800
<i>Industrial</i>			
AML/Barren Area Reclamation	Acre-Treated	0	420
Disturbed Forest Reclamation	Acre-Treated	0	280
Haul Road Stabilization	Acre-Treated	30	30
<i>Other BMPs</i>			
Streambank Stabilization	Ft	1,250	1,2500

6.2 Timeline

Based on meeting the above milestones, a 10-year Implementation Plan timeline was formulated for the Powell River watersheds (**Figure 6.1** through **Figure 6.5**). The timeline describes the needs for implementation in terms of completion of the agricultural, residential/urban, and industrial control measures.

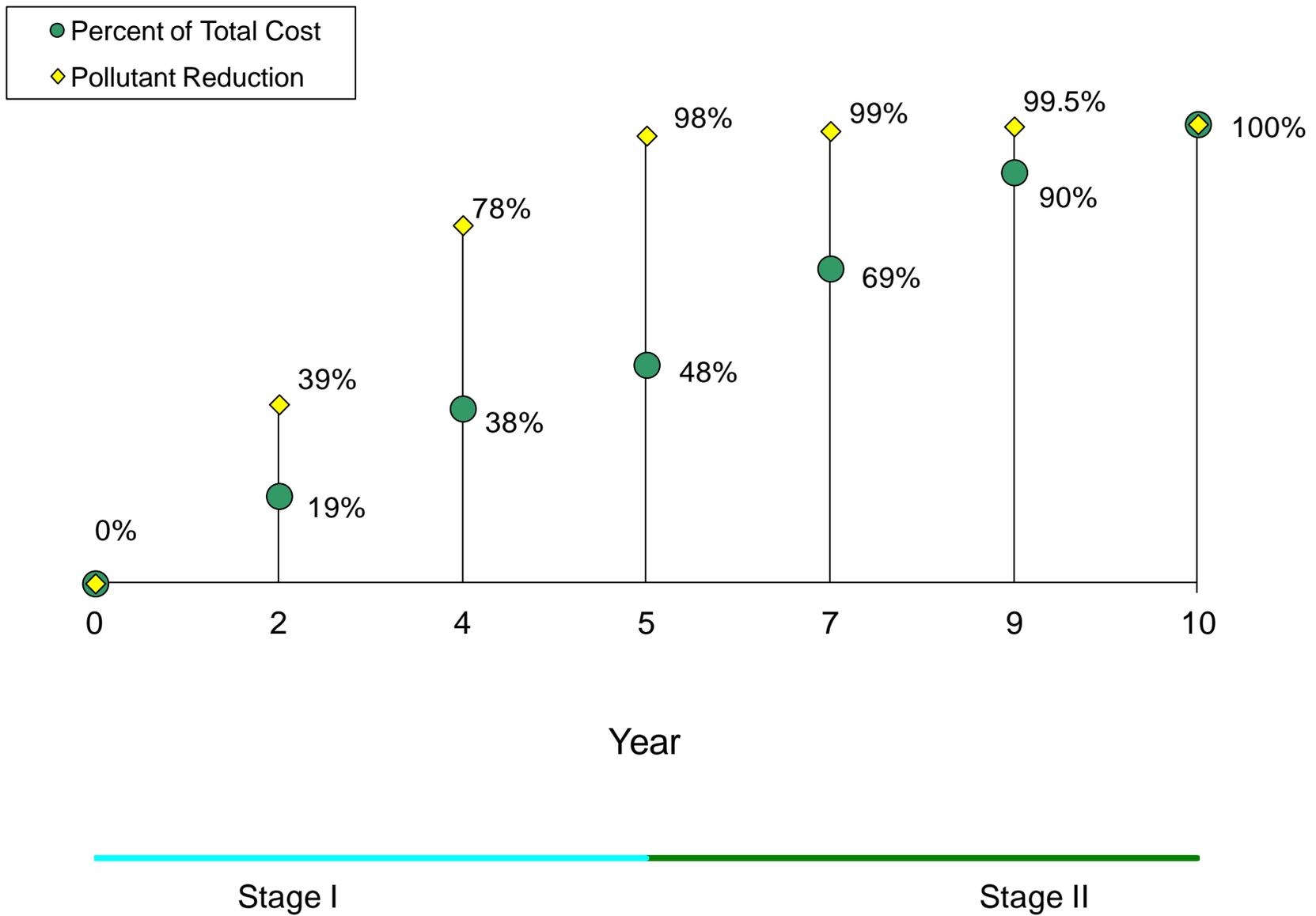


Figure 6.1 Timeline for implementation in the Butcher Fork (Bacteria) watershed.

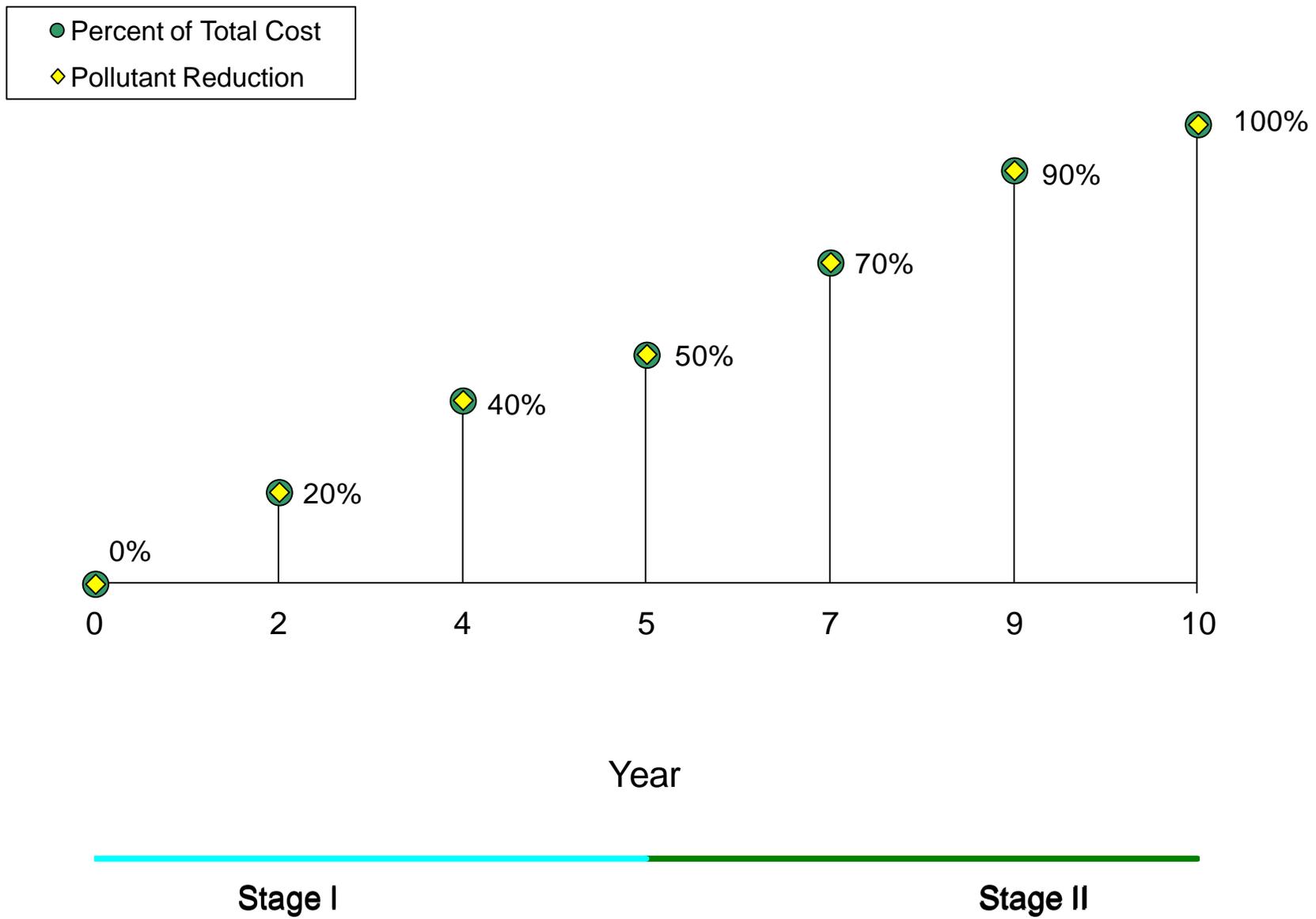


Figure 6.2 Timeline for implementation in the North Fork Powell River (Bacteria) watershed.

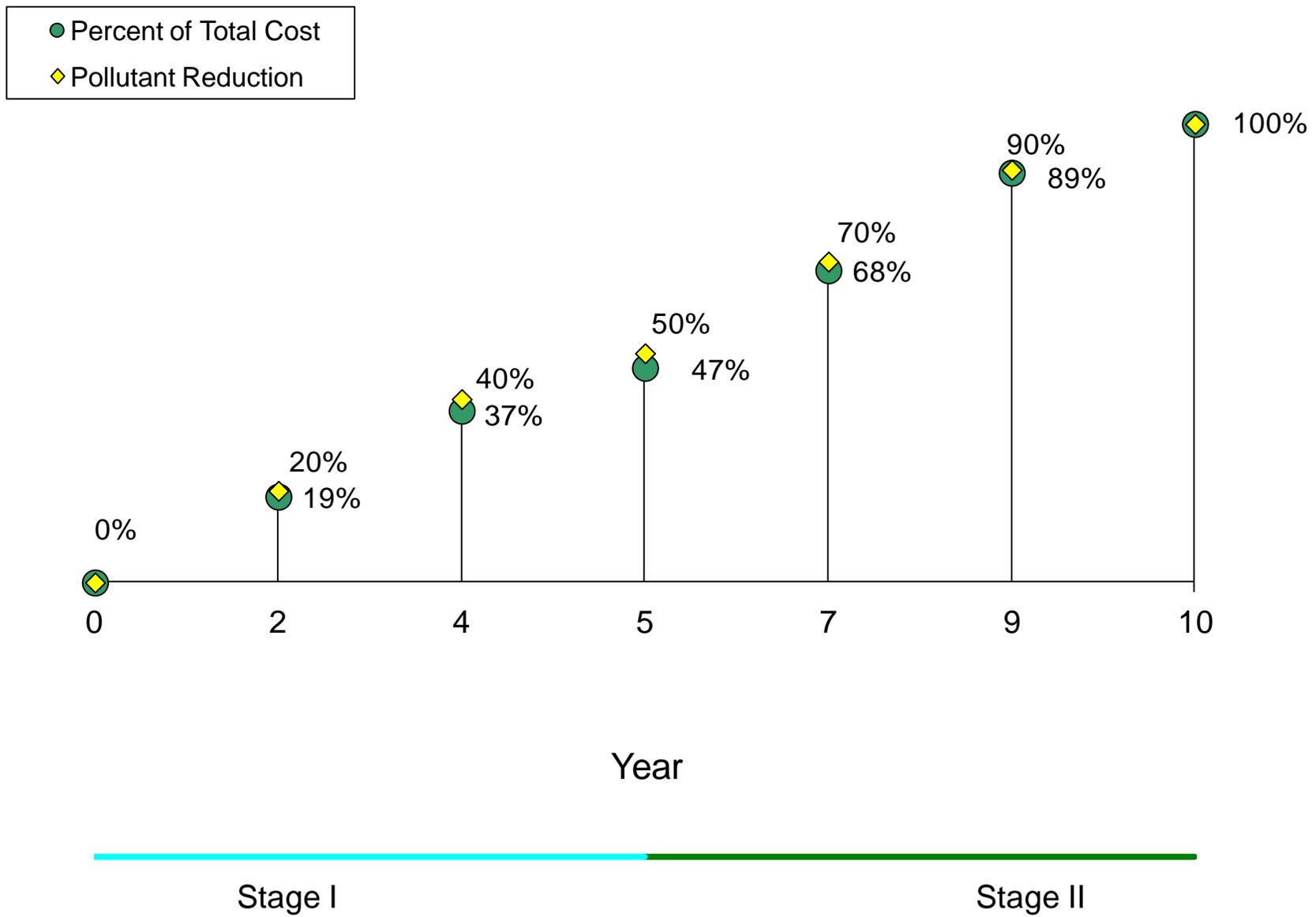


Figure 6.3 Timeline for implementation in the South Fork Powell River (Bacteria) watershed.

