

A Plan to Reduce Fecal Bacteria and Sediment in the Middle Fork Holston River and Wolf Creek Watersheds



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EXECUTIVE SUMMARY

This document outlines a plan for improving water quality in the Middle Fork Holston River and Wolf Creek watersheds located in Smyth and Washington Counties, with a small portion of the Middle Fork Holston River watershed occurring in Wythe County. Figure 1 in this document displays a map of these watersheds.

This plan was developed with the goal of achieving bacteria and sediment load reduction in the Middle Fork Holston River and Wolf Creek watersheds sufficient to eliminate these pollutants as causes of impairment to the designated uses of the water body segments identified in this plan. The plan represents a balance among the sediment and fecal bacteria load reductions needed to achieve water quality standards, the management practices that are socially and economically acceptable for stakeholders to implement and measurable goals that are reasonable for stakeholders to achieve in the watershed during the foreseeable future. As such, this plan serves as a guide for local stakeholders to improve water quality in the Middle Fork Holston River and Wolf Creek watersheds such that the segments impaired by fecal bacteria and sediment can be removed from the Virginia's list of impaired waters for the identified pollutants.

The Benefits of Efforts to Improve Water Quality

Efforts to improve water quality in the Middle Fork Holston River and Wolf Creek watersheds serve as a long-term investment in the natural resources “infrastructure” that forms the basis for the quality of life and sense of place that are valued highly by local communities. Implementing the actions in this plan will help sustain multiple sectors of the local economy such as agriculture, tourism, recreation, construction, real estate, and services like septic system pumping/ repair/ installation.

The water quality benefits of implementing this plan in the Middle Fork Holston River and Wolf Creek watersheds include:

- **Reduced risk of people becoming sick as a result of swimming in streams; improved recreational experiences as a result of water that is less murky and streambeds with less accumulation of mud, sand, silt**
- **Healthier populations of desirable aquatic life such as aquatic insects and sport fish**
- **Improved quality of drinking water supplies, including reduced treatment costs**

Additionally, the implementation of this plan is anticipated to have multiple complementary benefits to agricultural producers, residents, and local communities; for example:

- **Agricultural management practices that improve water quality, such as improved pasture management, help keep essential raw materials (soil, water, nutrients, and organic matter) on-farm rather than exporting them off the farm in water run-off. An increased retention of raw materials and**

increased resource utilization efficiency can improve soil fertility and increase vegetation productivity which can translate into reduced feed and fertilizer bills, increased crop/forage production, and yield substantially greater profitability.

- **Cleaner water in streams results in decreased exposure of livestock to waterborne disease. Improved herd health can result in lower veterinarian bills and higher weight gains.**
- **Cleaner water results in greater public appreciation and support of soil and water conservation efforts by farmers. For example, in some places, certification programs have been established to incentivize the use intensified conservation practices and help market farm products grown using such practices as being “fish friendly” or “sustainably grown”; this type of certification commands higher prices for products thereby offsetting the costs of implementing the additional practices.**
- **Decreased stream bank erosion reduces property loss and safety hazards**

The TMDL Process

Segments of the Middle Fork Holston River and Wolf Creek were listed by the Commonwealth of Virginia as having their primary contact recreation use (e.g. swimming, wading, kayaking) impaired by elevated levels of fecal bacteria on Virginia’s 2002 303(d) Impaired Waters List (see **Table ES-1**). Additionally, the Commonwealth of Virginia has determined that bottom-dwelling aquatic organisms in portions of the Wolf Creek (from Abingdon downstream to South Holston Reservoir) and Middle Fork Holston River (from Byers Creek confluence to just downstream of Greenway Creek confluence) watersheds are impaired by excess levels of fine sediment derived from human land uses.

The Commonwealth of Virginia has developed Total Maximum Daily Loads (TMDLs) for the segments identified in **Table ES-1**. The TMDL studies established pollution budgets for each impaired water body segment based on the pollution reductions needed to meet water quality standards and the pollutant loads estimated to be coming from each type of land use (e.g. forest, agriculture, residential, urban) in the watershed. The TMDL studies for the Middle Fork Holston River and Wolf Creek identified the following non-point sources of fecal bacteria in the Middle Fork Holston River and Wolf Creek watersheds that need to be reduced: agricultural runoff from cropland and pasture; direct deposition of fecal matter by livestock; pet waste; and human sources from straight pipes and failing septic systems. The TMDL also identified the following sources of sediment that need to be reduced: stormwater run-off from urban and residential areas; accelerated soil erosion on cropland and pasture; and streambank erosion. More detailed information on the TMDL process can be found in the chapter titled *Review of the TMDL*.

Implementation Actions

In order to meet the goal of this plan, sediment and fecal bacteria loads associated with urban, residential and agricultural land uses need to be reduced substantially. The land uses contributing to excess loads of fecal bacteria and sediment in the identified segments are found throughout the land area draining to the impaired segments. It follows that actions to improve water quality need to be distributed throughout the drainage of each impaired segment.

The implementation actions associated with Stage I of TMDL implementation are expected to improve water quality sufficiently enough to remove the identified Middle Fork Holston River and Wolf Creek segments from Virginia's list of impaired waters for the identified pollutants. Below are the most consequential types of practices and estimated amounts needed for achieving the Stage I sediment and fecal bacteria load reductions; complete estimates of the types and amounts of practices that will achieve water quality goals can be found in the Implementation Actions chapter of this document. These are estimates based on the available knowledge and will be adapted as necessary during the implementation process.

Residential practices:

- **Elimination of raw sewage discharges:**
 - Replace **85 straight pipes** with septic systems in the Middle Fork Holston River watershed
 - Replace **25 straight pipes** with septic systems in the Wolf Creek watershed
- **Correction of failing septic systems:**
 - Repair or replace **803 septic systems** in the Middle Fork Holston River watershed
 - Repair or replace **183 septic systems** in the Wolf Creek watershed

Agricultural practices:

- **Installation of livestock exclusion fencing along streams:**
 - **286 miles** of fence within the Middle Fork Holston River watershed
 - **27 miles** of fence in the Wolf Creek watershed
- **Implementation of improved pasture management:**
 - **44,035 acres** within the Middle Fork Holston River watershed
 - **7,702 acres** in the Wolf Creek watershed
- **Retention Ponds**
 - For treating run-off from up to **12,570 acres** in the Middle Fork Holston River watershed
 - For treating run-off from up to **4,800 acres** in the Wolf Creek watershed

- **Re-forestation of highly erodible pasture:**
 - **715 acres** of in the Middle Fork Holston River watershed
 - **35 acres** in the Wolf Creek watershed

Streambank stabilization, through re-establishment/enhancement of native riparian vegetation:

- **5,000 feet of streambank** in the Middle Fork Holston River watershed
- **13,055 feet of streambank** in the Wolf Creek watershed

Cost of Implementation

The estimated costs for implementing the actions outlined for Stage I in the TMDL IP are listed below. The *Implementation Costs* chapter of this plan provides a more detailed evaluation of the estimated costs for implementing this plan. Importantly, the completion of this plan makes the watershed eligible for certain state and federal grant funds (i.e. through the Virginia Agricultural Cost-Share program and the federal Clean Water Act Section 319h grant program) that are specifically intended to support the achievement of the actions within a TMDL IP. This TMDL IP will also serve as a valuable tool for sustaining funding for implementation efforts through a variety other federal, state, local, and private grant and loan programs. The Chapter titled *Funding for Implementation* provides information on a variety of potential funding sources that can help to complete the actions outlined in this plan.