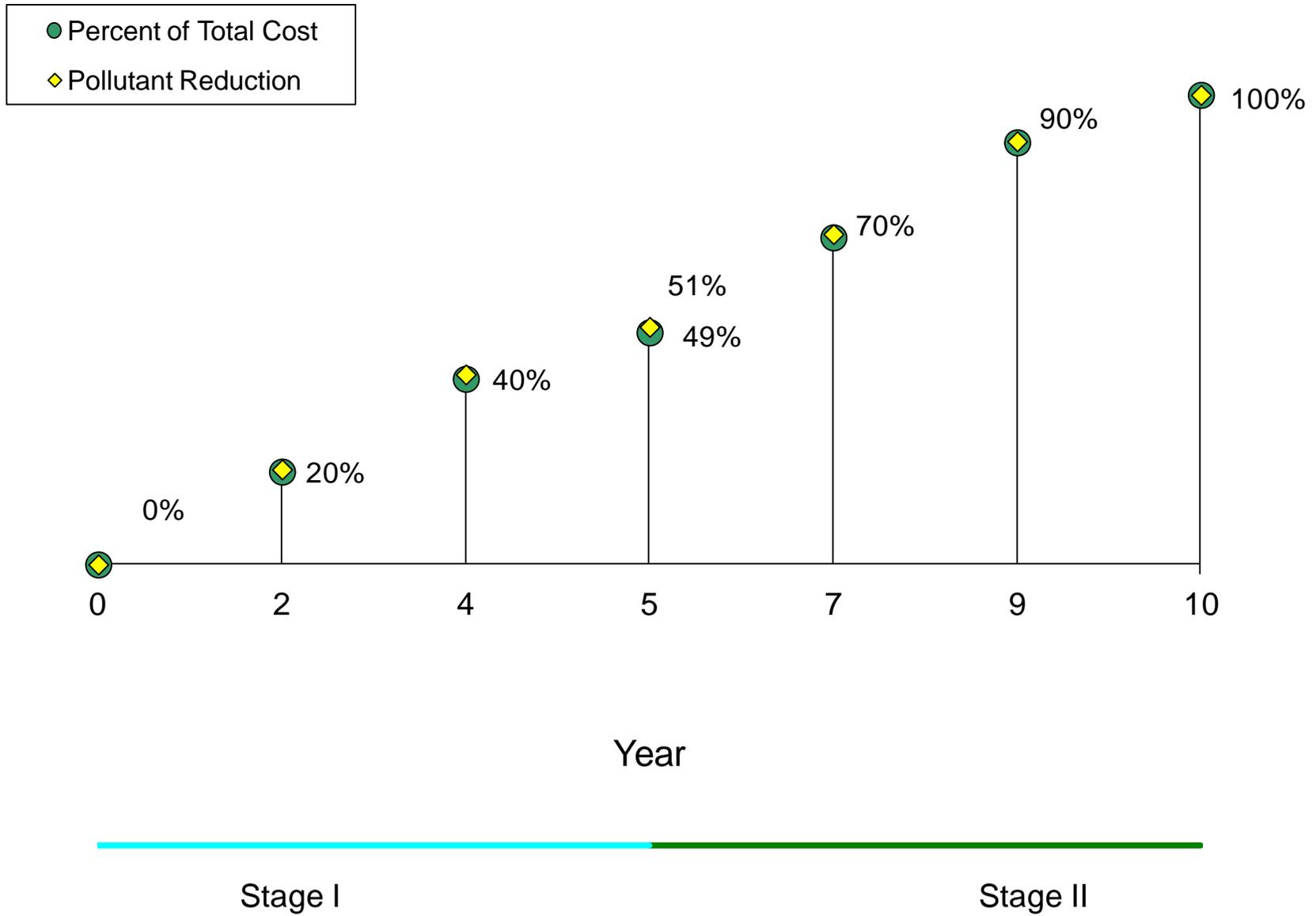


Figure 6.4 Timeline for implementation in the Upper Powell River (Bacteria) watershed.

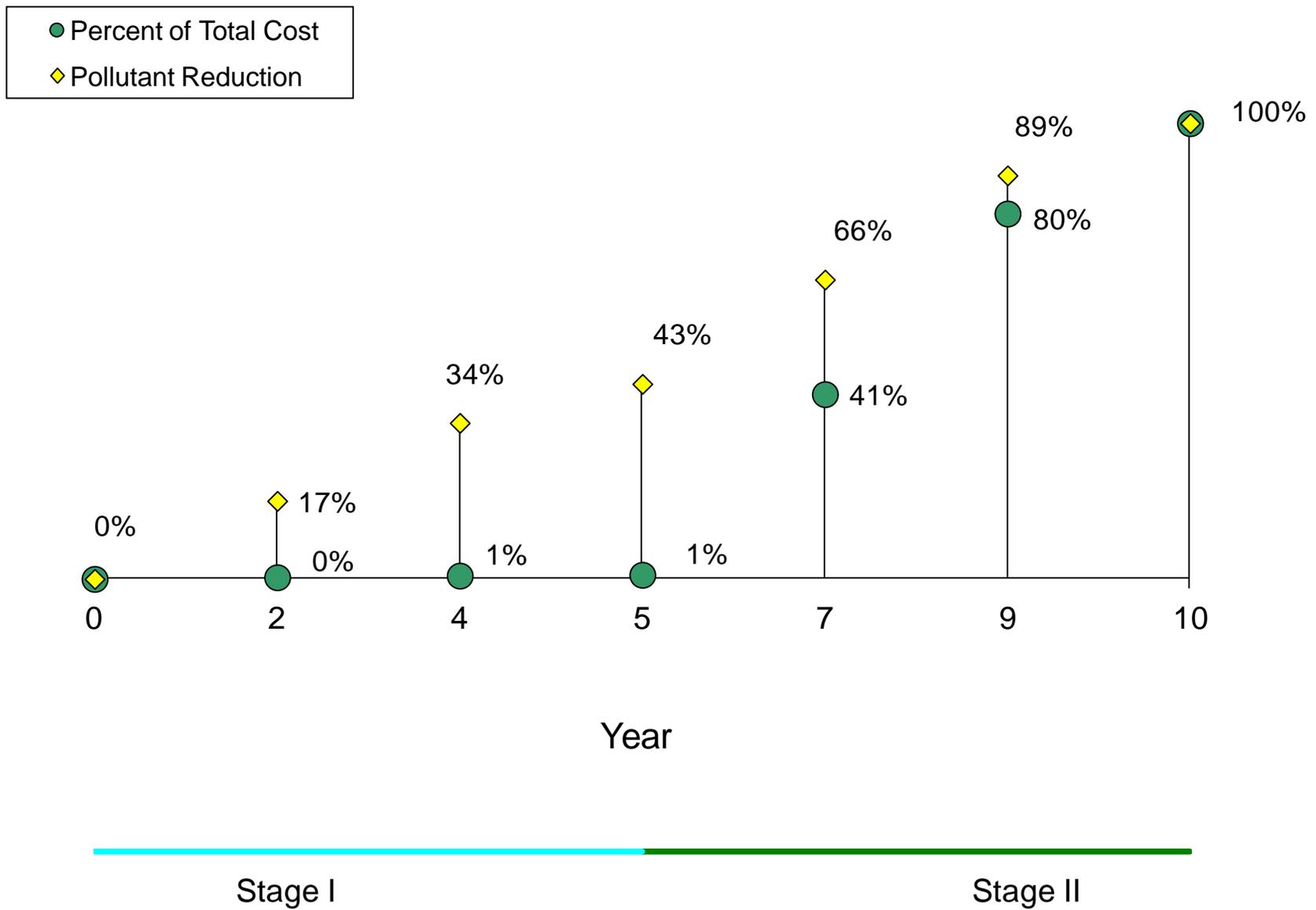


Figure 6.5 Timeline for implementation in the Powell River (Sediment) watershed.

6.3 Targeting

Implicit in the process of a staged implementation is targeting of control measures. Targeting ensures optimum utilization of resources. Targeting of critical areas for livestock fencing for bacteria reduction is typically accomplished through analysis of livestock population and the fencing requirements per subwatershed. In this particular case, fencing is only required in the Butcher Fork watershed. (Although fencing BMPs are being used as an incentive for improving pasture management in other watersheds, the requirement for fencing only exists in the Butcher Fork watershed.) For modeling purposes, Butcher fork was divided into two subwatersheds. As it turns out, livestock populations relative to fencing needs in these two subwatersheds are nearly equal. So, targeting based on that criterion is not useful.

One approach to targeting in this situation is to consider the pollution problem to be cumulative from the top to the bottom of the watershed and that unless upstream problems are resolved first, downstream BMPs may be overwhelmed. From this perspective, prioritization of projects for livestock fencing should proceed in an upstream to downstream fashion. Regardless of the prioritization, any interested parties should not be turned away simply because their farm is in a low ranking area.

Targeting of residential sewage treatment BMPs in the Powell River watersheds was looked at in two ways; first, based on the estimated straight pipe loads from the TMDL, and second, based on working group input. Based on the TMDL estimates, the TMDL watersheds (**Figure 6.6**) should be prioritized in the following order:

- North Fork Powell River (bac.) Watershed
- Upper Powell River (bac.) Watershed
- South Fork Powell River (bac.) Watershed
- Butcher Fork (bac.) Watershed

However, input from the working groups indicated that all of the straight pipes in the Butcher Fork watershed have been addressed. Also, input indicated that the most likely areas where straight pipes will be identified are in the South Fork Powell River watershed, and in the southern end of the North Fork Powell River watershed, where systems may be unintentionally discharging to caves.

Regarding the land-based BMPs for agricultural, residential, and industrial lands, targeting could best be accomplished through review of the land use distribution. **Figure 6.7** shows that, while most of the residential areas are clustered along roads and near municipal centers, the agricultural lands are spread through the valley and the AML areas are located in the headwaters areas northwest of the City of Norton.

An additional method of targeting practices in these areas involves considering the cost-efficiency of specific practices. **Table 5.15** indicates the cost-efficiencies of the practices proposed in this IP. Practices with high cost-efficiencies, relative to other practices, will provide the greatest benefit per dollar invested. This is why the current plan emphasizes improved pasture management, conservation tillage, and haul road stabilization in the first five years of implementation.

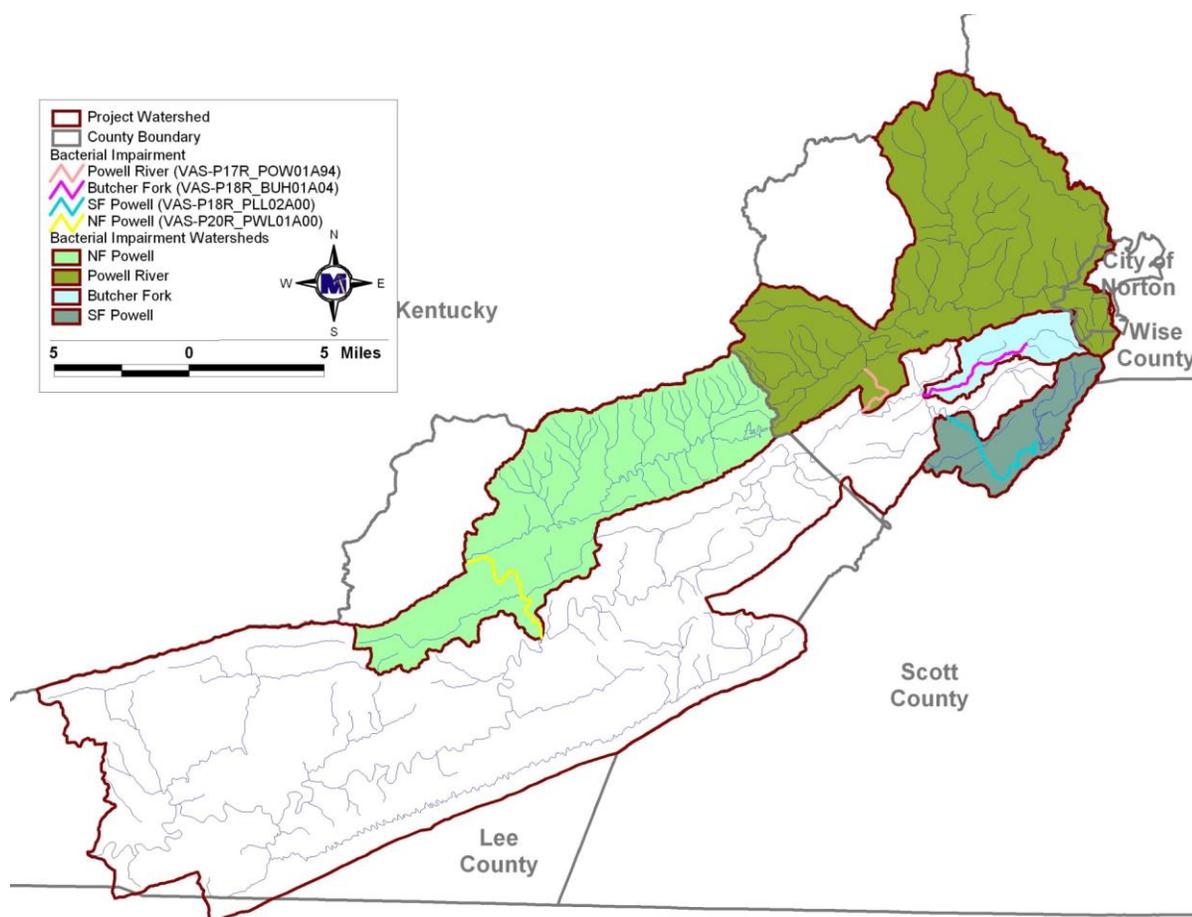


Figure 6.6 Bacteria impaired TMDL watersheds within the Powell River watersheds.

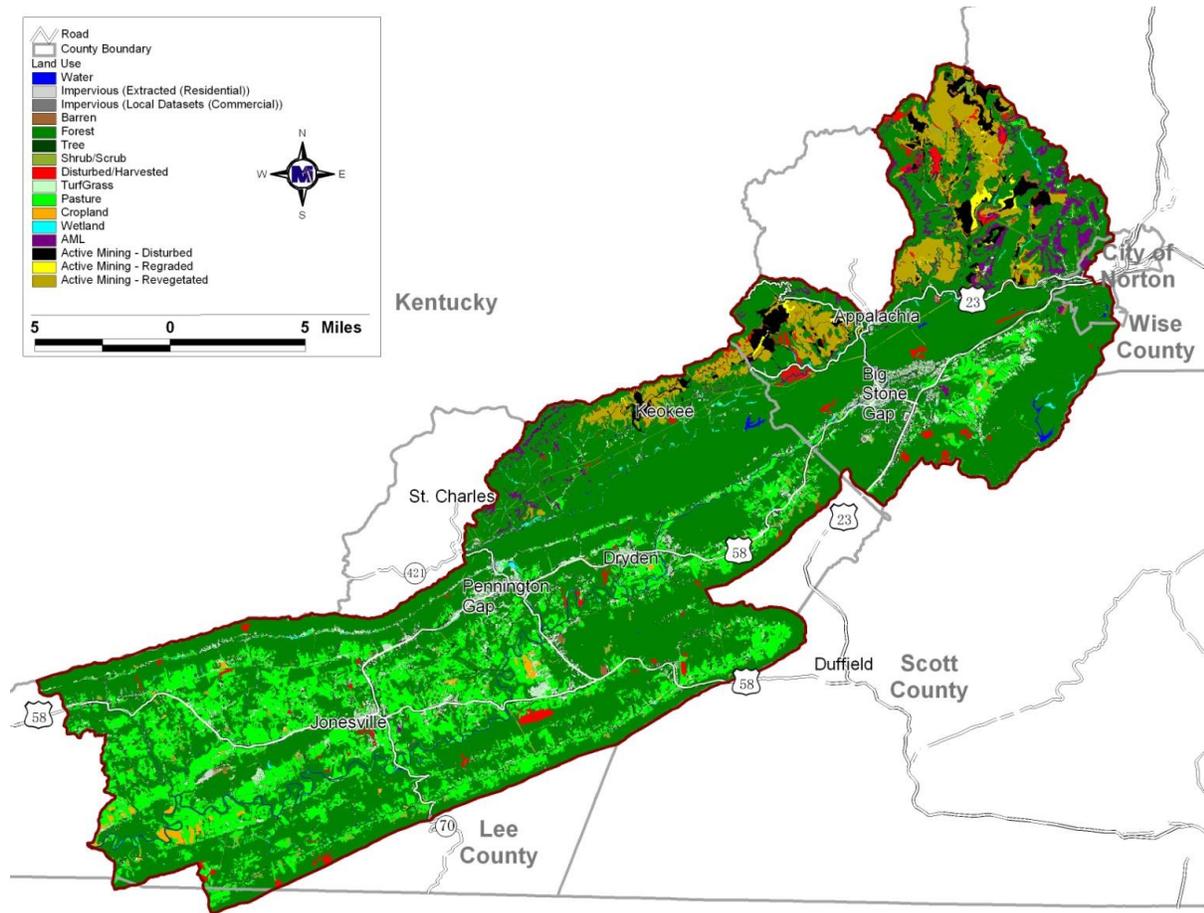


Figure 6.7 Land uses in the Powell River Watershed study area.

7. STAKEHOLDERS AND THEIR ROLE IN IMPLEMENTATION

Achieving the goals of this effort (*i.e.*, improving water quality and removing these waters from the impaired waters list) is dependent upon stakeholder participation. Both the local stakeholders charged with implementation of control measures and the stakeholders charged with overseeing our nation's human health are key elements of a successful IP. The first step is to acknowledge that a water quality problem exists and realize that needed changes must be made in operations, programs, and legislation to address these pollutants. The Daniel Boone and Lonesome Pine SWCDs have agreed to take responsibility for initiating contact to encourage landowners to install the agricultural BMPs and to correct residential onsite wastewater treatment systems in need. VADEQ staff will take the responsibility of working with the Daniel Boone and Lonesome Pine SWCDs and other partners in tracking implementation efforts as well as organizing the steering committee for evaluations of implementation progress. The following sections in this chapter describe the responsibilities and expectations for the various components of implementation.

7.1 Partners and their Role in Implementation

7.1.1 Daniel Boone and Lonesome Pine Soil & Water Conservation Districts and USDA Natural Resource Conservation Service

Both the SWCDs and NRCS are continually reaching out to farmers in the watersheds and providing them technical assistance with conservation practices. The Daniel Boone and Lonesome Pine SWCDs are local government entities providing soil and water conservation assistance to farmers and residents in the Powell River watersheds. During the implementation project, the SWCDs, along with NRCS, will provide outreach, technical and financial assistance to farmers and homeowners in the Powell River. Their responsibilities will include promoting implementation goals, available funding and the benefits of BMPs and providing assistance in the survey, design, layout, and approval of agricultural and residential BMPs. Education and outreach activities are a significant portion of their responsibilities. The SWCDs will be eligible for technical assistance funding to support their duties.

7.1.2 Lee County, Wise County, Towns and the City of Norton

Decisions made by local government staff and elected officials regarding land use and zoning will play an important role in the implementation of this plan. This makes the Lee and Wise County Boards of Supervisors, the Norton City Council, and the Planning Commissions key partners in long term implementation efforts. Local government support of land conservation will become increasingly important as greater numbers of conservation measures are implemented across the watersheds. Ensuring that land remains in agriculture and forest will allow the practices installed to continue to benefit water quality.

7.1.3 Virginia Department of Environmental Quality

The Virginia Department of Environmental Quality (VADEQ) has a lead role in the development of TMDL implementation plans. VADEQ also provides available grant funding and technical support for TMDL implementation. VADEQ will work closely with project partners including the Soil and Water Conservation Districts to track implementation progress for best management practices. In addition, VADEQ will work with interested partners on grant proposals to generate funds for projects included in the implementation plan. When needed, VADEQ will facilitate additional meetings of the steering committee to discuss implementation progress and make necessary adjustments to the implementation plan. VADEQ staff can also provide support with education and outreach related to water quality.

VADEQ is also responsible for monitoring state waters to determine compliance with water quality standards. VADEQ will continue monitoring water quality in Powell River watershed in order to assess water quality and determine when restoration has been achieved and the streams can be removed from Virginia's impaired waters list.

7.1.4 Virginia Department of Conservation and Recreation

The Virginia Department of Conservation and Recreation (VADCR) administers the Virginia Agricultural Cost Share Program, working closely with Soil and Water Conservation Districts to provide cost share and operating grants needed to deliver this program at the local level and track implementation. In addition, VADCR administers the state's Nutrient Management Program, which provides technical assistance to producers in appropriate manure storage and manure and commercial fertilizer.

7.1.5 Virginia Department of Health

The Virginia Department of Health (VDH) is responsible for adopting and implementing regulations for onsite wastewater treatment and disposal. The Sewage Handling and Disposal Regulations require homeowners to secure permits for handling and disposal of sewage (e.g. repairing a failing septic system or installing a new treatment system). VDH staff provide technical assistance to homeowners with septic system maintenance and installation, and respond to complaints regarding failing septic systems and straight pipes.

7.1.6 Department of Mines, Minerals, and Energy – Division of Mined Land Reclamation

The Division of Mined Land Reclamation (DMLR) presently regulates all of the land-disturbing, mining, and reclamation activities from coal-mining operations by issuing Coal Surface Mining Operation (CSMO) permits. The DMLR is delegated by the Federal Office of Surface Mining to administer the requirements of the Federal Surface Mining Control and Reclamation Act (SMCRA). Also, the EPA grants the DMLR the authority to administer the VPDES permit program under the Clean Water Act for the coal industry. To that end, the DMLR utilizes enforcement action under the Virginia Coal SMCRA and VPDES to effect compliance with the State Water Control Law.

7.1.7 Department of Mines, Minerals, and Energy – Division of Gas and Oil

The Division of Gas and Oil's (DGO) responsibilities include the regulation of the effects of gas and oil operations (both on and below the surface), issuance of permits, administration of client assistance programs, inspection of well sites and gathering pipelines, reclamation of abandoned well sites, protection of correlative rights, and promotion of resource conservation practices.

Permits are required for ground-disturbing geophysical exploration, exploration wells, development wells, and gathering pipelines. The DGO reviews applications that must address information on acreage to be disturbed, blasting activities, proposed new roads and existing access roads, erosion and sediment control plans, the design and operation of any pits, and the drilling and stimulating plan (including information on the water and constituents of the

drilling fluids and management and disposal of pit fluids, produced waters, drill cuttings and solids).

The DGO reviews all applications and may place conditions on a permit or require the applicant to submit more information or amend the proposed operation plan to ensure that the operator will comply with the law and regulation. Applicants must post a bond to guarantee that money is available for site reclamation and plugging should the operator fail to perform the work. The operator may not begin site work until the DGO issues a permit. In order to ensure compliance with the Virginia Gas and Oil Act and Regulation, field staff from the DGO make routine inspections of well sites, gathering pipelines, facilities, and other permitted sites and activities. Frequency of inspection is determined by a priority system that categorizes each permitted site or operation according to its level of activity or the stability of the associated disturbed area.

7.1.8 The Virginia Department of Forestry

Forests provide a vital role in preserving water quality. The Virginia Department of Forestry (VDOF) inspects logging jobs to ensure that BMPs are being installed by loggers, because there is a zero tolerance for sedimentation in nearby streams. Effective July 1, 2002, Virginia's General Assembly made changes to the Silvicultural Water Quality Law, Code of Virginia §10.1-1181.2(H) related to Notification of the Commercial Harvesting of Timber. This change gives the State Forester the authority to issue a civil penalty of \$250 for the initial violation and up to \$1,000 for subsequent violations within a 24-month (2-year) period. The Notification is required by the Operator (as defined in the law) and the civil penalty will be assessed against the Operator for failure to notify. Notification must be received by the VDOF within three working days of the start of the logging operation, or before completion if the operation will take less than three days to finish. The Virginia DOF has the authority under the Code of Virginia to issue Special Orders to any owner or operator who has conducted or is allowing the conduct on any silvicultural activity in a manner which is causing or is likely to cause pollution, and to implement corrective measures within a stated period of time. Failure to obey a Special Order issued by the VDOF can result in civil penalties of up to \$5,000 per day. A *Best Management Practices Field Guide* is available at:

<http://www.dof.virginia.gov/water/index.htm>.

Forestry BMPs are directed primarily to control erosion. For example, streamside forest buffers provide nutrient uptake and soil stabilization, which can benefit water quality by reducing the amount of nutrients and sediments that enter local streams.

The VDOF also has a major role in protecting watersheds through riparian forest buffers. Riparian forest buffers reduce erosion and cleanse water entering streams. These activities are allowed under the **Code of Virginia: Water Quality Law, Chapter 11, 10.1-1181.7**.

7.1.9 Other Potential Local Partners

There are numerous additional opportunities for future partnerships in the implementation of this plan. Additional potential partners in implementation include:

- VA Cooperative Extension
- County and city schools
- Trout Unlimited
- USDA Forest Service
- Virginia Department of Game and Inland Fisheries
- The Nature Conservancy
- Coalfield Beef Cattle Association
- Wise-Dickenson County Farm Bureau
- Appalachian Community Action
- Appalachian Voices
- Clinch-Powell Clean Rivers Initiative
- Upper Tennessee River Roundtable
- Private Industry and Economic Development Organizations

7.2 Integration with Other Watershed Plans

Each watershed in the state is under the jurisdiction of a multitude of individual, yet related, water quality programs and activities, many of which have specific geographic boundaries and goals. These include but are not limited to TMDLs, Roundtables, Water Quality Management Plans, erosion and sediment control regulations, stormwater management, Source Water

Protection Program, and local comprehensive plans. Coordination of the implementation project with these existing programs could result in additional resources and increased participation.

7.3 Monitoring

Improvements in water quality will be determined in the Powell River watershed through monitoring conducted by the VADEQ's ambient monitoring program. The monitoring data include bacteria, physical parameters (dissolved oxygen, temperature, pH, and conductivity), nutrients and organic and inorganic solids. The VADEQ uses the data to determine overall water quality status. The water quality status will help gauge the success of implementation aimed at reducing the amount of bacteria in the streams of the Powell River watersheds.

The VADEQ monitoring stations in the Powell River watershed are described in **Table 7.1**. Up-to-date monitoring results are available to residents by requesting the information from the VADEQ.

Table 7.1 Bacteria monitoring stations in Powell River bacteria TMDL watersheds.