Table ES- 1 Costs to Implement Stage I for the Middle Fork Holston River and Wolf Creek watersheds

Watershed	Agricultural BMPs	Residential BMPs	Technical Assistance (e.g. staff)	Total Cost
Middle Fork Holston River	\$18,152,404	\$6,488,300	\$1,833,33	\$26,474,037
Wolf Creek	\$2,331,837	\$1,821,540	\$250,00	\$4,403,377
Total	\$20,484,241	\$8,309,840	\$2,083,333	\$30,877,414

Implementation Timeline

A reasonably expeditious timeline has been established for meeting the goal of this TMDL Implementation Plan (TMDL IP). The timeline takes into consideration the size of the area being addressed, the magnitude of pollution reductions needed, the types of best management practices (BMPs) needed, the availability of financial resources, and the interest of stakeholders in completing the identified actions. Progress towards meeting BMP and water quality milestones will be monitored through tracking of BMP installation in the VA BMP cost-share program database and continued water quality monitoring by the Virginia Department of Environmental Quality (DEQ) (and potentially

by volunteer monitoring groups). More detailed information about implementation timelines and interim measures of progress is provided in the *Timeline and Milestones* chapter.

The following summarizes the estimated timelines for completing the Stage I BMPs in the sub-watersheds associated with the impaired stream segments addressed in this plan. Segments whose associated sub-watersheds have a five-year Stage I timeline (2013 to 2018):

- **Middle Fork Holston River, from headwaters downstream to Snaveley Creek confluence** (near Atkins); stream segment ID: VAS-O03R-01
- **Wolf Creek watershed, entire watershed**; stream segment ID: VAS-O06R-01

Segments whose associated sub-watersheds have a ten-year Stage I timeline (2013 to 2023):

- **Middle Fork Holston River, from Atkins to Hungry Mother Creek confluence** (below Marion); stream segment ID: VAS-O03R-02
- **Middle Fork Holston River, from Hungry Mother Creek confluence downstream to Sulphur Spring Creek confluence in Washington County**; stream segment ID: VAS-O04R-01
- **Middle Fork Holston River, from Sulphur Spring Creek confluence downstream to Byers Creek confluence**; stream segment ID: VAS-O05R-06
- **Middle Fork Holston River, from Byers Creek confluence downstream to just downstream of Greenway Creek confluence**; stream segment ID: VAS-O05R-05

Stakeholder Participation

Individuals representing agricultural, residential, commercial, environmental, and government interests on a local, state, and federal level contributed substantial amounts of their time towards IP meeting attendance. The input from these individuals is greatly appreciated.

Public meetings were held to inform the stakeholders about the purpose and need for the plan and to provide an overview of plan components such as the types and amounts of best management practices that are needed to improve water quality. Agricultural/Residential and Government working groups were formed to provide a venue for discussing details of the plan's components. A Steering Committee was formed to review the input from the working groups and provided recommendations for using the input to inform the content of the plan.

The following section provides *examples* of the input & recommendations provided by the agricultural work group, the residential/urban work group, and steering committee. More detailed information about the stakeholder participation process and input from meetings are provided in the chapter title *Stakeholder Participation*. Additionally,

meeting minutes have been provided as an attachment to the TMDL IP technical report, which is a separate, expanded version of this document.

Agricultural Sector Comments

- Several agricultural practices (e.g. NRCS code 328, NRCS code 329, VACS SL-1, VACS SL-11) were recommended in addition to the practices proposed by DCR for reducing sediment and fecal bacteria loads. An educational program for horse owners to address the impacts to streams from horses (on both small and large parcels) was also recommended.
- Constructing retention ponds throughout the IP area to reduce bacteria does not seem cost-effective because of the undulating topography and the cumulative cost. A better practice would be improved pasture management.
- Reducing livestock access to the mainstem Middle Fork Holston is complicated by the relatively higher risk of flood damage to fences. The Virginia Enhanced Cost-Share Initiative (VECI) provides 100% cost share for livestock exclusion practices and may help increase fencing participation.
- Stream exclusion has been successful in the IP area. The state/federal CREP program is popular in the IP area. Oftentimes, more than one practice is implemented on a single farm tract because they have complimentary management and financial benefits. Cost-share is more successful in areas where producers can see demonstration projects and have adequate time to make a decision.
- Among funding, personnel, and farmer participation, increasing the amount of farmer participating in BMP installation is the major challenge for achieving water quality protection goals.
- Participation in agricultural cost-share programs may be increased through small group meetings where conservation staff can have a productive dialogue with a farmer regarding the purpose and benefits of conservation practices. The TMDL implementation efforts may be more successful if it starts small and ramps up over time, as was done in the Three Creeks TMDL IP area. The reason is that a successful effort requires building relationships with individual farmers, which takes a number of years to accomplish.
- The Holston River and Evergreen SWCDs can envision meeting the timelines for achieving IP goals for agriculture (generally 15 years) under the following assumptions:
 - If funding for BMPs and technical assistance provided to the SWCDs was increased to match the estimated budget outlined in the IP.
 - If greater cost-share (e.g. the ability to provide up to 100%) was available on livestock exclusion systems that provide watering systems.

Residential/Urban Sector Comments

- Failing septic systems and straight pipes are illegal in Virginia. Gray water is defined as sewage that needs to be treated. Based on the number of septic repair applications VDH receives in Washington County and the size of the impaired watershed, estimates of failing septic systems and straight pipes appear to be inflated. Once people hear about funding opportunities, they are much less reluctant to come forward to address septic system problems and straight pipes. Straight pipes are difficult to find and must be addressed a case-by-case basis. The preferred approach by VDH is to avoid any legal action and penalties while addressing failing septic systems and straight pipes corrections because enacting penalties are counterproductive to homeowners coming forward to fix problems.
- Washington County does not have a mandatory hook up ordinance, but customers who have access to sewer and choose not to connect are charged a minimum usage fee. Some towns in the watershed may have mandatory hook up policies. Some areas in the watershed have received water lines to residences but not sewer. Many water lines in Washington County are 50+ years old and need replacement. Additional assessment work is needed to determine if leaking sewer lines occur upstream of the confluence of Town Creek and Wolf Creek. A lower rate of people choosing to connect to sewer connection should be assumed for sub-watersheds in Washington County since the hook-up fee is much greater than that of Smyth County.
- Pet ordinances and the use of pet waste composters are most applicable to urban areas; it is impractical for rural landowners on larger parcels to pick up dog feces. Abingdon has an animal waste disposal ordinance for public property and has bag distribution boxes located around town. Direct mailing attempts in the past have not been successful as an outreach tool and are complicated by watershed boundaries. Social media may be a potential outreach tool. Potential locations to promote pet waste clean-up and initiate BMPs include the Abingdon Dog Park, the River Walk public use area in Marion, and Hungry Mother State Park.
- There are several places in Abingdon where unnatural numbers of ducks and geese reside and contribute to bacteria violations. No-mow zones around ponds can discourage geese from entering streams on foot. There is significant potential to reduce sediment loading to Wolf Creek by reducing stream bank erosion in and around Abingdon.
- Public sewer is available in Abingdon, Emory, Glade Spring, Marion, and Chilhowie. Stakeholders felt the residential implementation cost-share program in the Three Creeks area was successful, especially septic pump-outs which help to identify needs for repairs.
- Washington County recently was awarded a stormwater grant which includes the development of a stormwater ordinance. At least in the near term, the County stormwater program will cover the Town of Abingdon since the town does not currently have a stormwater program. The Town of Abingdon will become an MS4 community in the near future and will be required to develop a stormwater program by EPA unless it gets a waiver to remain covered by the Washington County

stormwater program. The Town currently has an E & S program. Manufactured BMPs for treating stormwater quality are effective but expensive and require a large capacity and regular maintenance.

General Comments

- DCR stresses the importance of water quality & biological monitoring being as continuous as possible rather than allowing large time-gaps because demonstrating water quality improvement facilitates the ability to obtain additional federal/state grant funds. This can occur as a combination of DEQ monitoring, citizen group monitoring, and monitoring completed as part of an implementation project to evaluate effectiveness and/or further refine identification of sources.
- Given the geographic expanse of the watershed, insufficient monetary resources are available to implement a strong TMDL implementation effort throughout the IP area. A recommended strategy for achieving WQ is to target sub-watersheds/individual impaired segments for concentrating TMDL implementation work for a given period of time. Being able to demonstrate WQ improvement increases as BMPs are concentrated into a smaller watershed area and clearly showing improvement increases the ability to obtain additional funding.