Station	Stream	Station Type	River Mile
6BBUH000.76	Butcher Fork	Ambient	0.76
6BPWL001.49	NF Powell River	Ambient	1.49
6BPOW179.20	Powell River	Ambient	179.20
6BPOW193.38	Powell River	Ambient	193.38
6BPLL000.27	SF Powell River	Ambient	0.27
6BPLL002.55	SF Powell River	Ambient	2.55
6BPLL004.24	SF Powell River	Ambient	4.24

Table 7.2 Benthic monitoring stations in Powell River watershed.

Station	Stream	Station Type	River Mile
6BPOW120.12	Powell River	Benthic	120.12
6BPOW156.57	Powell River	Benthic	156.57
6BPOW162.89	Powell River	Benthic	162.89
6BPOW166.97	Powell River	Benthic	166.97
6BPOW179.20	Powell River	Ambient/Benthic	179.20
6BPOW184.19	Powell River	Benthic	184.19
6BPWL001.93	NF Powell River	Benthic	1.93
6BPWL004.40	NF Powell River	Benthic	4.4
6BPLL001.61	SF Powell River	Benthic	1.61
6BPLL002.55	SF Powell River	Ambient/Benthic	2.55

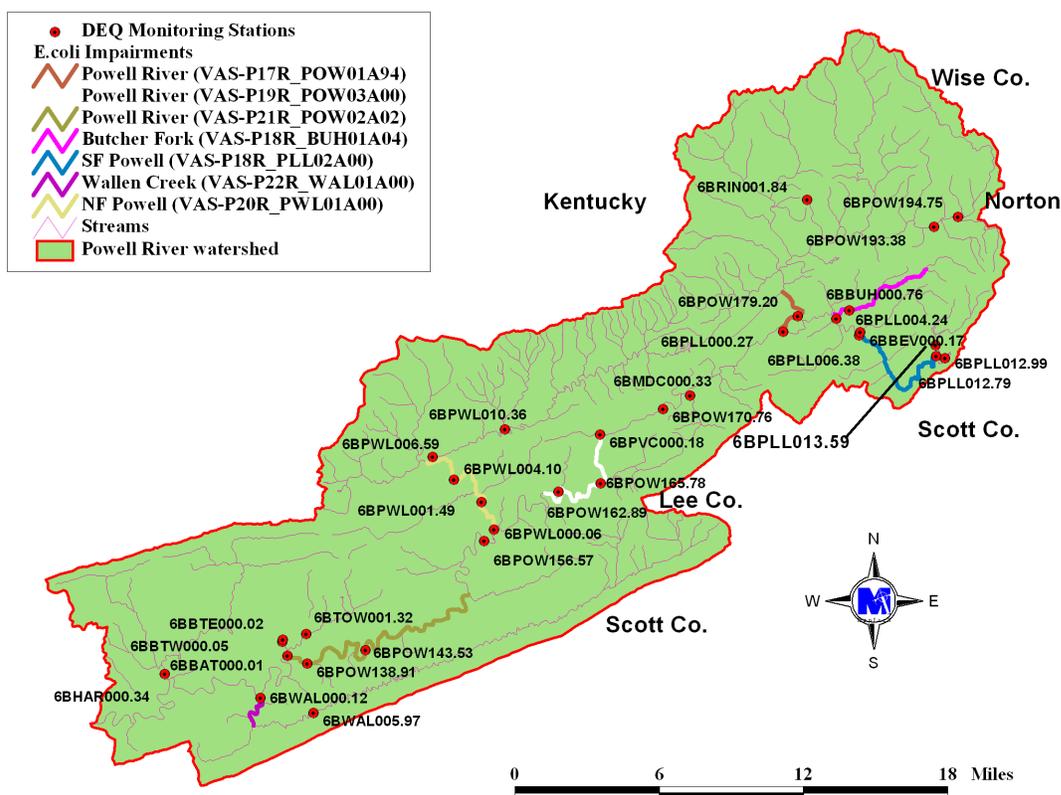


Figure 7.1 Location of VADEQ water quality monitoring stations in the Powell River Watershed.

7.4 Agricultural, Residential and Industrial Education Programs

Education and outreach is a significant component of any TMDL implementation project. The Daniel Boone and Lonesome Pine SWCDs will be in charge of initiating contact with residents and farmers to encourage the installation of BMPs. This one-on-one contact will facilitate communication of the water quality problems and the corrective actions needed. The district staff will conduct a number of outreach activities in the watershed to promote participation and community support to attain the IP milestones and to make the community aware of the TMDL requirements. Such activities will include information exchange through newsletters, mailings, field days, demonstrations, organizational meetings, etc. The staff will work with appropriate organizations such as VCE to educate the public. Grazing land/ forage workshops possibly with the Virginia Forage and Grassland Council are venues to distribute agricultural education materials. In regard to Industrial BMPs, VADEQ personnel can develop literature

regarding the TMDL and potential control measures. This information can be distributed through SWCDs, DMME, DGO, and VDOF permitting and educational programs (*e.g.*, the SHARP Logger Program). Specific agricultural, residential/urban, and industrial outreach ideas are outlined in section 5.3.

7.5 Legal Authority

The USEPA has the responsibility of overseeing the various programs necessary for the success of the CWA. However, administration and enforcement of such programs falls largely to the states. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. Currently, there are four state agencies responsible for regulating activities that impact water quality in Virginia. These agencies are VADEQ, VADCR, VDH, and Virginia Department of Agriculture and Consumer Services (VDACS).

VADEQ has responsibility for monitoring waters to determine compliance with state standards, and for requiring permitted point dischargers to maintain loads within permit limits. It has the regulatory authority to levy fines and take legal action against those in violation of permits. DEQ has the authority to regulate erosion and sediment control and the stormwater management program and is the lead agency for Virginia's Nonpoint Source Program. Beginning in 1994, animal waste from confined animal facilities that hold in excess of 300 animal units (cattle and hogs) has been managed through a Virginia general pollution abatement permit. These operations are required to implement a number of practices to prevent surface and groundwater contamination. In response to increasing demand from the public to develop new regulations dealing with animal waste, the Virginia General Assembly passed legislation in 1999 requiring VADEQ to develop regulations for the management of poultry waste in operations having more than 200 animal units of poultry (about 20,000 chickens) (ELI, 1999). On January 1, 2008 DEQ assumed regulatory oversight of all land application of treated sewage sludge, commonly referred to as biosolids as a directed by the Virginia General Assembly in 2007. DEQ's Office of Land Application Programs within the Water Quality Division to manages the biosolids program. The biosolids program includes having and following nutrient management plans for all fields receiving biosolids, unannounced

inspections of the land application sites, certification of persons land applying biosolids, and payment of a \$7.50 fee per dry ton of biosolids land applied.

VADCR holds the responsibility for addressing agricultural nonpoint sources (NPS) of pollution. Historically, most VADCR programs have dealt with agricultural NPS pollution through education and voluntary incentive programs. These cost-share programs were originally developed to meet the needs of voluntary partial participation and not the level of participation required by TMDLs (near 100%). To meet the needs of the TMDL program and achieve the goals set forth in the CWA, the incentive programs are continually reevaluated to account for this level of participation.

Through Virginia's Agricultural Stewardship Act (ASA), the Commissioner of Agriculture has the authority to investigate claims that an agricultural producer is causing a water quality problem on a case-by-case basis (Pugh, 2001). If deemed a problem, the Commissioner can order the producer to submit an agricultural stewardship plan to the local soil and water conservation district. If a producer fails to implement the plan, corrective action can be taken which can include a civil penalty of up to \$5,000 per day. The Commissioner of Agriculture can issue an emergency corrective action if runoff is likely to endanger public health, animals, fish and aquatic life, public water supply, etc. An emergency order can shut down all or part of an agricultural activity and require specific stewardship measures. VDACS has only two staff members dedicated to enforcing the Agricultural Stewardship Act, and very little funding is available to support water quality sampling. The Agricultural Stewardship Act is entirely complaint-driven.

The *Emergency Regulations for Alternative Onsite Sewage Systems*, adopted in April, 2010, require that all alternative onsite sewage treatment systems in Virginia be visited at least annually by a licensed operator. However, the Virginia Department of Health (VDH) does not currently have the authority, the mandate or the resources to require or conduct similar surveillance of all conventional onsite sewage treatment (septic) systems in the Commonwealth. (Note that, as resources allow, VDH may conduct or assist with such surveys that target localized areas of specific concern.)

Given the above limitations, VDH generally learns of failed septic systems directly or indirectly from the owners of those systems or through complaints from neighbors or other government agencies. Reports of straight pipes are less-frequently received from either source, since they are generally located in less-populated areas and are typically sited/intended to avoid detection.

When VDH receives a report of a non-compliant system, it performs a site inspection, if necessary, to verify the report. VDH then works with the homeowner to address the issue in an effective, timely and regulatory-compliant manner, generally through installation of a septic or alternative onsite system, repair or replacement of an existing system and/or failed components of that system, connection to a central collection/treatment system, or other appropriate measure(s). In the case of non-cooperative homeowners, VDH initially attempts to achieve compliance through internal enforcement actions and, ultimately, through the court system.

An impasse may be reached when a homeowner is willing, but financially unable to correct the non-compliance. In such situations, VDH assists in attempting to locate funding for the needed corrections.

State government has the authority to establish state laws that control delivery of pollutants to local waters. Local governments, in conjunction with the state, can develop ordinances involving pollution prevention measures. In addition, citizens have the right to bring litigation against persons or groups of people shown to be causing some harm to the claimant. The judicial branch of government also plays a significant role in the regulation of activities that impact water quality through hearing the claims of citizens in civil court and the claims of government representatives in criminal court.

The local governments can play a very active role in the implementation process. For example they could promote a septic system maintenance program. This could be done by handing out literature when individuals apply for a building permit. It is recommended that the counties within the Powell River watersheds adopt a reserve area for land parcels using on-site wastewater treatment of equal size to the approved on-site disposal system for use in the event the on-site disposal system fails. Further, the reserve area shown must be of equal capacity to

the primary drainfield using the same technology as the primary system. Nothing shall be constructed within the reserve area. The counties could also play an active role in the proper disposal of pet waste. When licenses for dog kennels are issued the owners should be required to produce a plan for the proper disposal of waste from the facility. Future subdivisions should be developed with sustainable growth practices that minimize or eliminate storm water runoff. Future subdivisions should be developed with sustainable growth practices that minimize or eliminate storm water runoff.

7.6 Legal Action

The Clean Water Act Section 303(d) calls for the identification of impaired waters. It also requires that the streams be ranked by the severity of the impairment and that a Total Maximum Daily Load be calculated for that stream that would bring it back into compliance with the set water quality standard. Currently, TMDL Implementation Plans are not required in the Federal Code; however, Virginia State Code does incorporate the development of Implementation Plans for impaired streams. USEPA largely ignored the nonpoint source section of the Clean Water Act until citizens began to realize that regulating only point sources was no longer maintaining water quality standards. Lawsuits from citizens and environmental groups citing USEPA for not carrying out the statutes of the CWA began as far back as the 1970s and have continued until the present. In Virginia in 1998, the American Canoe Association and the American Littoral Society filed a complaint against USEPA for failure to comply with provisions of §303d. The suit was settled by Consent Decree, which contained a TMDL development schedule through 2010. It is becoming more common for concerned citizens and environmental groups to turn to the courts for the enforcement of water quality issues.

In 1989, concerned residents of Castile in Wyoming County, New York filed suit against Southview Farm. Southview had around 1,400 head of milking cows and 2,000 total head of cattle. Tests on private wells determined that the water was contaminated with nitrates traced to irresponsible handling of animal wastes by Southview. In 1990, Southview was given a notice of violations under the Clean Water Act. Rather than change their farming practices or address the contaminated wells, they ignored the warning. In 1995, after court hearings and an appeal, the case was finally settled. Southview had to donate \$15,000 to the Dairy Farms

Sustainability Project at Cornell University, pay \$210,000 in attorney fees for the plaintiff, and employ best management practices (Knauf, 2001).

On the Eastern Shore of Virginia, an aquaculture operation raising clams and oysters, brought suit against his neighbor, a tomato grower. The aquaculture operation owner claimed that the agricultural runoff created from the plasticulture operation carried pollutants which were destroying his shellfish beds. The suit was settled out of court in favor of the aquaculture operation owner.

Successful implementation depends on stakeholders taking responsibility for their role in the process. The primary role, of course, falls on the landowner. However, local, state and federal agencies also have a stake in ensuring that Virginia's waters are clean and provide a healthy environment for its citizens. An important first step in correcting the existing water quality problem is recognizing that there is a problem and that the health of citizens is at stake. Virginia's approach to correcting NPS pollution problems has been, and continues to be, encouragement of participation through education and financial incentives.

8. FUNDING

The following practices are identified as vital to attaining the goals of the Powell River watersheds IP: LE-1T, LE-2, LE-2T, SL-6, CREP/SL-6 (Livestock Exclusion), WP-2T (Streambank Protection in TMDL areas), SL-10T, EQIP (Improved Pasture Management), conservation tillage, RB-1 (Septic Tank Pump-Out), RB-2 (Sewer System Connection), RB-3/3R (Septic Tank Repair), RB-4 (Septic Tank System Installation/Replacement), RB-5 (Alternative On-site Waste Treatment System), Rain Gardens, Bioretention Basis, Infiltration Trench, Streambank Stabilization, Reclamation of Abandoned Mine Land, Reclamation of Disturbed Forest and Haul Road Stabilization. Potential funding sources available during implementation were identified during IP development. A brief description of the programs and their requirements is provided in this chapter. Detailed descriptions can be obtained from the SWCDs, VADCR, NRCS, and VCE. It is recommended that participants discuss funding options with experienced personnel at their local SWCDs in order to choose the best option. Information on program description and requirements was provided from fact sheets prepared by Virginia State Technical Advisory Committee, VADEQ, VADCR, and Southeast Rural Community Assistance Project, Inc.

Federal Clean Water Act 319 Funds

Through Section 319 of the Federal Clean Water Act, Virginia is awarded grant funds to implement the nonpoint source programs. VADEQ administers the money in coordination with the Nonpoint Source Advisory Committee (NPSAC) to fund watershed projects, demonstration and educational programs, nonpoint source pollution control program development, and technical and program staff. VADEQ reports annually to the USEPA on the progress made in nonpoint source pollution prevention and control. A 319 application will be written upon completion of the IP to request funding for the technical assistance required (FTEs).

Virginia Agricultural Best Management Practices Cost-Share Program

The cost-share program is funded with state and federal monies through local SWCDs. SWCDs administer the program to encourage farmers and landowners to use BMPs on their land to better control sediment, nutrient loss, and transportation of pollutants into our waters due to excessive surface flow, erosion, leaching, and inadequate animal waste management.

Program participants are recruited by SWCDs based upon those factors, which have a great impact on water quality. The objective is to solve water quality problems by fixing the worst problems first. Cost-share is typically 75% of the actual cost, not to exceed the local maximum. The Virginia Water Quality Improvement Fund (WQIF) also provides funding for this program, which is dependent upon a percentage of state surpluses.

Virginia Agricultural Best Management Practices Tax Credit Program

For all taxable years, any individual or corporation engaged in agricultural production for market, who has in place a soil conservation plan approved by the local SWCD, shall be allowed a credit against the tax imposed by Section 58.1-320 of an amount equaling 25% of the first \$70,000 expended for agricultural best management practices by the individual. “Agricultural best management practices” are approved measures that will provide a significant improvement to water quality in the state’s streams and rivers, and is consistent with other state and federal programs that address agricultural nonpoint source pollution management. Any practice approved by the local SWCD Board shall be completed within the taxable year in which the credit is claimed. The credit shall be allowed only for expenditures made by the taxpayer from funds of his/her own sources. The amount of such credit shall not exceed \$17,500 or the total amount of the tax imposed by this program (whichever is less) in the year the project was completed, as certified by the Board. If the amount of the credit exceeds the taxpayer’s liability for such taxable year, the excess may be carried over for credit against income taxes in the next five taxable years until the total amount of the tax credit has been taken. This program can be used independently or in conjunction with other cost-share programs on the stakeholder’s portion of BMP costs. It is also approved for use in supplementing the cost of repairs to streamside fencing.

Virginia Agricultural Best Management Practices Loan Program

Loan requests are accepted through VADEQ. The interest rate is 3% per year and the term of the loan coincides with the life span of the practice. To be eligible for the loan, the BMP must be included in a conservation plan approved by the local SWCD Board. The minimum loan amount is \$5,000; there is no maximum limit. Eligible BMPs include 23 structural practices such as animal waste control facilities, loafing lot management systems, and grazing land

protection systems. The loans are administered through certain participating lending institutions.

Virginia Small Business Environmental Assistance Fund Loan Program

The Fund, administered through VADEQ, is used to make loans or to guarantee loans to small businesses for the purchase and installation of environmental pollution control equipment, equipment to implement voluntary pollution prevention measures, or equipment and structures to implement agricultural BMPs. The equipment must be needed by the small business to comply with the federal Clean Air Act, or it will allow the small business to implement voluntary pollution prevention measures. The loans are available in amounts up to \$50,000 and will carry an interest rate of 3%, with favorable repayment terms based on the borrower's ability to repay and the useful life of the equipment being purchased or the life of the BMP being implemented. There is a \$30 non-refundable application processing fee. The Fund will not be used to make loans to small businesses for the purchase and installation of equipment needed to comply with an enforcement action. To be eligible for assistance, a business must employ 100 or fewer people and be classified as a small business under the federal Small Business Act.

Virginia Water Quality Improvement Fund

This is a permanent, non-reverting fund established by the Commonwealth of Virginia in order to assist local stakeholders in reducing point and nonpoint nutrient loads to surface waters. Eligible recipients include local governments, SWCDs, and individuals. Grants for point sources and nonpoint sources are administered through VADEQ. Most WQIF grants provide matching funds on a 50/50 cost-share basis. Successful applications are listed as draft/public-noticed agreements, and are subject to a public review period of at least 30 days.

Community Development Block Grant Program

The Department of Housing and Urban Development sponsors this program, intended to develop viable communities by providing decent housing and a suitable living environment and by expanding economic opportunities primarily for persons of low and moderate income. Recipients may initiate activities directed toward neighborhood revitalization, economic development, and provision of improved community facilities and services. Specific activities may include public services, acquisition of real property, relocation and demolition,

rehabilitation of structures, and provision of public facilities and improvements, such as new or improved water and sewer facilities.

Conservation Reserve Program (CRP)

Offers are accepted and processed during fixed signup periods that are announced by Farm Services Agency (FSA). All eligible (cropland) offers are ranked using a national ranking process. If accepted, contracts are developed for a minimum of 10 and not more than 15 years. Payments are based on a per-acre soil rental rate. Cost-share assistance is available to establish the conservation cover of tree or herbaceous vegetation. The per-acre rental rate may not exceed the Commodity Credit Corporation's maximum payment amount, but producers may elect to receive an amount less than the maximum payment rate, which can increase the ranking score. To be eligible for consideration, the following criteria must be met: 1) cropland was planted or considered planted in an agricultural commodity for two of the five most recent crop years, and 2) cropland is classified as "highly-erodible" by NRCS. Eligible practices include planting these areas to trees and/or herbaceous vegetation. Application evaluation points can be increased if certain tree species, spacing, and seeding mixtures that maximize wildlife habitats are selected. Land must have been owned or operated by the applicant for at least 12 months prior to the close of the signup period. The payment to the participant is up to 50% of the cost for establishing ground cover. Incentive payments for wetlands hydrology restoration equal 25% of the cost of restoration.

Conservation Reserve Enhancement Program (CREP)

This program is an "enhancement" of the existing USDA CRP Continuous Sign-up. It has been "enhanced" by increasing the cost-share rates from 50% to 75% and 100%, increasing the rental rates, and offering a flat rate incentive payment to place a permanent "riparian easement" on the enrolled area. Pasture and cropland (as defined by USDA) adjacent to streams, intermittent streams, seeps, springs, ponds and sinkholes are eligible to be enrolled. Buffers consisting of native, warm-season grasses on cropland, to mixed hardwood trees on pasture, must be established in widths ranging from the minimum of 30% of the floodplain or 35 feet, whichever is greater, to a maximum average of 300 feet. Cost-sharing (75% - 100%) is available to help pay for fencing to exclude livestock from the riparian buffer, watering facilities, hardwood tree planting, filter strip establishment, and wetland restoration. In

addition, a 40% incentive payment upon completion is offered and an average rental rate of \$70/acre on stream buffer area for 10-15 years. The State of Virginia will make an additional incentive payment to place a perpetual conservation easement on the enrolled area. The statewide goal is 8,000 acres.

The landowner can obtain and complete CREP application forms at the FSA center. The forms are forwarded to local NRCS and SWCD offices while FSA determines land eligibility. If the land is deemed eligible, NRCS and the local SWCDs determine and design appropriate conservation practices. A conservation plan is written, and fieldwork is begun, which completes the conservation practice design phase.

FSA then measures CREP acreage, conservation practice contracts are written, and practices are installed. The landowner submits bills for cost-share reimbursement to FSA. Once the landowner completes BMP installation and the practice is approved, FSA and the SWCD make the cost-share payments. The SWCDs also pay out the state's one-time, lump sum rental payment. FSA conducts random spot checks throughout the life of the contract, and the agency continues to pay annual rent throughout the contract period.

Environmental Quality Incentives Program (EQIP)

This program was established in the 1996 Farm Bill to provide a single voluntary conservation program for farmers and landowners to address significant natural resource needs and objectives. This program replaces the Agricultural Conservation Program (ACP) and the Water Quality Incentive Program (WQIP). Approximately 65% of the EQIP funding for the state of Virginia is directed toward "Priority Areas." These areas are selected from proposals submitted by a locally led conservation work group. Proposals describe serious and critical environmental needs and concerns of an area or watershed, and the corrective actions they desire to take to address these needs and concerns. The remaining 35% of the funds are directed toward statewide priority concerns of environmental needs. EQIP offers 5 to 10-year contracts to landowners and farmers to provide 75% cost-share assistance, 25% tax credit, and/or incentive payments to implement conservation practices and address the priority concerns statewide or in the priority area. Eligibility is limited to persons who are engaged in livestock or agricultural production. Eligible land includes cropland, pasture, and other

agricultural land in priority areas, or land that has an environmental need that matches one of the statewide concerns.

Southeast Rural Community Assistance Project (SE/R-CAP)

The mission of this project is to promote, cultivate, and encourage the development of water and wastewater facilities to serve low-income residents at affordable costs and to support other development activities that will improve the quality of life in rural areas. Staff members of other community organizations complement the SE/R-CAP central office staff across the region. They can provide (at no cost to a community): on-site technical assistance and consultation, operation and maintenance/management assistance, training, education, facilitation, volunteers, and financial assistance. Financial assistance includes \$1,500 toward repair/replacement/installation of a septic system and \$2,000 toward repair/replacement/installation of an alternative waste treatment system. Funding is only available for families making less than 125% of the federal poverty level. The federal poverty threshold for a family of four is \$23,550 (USDHHS, 2013).

National Fish and Wildlife Foundation

Offers are accepted throughout the year and processed during fixed signup periods. The signup periods are on a year-round, revolving basis, and there are two decision cycles per year. Each cycle consists of a pre-proposal evaluation, a full proposal evaluation, and a Board of Directors' decision. An approved pre-proposal is a pre-requisite to the submittal of the full proposal. Grants generally range between \$10,000 and \$150,000. Payments are based on need. Projects are funded in the U.S. and any international areas that host migratory wildlife from the U.S. Grants are awarded for the purpose of conserving fish, wildlife, plants, and their habitats. Special grant programs are listed and described on the NFWF website (<http://www.nfwf.org>). If the project does not fall into the criteria of any special grant programs, the proposal may be submitted as a general grant if it falls under the following guidelines: 1) it promotes fish, wildlife and habitat conservation, 2) it involves other conservation and community interests, 3) it leverages available funding, and 4) project outcomes are evaluated. A pre-proposal that is not accepted by a special grant program may be deferred to the general grant program.

Clean Water State Revolving Fund

USEPA awards grants to states to capitalize their Clean Water State Revolving Funds (CWSRFs). The states, through the CWSRF, make loans for high-priority water quality activities. As loan recipients make payments back into the fund, money is available for new loans to be issued to other recipients. Eligible projects include point source, nonpoint source and estuary protection projects. Point source projects typically include building wastewater treatment facilities, combined sewer overflow and sanitary sewer overflow correction, urban stormwater control, and water quality aspects of landfill projects. Nonpoint source projects include agricultural, silvicultural, rural, and some urban runoff control; on-site wastewater disposal systems (septic tanks); land conservation and riparian buffers; leaking underground storage tank remediation, etc. Estuary protection projects include all of the above point and nonpoint source projects, as well as habitat restoration and other unique estuary projects.

USEPA Environmental Education Grant Funding Opportunity

The purpose of the grant is to promote environmental stewardship and help develop knowledgeable and responsible students, teachers and citizens. More information on eligibility and application materials, please visit <http://www.epa.gov/enviroed/grants.html>.

There is a requirement to specify an environmental issue, based on USEPA's current priorities that the proposed project will focus on. There is more emphasis on expanding the conversation on environmentalism by including a variety of audiences in proposed projects. If applying through grants.gov, make sure to register at least one week ahead of time.

Additional Potential Funding Sources Identified in the Working Group Meetings

Some potential funding sources that were identified in the working group meetings include:

- Coalfield Water Development Fund (CWDF)
- Abandoned Mine Land Fund
- RECLAIM funding
- Riparian Tax Credit with DOF
- Forest Stewardship Program (FSP)
- PL-566 (Specific to NF Powell River)

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GLOSSARY

303(d). A section of the Clean Water Act of 1972 requiring states to identify and list water bodies that do not meet the states' water quality standards.

ACP. Agricultural Conservation Program.

Allocations. That portion of a receiving water's loading capacity attributed to one of its existing or future pollution sources (nonpoint or point) or to natural background sources. (A wasteload allocation [WLA] is that portion of the loading capacity allocated to an existing or future point source, and a load allocation [LA] is that portion allocated to an existing or future nonpoint source or to natural background levels. Load allocations are best estimates of the loading, which can range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading.)

ASA. Agricultural Stewardship Act.

Best management practices (BMPs). Methods, measures, or practices determined to be reasonable and cost-effective means for a landowner to meet certain, generally nonpoint source, pollution control needs. BMPs include structural and nonstructural controls and operation and maintenance procedures.

cfu. colony-forming units.

Clean Water Act (CWA). The Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972), Public Law 92-500, as amended by Public Law 96-483 and Public Law 97-117, 33 U.S.C. 1251 et seq. The Clean Water Act (CWA) contains a number of provisions to restore and maintain the quality of the nation's water resources. One of these provisions is Section 303(d), which establishes the TMDL program.

CREP. Conservation Reserve Enhancement Program.

CRP. Conservation Reserve Program.

CWA. Clean Water Act, 1972.

CWSRF. Clean Water State Revolving Fund.

DMME. Virginia Department of Mines, Minerals, and Energy.

E. coli (Escherichia coli). One of the groups of fecal coliform bacteria associated with the digestive tract of warm-blooded animals used as indicator organisms (organisms indicating presence of pathogens) to detect the presence of pathogenic bacteria in the water.

Ecosystem. An interactive system that includes the organisms of a natural community association together with their abiotic physical, chemical, and geochemical environment.

Effluent limitation. Restrictions established by a state or USEPA on quantities, rates, and concentrations in pollutant discharges.

Endpoint. An endpoint (or indicator/target) is a characteristic of an ecosystem that may be affected by exposure to a stressor. Assessment endpoints and measurement endpoints are two distinct types of endpoints commonly used by resource managers. An assessment endpoint is the formal expression of a valued environmental characteristic and should have societal relevance (an indicator). A measurement endpoint is the expression of an observed or measured response to a stress or disturbance. It is a measurable environmental characteristic that is related to the valued environmental characteristic chosen as the assessment endpoint. The numeric criteria that are part of traditional water quality standards are good examples of measurement endpoints (targets).

EQIP. Environmental Quality Incentives Program.

Fecal coliform (FC). Indicator organisms (organisms indicating presence of pathogens) associated with the digestive tract.

FSA. Farm Service Agency.

FTE. Full-Time Equivalents.

Geometric mean. A measure of the central tendency of a data set that minimizes the effects of extreme values.

GWLF. Generalized Watershed Loading Function. A watershed loading model developed to assess non-point source flow and sediment and nutrient loading from urban and rural watersheds.

HSPF. Hydrological Simulation Program – Fortran. A computer simulation tool used to mathematically model nonpoint source pollution sources and movement of pollutants in a watershed.

Impairment. A detrimental effect on the biological integrity of a water body that prevents attainment of the designated use.

Indicator organism. An organism used to indicate the potential presence of other (usually pathogenic) organisms. Indicator organisms are usually associated with the other organisms, but are usually more easily sampled and measured.

Margin of safety (MOS). A required component of the TMDL that accounts for the uncertainty about the relationship between the pollutant loads and the quality of the receiving waterbody (CWA Section 303(d)(1)(C)). The MOS is normally incorporated into the conservative assumptions used to develop TMDLs (generally within the calculations or models) and approved by the USEPA either individually or in state/USEPA agreements. If the MOS needs to be larger than that which is allowed through the conservative assumptions, additional MOS can be added as a separate component of the TMDL (in this case, quantitatively, a TMDL = LC = WLA + LA + MOS).

Memorandum of Understanding (MOU). A memorandum of understanding (MOU) may be used as a confirmation of agreed upon terms when an oral agreement has not been reduced to a formal contract. It may also be a contract used to set forth the basic principles and guidelines under which the parties will work together to accomplish their goals.

MS4. Municipal Separate Stormwater Sewer System.

National Pollutant Discharge Elimination System (NPDES). The national program for issuing, modifying, revoking and re-issuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Clean Water Act.

Nonpoint sources (NPS). Pollution that originates from multiple sources over a relatively large area. Nonpoint sources can be divided into source activities related to either land or water use including failing septic tanks, improper animal-keeping practices, forest practices, and urban and rural runoff.

NPSAC. Nonpoint Source Advisory Committee.

NRCS. Natural Resources Conservation Service.

OSTS. Onsite sewage treatment systems (*e.g.*, septic systems and alternative waste treatment systems).

Phased/staged approach. Under the phased approach to TMDL development, load allocations and waste load allocations are calculated using the best available data and information recognizing the need for additional monitoring data to accurately characterize sources and loadings. The phased approach is typically employed when nonpoint sources dominate. It provides for the implementation of load reduction strategies while collecting additional data.

Point source. Pollutant loads discharged at a specific location from pipes, outfalls, and conveyance channels from either municipal wastewater treatment plants or industrial waste treatment facilities. Point sources can also include pollutant loads contributed by tributaries to the main receiving water stream or river.

Pollutant. Dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. (CWA section 502(6)).

Pollution. Generally, the presence of matter or energy whose nature, location, or quantity produces undesired environmental effects. Under the Clean Water Act, for example, the term is defined as the man-made or man-induced alteration of the physical, biological, chemical, and radiological integrity of water.

Public comment period. The time allowed for the public to express its views and concerns regarding action by the USEPA or states (*e.g.*, a Federal Register notice of a proposed rule-making, a public notice of a draft permit, or a Notice of Intent to Deny).

Publicly owned treatment works (POTW). Any device or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature that is owned by a state or municipality. This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

Rapid Bioassessment Protocol II (RBP II). A suite of measurements based on a quantitative assessment of benthic macroinvertebrates and a qualitative assessment of their habitat. RBP II scores are compared to a reference condition or conditions to determine to what degree a water body may be biologically impaired.

Riparian areas. Areas bordering streams, lakes, rivers, and other watercourses. These areas have high water tables and support plants that require saturated soils during all or part of the year. Riparian areas include both wetland and upland zones.

Riparian zone. The border or banks of a stream. Although this term is sometimes used interchangeably with floodplain, the riparian zone is generally regarded as relatively narrow compared to a floodplain. The duration of flooding is generally much shorter, and the timing less predictable, in a riparian zone than in a river floodplain.

Runoff. That part of precipitation, snowmelt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into receiving waters.

SE/R-CAP. Southeast Rural Community Assistance Project.

Sediment. In the context of water quality, soil particles, sand, and minerals dislodged from the land and deposited into aquatic systems as a result of erosion.

Septic system. An on-site system designed to treat and dispose of domestic sewage. A typical septic system consists of a tank that receives waste from a residence or business and a drain field or subsurface absorption system consisting of a series of percolation lines for the disposal of the liquid effluent. Solids (sludge) that remain after decomposition by bacteria in the tank must be pumped out periodically.

Sewer. A channel or conduit that carries wastewater and storm water runoff from the source to a treatment plant or receiving stream. Sanitary sewers carry household, industrial, and commercial waste. Storm sewers carry runoff from rain or snow. Combined sewers handle both.

Source. An origination point, area, or entity that releases or emits a stressor. A source can alter the normal intensity, frequency, or duration of a natural attribute, whereby the attribute then becomes a stressor.

Staged Implementation. A process that allows for the evaluation of the adequacy of the TMDL in achieving the water quality standard. As stream monitoring continues to occur, staged or phased implementation allows for water quality improvements to be recorded as they are being achieved. It also provides a measure of quality control, and it helps to ensure that the most cost-effective practices are implemented first.

Stakeholder. Any person with a vested interest in the TMDL development.

TDN. total digestible nutrients.

TMDL Implementation Plan. A document required by Virginia statute detailing the suite of pollution control measures needed to remediate an impaired stream segment. The plans are also required to include a schedule of actions, costs, and monitoring. Once implemented, the plan should result in the previously impaired water meeting water quality standards and achieving a "fully supporting" use support status.

Total Dissolved Solids (TDS). A measure of the concentration of dissolved inorganic chemicals in water.

Total Maximum Daily Load (TMDL). The sum of the individual wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources and natural background, plus a margin of safety (MOS). TMDLs can be expressed in terms of mass per time, toxicity, or other appropriate measures that relate to a state's water quality standard.

Total Suspended Solids (TSS). Usually fine sediments and organic matter. Suspended solids limit sunlight penetration into the water, inhibit oxygen uptake by fish, and alter aquatic habitat.

TRC. Total Residual Chlorine. A measure of the effectiveness of chlorinating treated wastewater effluent.

USDA. United States Department of Agriculture.

USDHHS. United States Department of Health and Human Services

USEPA. United States Environmental Protection Agency.

Use Attainability Analysis (UAA). A UAA is a structured scientific assessment of the factors affecting the attainment of the use, which may include physical, chemical, biological, and economic factors as described in the Federal Regulations.

VADACS. Virginia Department of Agriculture and Consumer Services.

VADCR. Virginia Department of Conservation and Recreation.

VADEQ. Virginia Department of Environmental Quality.

VASCI. Virginia Stream Condition Index.

VCE. Virginia Cooperative Extension.

VDH. Virginia Department of Health.

VDOF. Virginia Department of Forestry.

Watershed. A drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.

WQIA. Water Quality Improvement Act.

WQIP. Water Quality Improvement Plan.

WQMIRA. Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (§62.1-44.19:4 through 19:8 of the Code of Virginia), or NPS management measures.

WQMP. Water Quality Management Plan.

WRP. Wetland Reserve Program.

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APPENDIX A

Working Group and Steering Committee Minutes and Reports

MINUTES

Powell River and Tributaries IP

Agricultural Working Group Meeting- Appalachia

WHEN: May 16, 2017; 6:00-8:00pm

WHERE: Town of Appalachia Council Chambers (508 West Main Street)

ATTENDEES:

- Department of Environmental Quality (DEQ)
 - Martha Chapman – TMDL Coordinator – SW Regional Office
 - Stephanie Kreps – NPS Coordinator – SW Regional Office
 - Frank Kibler- LENOWISCO Planning District
 - Adam Hooper- citizen
-

Meeting purpose: To discuss the agricultural aspects and ways to reduce the sediment and bacteria impairment in the Powell watershed in Wise County; Engage the public in the development of the Implementation Plan (IP) (also known as a Water Quality Improvement Plan or Clean Up Plan).

Meeting goal: Collect information from agricultural stakeholders to inform the components of the Implementation Plan: landuse changes, best management practices, partnerships, potential funding sources, outreach/education; timeline and future plans that may contribute to IP goals.

Stephanie Kreps (DEQ) gave a brief introduction and set the context of the meeting. Handouts were provided and can be found on the DEQ website: <http://bit.do/DEQPowell-ImplementationPlanProgress>.

Questions discussed:

Most of the questions on the agenda were not discussed because the participants are not directly involved in agriculture. An alternative meeting date (May 24, 10-11am, LPSWCD office) was arranged with representatives from the Lonesome Pine Soil and Water Conservation District and Natural Resources Conservation Service (NRCS) since they did not attend the meeting.

The following was discussed at the meeting:

- 1) Land cover has changed with a reduction in AML acres and increase in cropland.
- 2) **Estimate of wildlife:** There is a need to add bear to the wildlife estimate since there seem to be an increased number in the county (especially on Black Mountain/Black Creek). Otherwise, the wildlife estimates seem reasonable.

- 3) **Best management practices:** Most farmers don't want their livestock in the streams because they get sick more often.
- 4) **Partnerships:** Frank suggested getting in touch with contacts he has at Coalfield Beef Cattle Association and the Wise-Dickenson County Farm Bureau.
- 5) **Outreach/Education:** What is the best way to reach out to farmers in the county:
 - a. Online sources not as affective since internet not available everywhere
 - b. Big Stone Gap and Norton farmer's market
 - c. Kentucky-Virginia District Fair
 - d. Weekly paper in Big Stone Gap (The Post), The Coalfield Progress (Wise and Dickenson County, most popular), Kingsport Times (more for Lee County), Powell Valley News (Lee County)
 - e. Feed store on old 23 in Big Stone Gap
 - f. High Knob Chapter of the Virginia Master Naturalists
 - g. Southern Appalachia Mountain Stewards (SAMS) newsletter
 - h. The Clinch Coalition
 - i. Appalachian Voices newspaper
- 6) **Timeline:** A 10 year timeline is realistic for agriculture. One participant said 10 years wouldn't be long enough for industrial or residential BMPs.
- 7) **Future plans:** Need to talk with Town of Appalachia Town Manager and LENOWISCO PDC on details of the Powell River Trail being developed between Appalachia and Norton—streambank stabilization needed? There is also a new report, "LENOWISCO Regional Agricultural Development Strategic Plan" done by Virginia Tech Office of Economic Development that may provide additional information for the IP.
- 8) **Funding:** More for residential/town areas (not sure if water and sewer), but the [Coalfield Water Development Fund \(CWDF\)](#) may be an option.
- 9) **Citizen monitoring:** SAMS and Appalachian Voices will know if there is any citizen monitoring being done on the Powell.

Residential issues discussed with LENOWISCO:

- New sewer lines in Roda and Osaka almost complete and accessing most (if not all) residents (within the Callahan Creek watershed)
- These new lines will connect to an existing sewer line at Andover to Big Stone Gap Waste Water Treatment Plan

MINUTES

Powell River and Tributaries IP

Agricultural Working Group Meeting- Jonesville

WHEN: May 18, 2017; 6:00-8:00pm

WHERE: Daniel Boone Soil and Water Conservation District office
32637 Main Street, Jonesville, VA

ATTENDEES:

- Shawn Morris- Daniel Boone Soil and Water Conservation District (DBSWCD)
 - Lisa Cope- Daniel Boone Soil and Water Conservation District (DBSWCD)
 - Ronald Lambert- The Nature Conservancy (TNC)
 - Kenny Thomas- Thomas Cattle
 - Nathan Osborne- Natural Resources Conservation Service (NRCS)
 - Department of Environmental Quality (DEQ)
 - Martha Chapman – TMDL Coordinator – SW Regional Office
 - Stephanie Kreps – NPS Coordinator – SW Regional Office
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Meeting purpose: To discuss the agricultural aspects and ways to reduce the sediment and bacteria impairment in the Powell River watershed in Lee County; Engage the public in the development of the Implementation Plan (IP) (also known as a Water Quality Improvement Plan or Clean Up Plan).

Meeting goal: Collect information from agricultural stakeholders to inform the components of the Implementation Plan: landuse changes, best management practices, partnerships, potential funding sources, outreach/education; timeline and future plans that may contribute to IP goals.

Stephanie Kreps (DEQ) gave a brief introduction and set the context of the meeting. Handouts were provided and can be found on the DEQ website: <http://bit.do/DEQPowell-ImplementationPlanProgress>.

The following was discussed at the meeting:

- 1) **Landuse:** Landuse for beef has increased all over the county in the past 5-10 years. Move toward beef and less on cropland/tobacco. No dairies in the county. A lot of fields have grown up and now forest (more forest and more unmanaged/abandoned farmland now). “A lot” of timber has been harvested recently (for example, 500 acres along Rt 421 to Pennington Gap). It’s possible that the landuse data for the TMDL was before the prison was built in Lee County.

- 2) **Estimates on livestock:** The estimates in the TMDL are still relevant—not a lot has changed since 2008. Remove dairy for Lee County (none exist). The group doesn't have a handle on the number of horses. There may be more cattle since tobacco has decreased.
- 3) **Biosolids** are still being applied. Confirmed with DEQ-SWRO, 54.08 dry tons were applied on 1 farm outside Pennington Gap in 2016. Can assume this occurs annually.
- 4) **Estimate of wildlife:** Need to add otters to the estimated wildlife in the watershed. Bears and wild boar are increasing in the area. All other estimates seem accurate.
- 5) **Best management practices:** Waste storage facilities and sink hole exclusions being done now. Streambank stabilization not as affective so do exclusions. Strip till and no till a big interest in Lee County. Cover crops could be done more. Only voluntary BMPs being done is no-till. Existing staffing levels at the SWCD are sufficient—no need for additional FTE. Only barriers are that some people still expect 100% cost-share.
- 6) **Partnerships:** [Regional Conservation Partnership Program \(RCPP\)](#) administered by The Nature Conservancy focuses on Lee, Scott and Russell County. It “improves water quality and aquatic habitat by developing a local working group for resource identification and bmp prioritization, designing a GIS-based ranking system to prioritize RCCP project investments, implementing agricultural and mining BMPs in biologically critical areas, and assessing the positive impacts of these BMPs on water quality.” Their funds must be allocated by 2018 and spent by 2021. DEQ 319 funds could be next step once this project is completed. The [Clinch-Powell Clean Rivers Initiative \(CPCRI\)](#) is up for renewal in October 2017. This coalition of partners can provide data and help implement the Implementation Plan.
- 7) **Funding:** No additional resources than what was provided as a potential list from past IPs.
- 8) **Outreach/Education:** Best way to reach out to farmers is the Powell Valley News, SWCD pasture walks (very popular), workshops on grazing would be a good idea.
- 9) **Timeline:** 10 years is realistic/adequate.
- 10) **Future plans:** There is a Clinch-Powell BMP affectiveness study being done that The Nature Conservancy is participating in (would need to get more information). DCR-Daniel Boone SWCD is doing a tillage windshield survey in 2017. UVA-Wise is doing DNA testing for critters in the river to get a sense of what species are living within the watershed.

General:

- 1) No other bacteria sources are considered an issue.
- 2) Logging is probably an issue with sedimentation.

- 3) Wilderness Road State Park is doing water quality monitoring at Indian Creek. Are there any on-going or planned citizen monitoring sites in the area? Should citizen monitoring (if not in place) be included in the IP?
- 4) Shawn Morris with Daniel Boone SWCD will represent this group in the Steering Committee.

MINUTES

Powell River and Tributaries IP

Industrial Working Group Meeting- Big Stone Gap

WHEN: Monday, May 22, 2017, 3:00pm- 5:00pm

WHERE: Department of Mines, Minerals and Energy office
3405 Mountain Empire Road, Big Stone Gap, VA

ATTENDEES:

- Brad Kreps- The Nature Conservancy (TNC)
- Frank Kibler- LENOWISCO Planning District
- James Scott- Coal Mining Engineering
- Joey O'Quinn- VA Department of Mines, Minerals & Energy (DMME)
- Kenny Jesensky- VA Department of Mines, Minerals & Energy (DMME)
- Matt Hepler- Appalachian Voices
- Tim Miles- Daniel Boone Soil and Water Conservation District (DBSWCD)
- William Neff- VA Department of Forestry (DOF)
- Department of Environmental Quality (DEQ)
 - Martha Chapman – TMDL Coordinator – SW Regional Office
 - Kristy Woodall- TMDL Data Coordinator- SW Regional Office
 - Stephanie Kreps – NPS Coordinator – SW Regional Office

Meeting purpose: To discuss the industrial aspects and ways to reduce the sediment impairment in the Powell watershed in Lee and Wise County; Engage the public in the development of the Implementation Plan (IP) (also known as a Water Quality Improvement Plan or Clean Up Plan).

Meeting goal: Collect information from industrial stakeholders to inform the components of the Implementation Plan: land use changes, best management practices, partnerships, potential funding sources, outreach/education; timeline and future plans that may contribute to IP goals.

Joey O'Quinn (DMME) and Stephanie Kreps (DEQ) gave a brief introduction and set the context of the meeting. Martha Chapman (DEQ) gave a brief overview of what has changed since the TDML was completed. Handouts were provided and can be found on the DEQ website: <http://bit.do/DEQPowell-ImplementationPlanProgress>.

The following was discussed at the meeting:

1) Land use:

- a) Active discharge into the Powell is down 50% from when TMDL done- not a lot needs to be done to monitor active discharge. DMME issues discharge permits for

mining activities. Active mining is decreasing. In the April Blue Book Report, find tonnage for each mine. Only mine producing is near Pardee (Red River Coal).

- b) Abandoned Mine Lands (AMLs) are still a significant impact and still have work to do (approximately 26 AML projects in the Powell watershed have been done with \$4 million, so a high priority).
- c) Forestry activities are about the same since the TMDL (or maybe even slowing down).
- d) It may be necessary to add natural gas wells as a potential source of sediment (wasn't considered in TMDL development)—do these cause disturbance that could impact the watershed (question for MapTech)? Possibly their access roads? Joey O'Quinn mentioned that gas well locations should be available via DMME's map service. In the Levisa/Garden Creek IP, gas well access roads were part of the offset program.
- e) Clarification that Best Management Practices (BMPs) are necessary anywhere within the TMDL area was explained by DEQ (doesn't have to be directly next to the impaired segments).

2) Best management practices:

- a) DMME currently implementing BMPs (and should continue to do) :
On the AML, Barren and Disturbed Forest areas:
 - **Regrading and Revegetation on critical areas (main one)**
 - Vegetated Stream Buffer
 - Reforestation of Erodible Land
 - Re-mining Abandoned Mine Land
 - Haul road stabilization
- b) A number of companies now paving haul roads so could add this to BMP list
- c) There are AMD wetland projects in Lee County
- d) There's nothing different at Pardee's nested site (VAS-P17R_POW03C14) for BMP implementation. Joey O'Quinn (DMME) and Matt Hepler (Appalachian Voices) will look into any potential AMLs around Pardee that can be reclaimed.
- e) It was mentioned that pollution reduction targets are being met on mining lands but there's still reductions needed from other land uses.
- f) Forestry- there are no mandatory BMPs. Streamside Management Zones are encouraged to leave 50% of timber but not required by law. Seeing more pre-harvest plans being done with (pre-planning that helps avoid big problems later on). Also, seeing more chippers on harvested areas not leaving woody material behind to stabilize ground. (4 whole tree chippers in 3 county area). [Forestry Best Management Practices Manual](#) good source of options to address sediment (if these are being done on a forestry job than there shouldn't be any runoff). Main BMPs are: road stabilization, seed+mulch >10% grade, stream crossings, non-erodible haul roads). Not seeing as many clearcuts as before.
- g) There are landowners within the Powell watershed willing to do restoration/reclamation on AMLs; yet at the same time, landowners and mining companies are not the same and can cause constraints. For forestry, getting homeowner to go back and address harvested areas is not likely.

- 3) **Partnerships:** Main partnerships are DOF, DMME, gas companies, Upper Tennessee River Roundtable, The Nature Conservancy, Appalachian Voices, Clinch-Powell Clean Rivers Initiative, Daniel Boone SWCD, NRCS, Town Government, County, economic development organizations
- 4) **Funding:** 319(h), WQIF, Abandoned Mine Land Fund, RECLAIM funding, Riparian Tax Credit with DOF, Forest Stewardship Program (FSP), [PL-566](#) specific to NF Powell River, others from Straight Creek Implementation Plan?
- 5) **Timeline:** 10 year, staged plan is realistic.
- 6) **Future plans:**
 - a) Division of Gas & Oil increasing well development (will need to follow up with them on the extent). Are there particular BMPs that need to be done?
 - b) [Clinch-Powell Clean Rivers Initiative](#) has some studies/data that may be informative.

General:

- 5) Other sediment sources may be road construction and bridge replacement (contact VDOT); Spearhead Trail ATV trails (contact Shawn Lindsey or Chris Sturgill)
- 6) Would be good to have more coal industry and landowner representatives in this discussion.
- 7) Joey O'Quinn (DMME) will represent this group on the Steering Committee.

Powell River and Tributaries IP**Residential Working Group: Big Stone Gap**1st Meeting

WHEN: Tuesday, May 23, 2017, 6:00-8:00 p.m.

WHERE: Big Stone Gap Town Hall Gymnasium
505 East 5th St South, Big Stone Gap, VA

ATTENDEES:

- Andrew Meador- Big Stone Gap Parks and Recreation
 - Department of Environmental Quality (DEQ)
 - Martha Chapman – TMDL Coordinator – SW Regional Office
 - Stephanie Kreps – NPS Coordinator – SW Regional Office
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Meeting purpose: To discuss the residential aspects and ways to reduce the sediment and bacteria impairment in the Powell River watershed in Wise County; Engage the public in the development of the Implementation Plan (IP) (also known as a Water Quality Improvement Plan or Clean Up Plan).

Meeting goal: Collect information from residential stakeholders to inform the components of the Implementation Plan: landuse changes, best management practices, partnerships, potential funding sources, outreach/education; timeline and future plans that may contribute to IP goals.

Stephanie Kreps (DEQ) gave a brief introduction and set the context of the meeting. Handouts were provided and can be found on the DEQ website: <http://bit.do/DEQPowell-ImplementationPlanProgress>.

The following was discussed at the meeting:

- 1) Big Stone Gap has ten town parks and the greenbelt (2.5 mile walking trail that will eventually connect to Town of Appalachia rail to trail) that they manage. Spearhead Trails is looking to connect an ATV trail between Appalachia and Pennington Gap.
- 2) Big Stone Gap Public Works fixed a streambank collapse (happened 2-3 years ago) at the South Fork and Middle Fork confluence. Need to follow up with Glenn Bishop for more information.
- 3) Big Cherry Reservoir is open for the public—there are plans to develop trails (bike, horse and ziplines). Need to follow up with Steve Lawson, Town Manager, for more details.
- 4) **Best management practices:**
 - a. The town mows and weeds the riverbanks for fishermen. Used to have more small mouth bass but they're decreasing (probably competing with trout that's being

stocked). There's not a lot of public access on the Powell in Wise and Lee County: 1 public access point at Dryden (Yokum) and a second one near Woodway on Rt 421. Could look at town park stream management and access point management to reduce sediment.

- b. Lots of ducks and geese at A.K. Fraley Park—could address runoff from park to reduce bacteria runoff. There are no pet waste stations at the park or Greenbelt—could install some to reduce bacteria runoff. There are trashcans. A lot of dogs can be found in the Greenbelt.
 - c. Is the carwash next to the Powell River, across from Frog Level an issue?
- 5) **Outreach/Education:** The best way to reach people +35 years old is the local newspaper, The Post (for Big Stone Gap) and Coalfield Progress (for Norton area), Powell Valley News (for Lee County). For people under 40, the best way to reach them is the Town of Big Stone Gap and BSG Parks and Recreation Facebook page. The Visitor Center is managed by Parks and Recreation (Jill Bullock). Rhonda at the Hallmark store also manages/advertises town events/news.
- 6) **Future plans:** A.K. Fraley Park (across from Glencoe Cemetary) will be building a disc golf course and will have increased traffic (a lot more people on the bank and feeding ducks in the park, therefore, probably more duck feces and trash). A dog park is going to be built near Bullit Park.

MINUTES

Powell River and Tributaries IP

Agricultural Working Group Meeting- Jonesville

WHEN: May 24, 2017; 10am-noon

WHERE: Lonesome Pine Soil and Water Conservation District office
Clintwood, VA

ATTENDEES:

- Landon Johnson- Lonesome Pine Soil and Water Conservation District (LPSWCD)
 - Wes Stanley- Natural Resources Conservation Service (NRCS)
 - Department of Environmental Quality (DEQ)
 - Martha Chapman – TMDL Coordinator – SW Regional Office
 - Stephanie Kreps – NPS Coordinator – SW Regional Office
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Meeting purpose: To discuss the agricultural aspects and ways to reduce the sediment and bacteria impairment in the Powell River watershed in Wise County; Engage the public in the development of the Implementation Plan (IP) (also known as a Water Quality Improvement Plan or Clean Up Plan).

Meeting goal: Collect information from agricultural stakeholders to inform the components of the Implementation Plan: landuse changes, best management practices, partnerships, potential funding sources, outreach/education; timeline and future plans that may contribute to IP goals.

Stephanie Kreps (DEQ) gave a brief introduction and set the context of the meeting. Handouts were provided and can be found on the DEQ website: <http://bit.do/DEQPowell-ImplementationPlanProgress>.

The following was discussed at the meeting:

- 1) **Landuse:** Landuse for beef has increased in Wise County; LPSWCD and NRCS projects increasing too. There's more grazing land (reclaimed mine land) and people with interest. LPSWCD and NRCS have several projects in Beaver Dam Creek in Powell Valley. In Wise County within the TMDL, all agriculture is in Powell Valley. Cropland in Powell Valley is mainly corn and hay. Clinch Haven Farms in Powell Valley has 30-50 acres (largest in county). Lots of poor pasture in Powell Valley. Lonesome Pine Golf Course on Butcher Fork may be a source of runoff.
- 2) **Estimates on livestock:** Butcher Fork sheep estimate about 25-30. SF Powell (VAS-P18R_PLL02A00) there are about 15-20 sheep and 100 cattle; SF Powell (VAS-P18R_PLL01A02) there's hay/corn mostly and 25 cattle, 6 horses; SL Powell (VAS-

P18R_PLL01A98) there are 25 cattle, 6 horses; Powell (VAS-P17R_POW01A94) no agriculture; Powell River (VAS-P17R_POW03C14) no agriculture..

- 3) **Biosolids** used to be applied at airport in Guest River drainage. Nothing within the Powell TMDL.
- 4) **Estimate of wildlife:** Overall estimates ok but surprised by geese and duck estimates (seem high).
- 5) **Best management practices:** Currently doing SL-6 and WP-4 BMPs within s TMDL area in Wise County. Would be interest in dredging sediment clogging up creeks on farms and controlling invasive species (autumn olive, multiflora rose, kudzu) if there are BMPs available. No voluntary BMPs are being done now. The only constraints is the economy and folks getting laid off (therefore, can't pay for practices). BMPs to address poor pasture is relevant anywhere in Powell Valley (especially around Butcher Fork and South Fork (VAS-P18R_PLL02A00). There's no interest in doing conversion to forest. There are 10 people logging to every 1 tree planted—people want land cleared. The only areas where trees are being planted are associated with EQIP. CREP not eligible in Wise County.
- 6) **Partnerships:** There's a good working relationship between NRCD and LPSWCD. It depends on the scale of the project but the LPSWCD can get better rates on SL-6. There's no problem with interest in folks signing up..
- 7) **Funding:** A \$100k project over 2 years is reasonable for the LPSWCD to do (no additional FTE needed). No additional funding sources mentioned.
- 8) **Outreach/Education:** Best way to reach out to farmers in Wise County is the Coalfield Progress, horse shows, cattle market, extension events, newsletter done/mailed by LPSWCD; Tractor Supply (10% discount at Wise location if participate in BMP program); Jonesville Co-Op a good place to advertise; farm tours. No social media outlets but email is affective.
- 9) **Timeline:** 10 years is realistic/adequate.
- 10) **Future plans:** More residential areas coming in and agriculture decreasing into Powell Valley because of younger generations not doing agriculture;

General:

- 1) No other bacteria or sediment sources are considered an issue.
- 2) Mountain Empire Community College or DMME office may be a good place for the Steering Committee to meet in September.
- 3) Landon Johnson will participate in the Steering Committee to represent Wise County agriculture.

Powell River and Tributaries IP**Residential Working Group: Pennington Gap**1st Meeting

WHEN: Thurs, May 25, 2017, 6:00-8:00 p.m.

WHERE: Pennington Gap Community Center
41670 West Morgan Ave, Pennington Gap, VA

ATTENDEES:

- Tim Miles- Daniel Boone Soil and Water Conservation District
- Keith Harless- Town of Pennington Gap Manager
- Kaitlyn Harless- Pennington Gap citizen
- Department of Environmental Quality (DEQ)
 - Martha Chapman – TMDL Coordinator – SW Regional Office
 - Stephanie Kreps – NPS Coordinator – SW Regional Office

Meeting purpose: To discuss the residential aspects and ways to reduce the sediment and bacteria impairment in the Powell River watershed in Lee County; Engage the public in the development of the Implementation Plan (IP) (also known as a Water Quality Improvement Plan or Clean Up Plan).

Meeting goal: Collect information from residential/town stakeholders to inform the components of the Implementation Plan: landuse changes, best management practices, partnerships, potential funding sources, outreach/education; timeline and future plans that may contribute to IP goals.

Stephanie Kreps (DEQ) gave a brief introduction and set the context of the meeting. Handouts were provided and can be found on the DEQ website: <http://bit.do/DEQPowell-ImplementationPlanProgress>.

The following was discussed at the meeting:

1. **Landuse:** Pasture has increased and mining decreased in Lee County. Not much change in residential growth. Walmart was the last largest development (built +10 years ago).

Septic/Sewer Issues:

- 1) **Estimates on septic systems, sewer lines, straight pipes:**
 - a. All homes in Pennington Gap are connected to the sewer lines so failing septic and straight pipes not an issue in this area (septic program not applicable). Any septic tanks in the area would be abandoned.
 - b. St. Charles area is now connected to sewer which connects to Pennington Gap. Dryden area still has septic tanks.

- c. Dryden to Walmart in Ben Hur has sewer access.
- 2) **Regulations:** Connection to sewer line with new construction (need to check with VDH).
 - 3) **Best management practices:** Septic program not applicable to Pennington Gap area.

Urban/developed areas:

- 1) **Regulations:** No ordinances on construction along river in town
- 2) **Best management practices:**
 - a. Currently there are 2 main stormwater issues in Pennington Gap
 - i. Behind Lee Theater (sinkhole/creek)
 - ii. Underground stormwater tunnel (5' diameter) under downtown to railroad (constructed in early 1900s). The channel is showing signs of collapsing—already backing up and collapsing on Kentucky St at railroad). There's no ownership of the tunnel; therefore, don't know who should fix it. There is a need to channel water away from the town to reduce load on this channel. Or need to fix the existing channel.
 - b. Front of Leeman Field at the ATV drag race area (next to NF Powell) there are portions of the streambank that need stabilization. ATVs are not getting into the river. Also, a lot of trash from St. Charles area builds up along the banks of Leeman Field.
 - c. Natural islands have built up at the trestle at town entrance—is it possible to remove this extra sediment?
- 3) **Partnerships:** Department of Conservation and Recreation helped fund the new ATV Welcome Center at Leeman Field trailhead. Could partner with Department of Game and Inland Fisheries (DGIF) for Kids Fishing Day at Leeman Field.
- 4) **Outreach/Education:** Powell Valley News/Kingsport Times best newspapers, Pennington Gap Facebook, new online paper Lee Daily, email, Farmer's Market not as useful for outreach, Trade Day (1st Fri of every month) is a yard sale (proceeds to Fire Department). Have a need for an information kiosk at Leeman Field (park-n-ride) and along Greenway. Could attach Middle School to Greenway with informational kiosk/outdoor classroom. Kids Fishing Day at Leeman Field with DGIF is of interest.
- 5) **Timeline:** 10 years is this realistic.
- 6) **Future plans:** Boxing gym donated to town—will be demolished and will develop “barrier-free park” (for autistic and sensitive children) with a pavilion and access point for fishing.
- 7) **Funding:** Department of Conservation and Recreation at ATV trailhead, DGIF could help with access point.

Pet waste/Wildlife:1) **Best management practices:**

- a. Pet waste stations exist at Leeman Field in Pennington Gap (only park in town). Town owns all the riverfront at Leeman Field (some streambank stabilization already been done).

- 2) **Future plans:** Pennington Gap still trying to complete study for their Greenway (2 mile trail along NF Powell). Could install pet waste stations along trail.

General:

- 1) No citizen monitoring sites in the area
- 2) Keith Harless, Pennington Gap Town Manager and Tim Miles, Conservation Technician at DBSWCD will represent this group on the Steering Committee.

April 11/13, 2017 24

Sediment Reduction Goals for Implementation Plan

- 100% removal of straight pipes
- 23% reduction in sediment loads from
 - Abandoned Mine Land (AML)
 - Barren Areas
 - Conventional Tillage Crops
 - Disturbed Forest
 - Residential
 - Unimproved Pasture
 - Streambank Erosion

MAPTECH Implementation Plan for the Powell River and Tributaries NATURAL RESOURCE SOLUTIONS THROUGH Science and Engineering

#2

Minutes**Powell River and Tributaries IP****Discussion with VA Department of Health**

WHEN: Tuesday, June 6, 2017, 1:00-2:00 p.m.

WHERE: Wise County Health Department Office
Wise, VA

ATTENDEES:

- Brad Stallard—VA Department of Health (VDH)
 - Stephanie Kreps — Department of Environmental Quality (DEQ)SW Regional Office
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Meeting purpose: To discuss the residential aspects and ways to reduce the sediment and bacteria impairment in the Powell River watershed in Lee and Wise County; Engage the public in the development of the Implementation Plan (IP) (also known as a Water Quality Improvement Plan or Clean Up Plan).

Meeting goal: Collect information from residential/town stakeholders to inform the components of the Implementation Plan: landuse changes, best management practices, partnerships, potential funding sources, outreach/education; timeline and future plans that may contribute to IP goals.

Stephanie Kreps (DEQ) gave a brief introduction and set the context of the meeting. Handouts were provided and can be found on the DEQ website: <http://bit.do/DEQPowell-ImplementationPlanProgress>.

The following was discussed at the meeting:

Landuse: Development in Wise County is low to non-existent. In Lee County it's low but not as low as Wise County. No new developments to consider for possible bacteria or sediment sources to watershed.

Septic/Sewer Issues:

- 4) **Estimates on septic systems, sewer lines, straight pipes:**
 - a. The estimates in the TMDL are probably over estimated. There are no active sewer lines going in now within the TMDL (Stonega, Roda and Osaka are getting new sewer but within the Callahan Creek TMDL. Most/if not all areas in Callahan TMDL will be connected to sewer).
 - b. Since the TMDL, sewer extension have been installed in Wise County, just west of Norton along the Powell River and in Lee County, just west of Pennington Gap along Rt. 58.

- c. There are no straight pipes along Butcher Fork (all been addressed). Some alternative systems have been installed and being monitored by VDH.
 - d. In the SF Powell (VAS-P18R_PLL02A00) there are probably straight pipes in this area.
 - e. At the southern end of the NF Powell impairment in Pennington Gap (VAS-P20R_PWL01A00) in the Elk Knob area there are some old houses that may have septic going into caves (karst area) and not aware of it.
 - f. Woodway Public Service Authority (based in Pennington Gap) would be willing to extend sewer in area.
 - g. Pennington Gap area all connected to sewer lines.
- 5) **Regulations:** Wise County has sewer line connection ordinances but not enforced.
- 6) **Best management practices:** Septic program could be applicable to help identify problems with septic tanks, yet most of the areas around the towns are connected to sewer (some work to do in SF Powell but not a lot). No one is building in the rural areas so no new septic tanks being applied for.
- 7) **Partnerships:** [Appalachian Community Action](#) (based in Jonesville, VA), Hands Across the Mountain (still exist?)
- 8) **Future plans:** There are discussions to install sewer lines at Dunbar in Wise County (just south of Pardee) but this is a long-term plan. Nothing new in Lee County.
- 9) **Funding:** Probably less funding opportunities now.

Pet waste/Wildlife:

- 3) **Best management practices:** Best to focus on town parks.
- 4) Few dog kennels exist (small scale so no permits).

General:

- 3) Brad Stallard (VDH) will participate on the Steering Committee.