INTRODUCTION

The Total Maximum Daily Load (TMDL) studies were completed in October 2009 for Middle Fork Holston River and Wolf Creek based on water quality and biological monitoring indicating that they were violating the State's water quality standards for fecal bacteria and aquatic life. Once TMDLs are developed, the next step is to create a plan to achieve the needed pollutant reductions. An Implementation Plan describes the Best Management Practices (BMPs) that can be installed to reduce pollutant loads and improve water quality in impaired streams. This document is the Implementation Plan for the Middle Fork Holston River and Wolf Creek watersheds. Based on established pollution management practices, the necessary steps to reach good water quality are the following:

1. Conduct a TMDL study to determine which pollutants and sources are causing the stream to fail to meet its water quality standards,
2. Develop an implementation plan containing the corrective actions needed to reduce those pollutants, and
3. Implement the actions of the plan and track the improvements in water quality.

The Federal Clean Water Act (CWA) became law in 1972 and 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 Commonwealth of Virginia has found that many stream segments do not meet state water quality standards for protection of the six beneficial uses: fishing, swimming, shellfish, aquatic life, wildlife and drinking.

When a stream fails to meet the water quality standards, it is listed as impaired, or dirty, on the CWA's Section 303(d) list. When this occurs, the CWA and the U.S. Environmental Protection Agency (EPA) 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. A TMDL accounts for seasonal variations and must include a margin of safety (MOS).

TMDL PROCESS

After a stream is listed on the impaired waters list, or "303(d) list," the TMDL process includes three steps.

Step one of the TMDL process for both the Middle Fork Holston River and Wolf Creek watersheds was completed in October 2009 and subsequently approved by EPA in April 2010. The results of the TMDLs are summarized in the *Review of the TMDL* Section of

this booklet. Now that the TMDL studies have been developed, measures must be taken to reduce pollution levels in the streams as specified in the TMDL.

Step two of the TMDL process is the development of the Implementation Plan (IP). This booklet is an abbreviated version of the IP which can be obtained by contacting the Virginia Department of Conservation and Recreation. In fulfilling the state's requirement for the development of an implementation plan, a framework has been established for reducing fecal bacteria and sediment levels and achieving the water quality goals for the impaired stream segments of the Middle Fork Holston River and Wolf Creek. This plan outlines how the streams identified in the TMDLs can be returned to fully supporting status. The IP describes corrective actions and the installation of BMPs to be implemented in a staged manner. Step two of the TMDL process will be officially concluded with the approval of the IP by the EPA.

Step three in the TMDL process is to meet the water quality goals through implementation of the plan. Having finalized the IP increases opportunities for implementation funding, and provides guidance to the residents of the watersheds on how to improve water quality in their community and enhance their natural resources. Implementation of this plan will reduce levels of fecal bacteria and sediment in the Middle Fork Holston River and Wolf Creek watersheds. The benefits of the implementation of this plan are described in detail in the *Implementation Benefits* Chapter of this document. In short, implementation of this plan may provide benefits to homeowners and farmers, as well as those that use the streams for recreation purposes.

REQUIREMENTS FOR IMPLEMENTATION PLANS

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 Commonwealth's State Water Control Board to "develop and implement a plan to achieve fully supporting status for impaired waters." In order for IPs to be approved by Virginia, 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
- Associated costs, benefits, and environmental impact of addressing the impairment

Federal Requirements

Section 303(d) of the CWA and current EPA regulations do not require the development of implementation strategies. However, the EPA outlines the minimum elements that a plan to implement TMDLs should contain in its 1999 Guidance for Water Quality-Based Decisions: The TMDL Process. The listed elements are as follows.

- 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.

Also, EPA requires the following minimum elements of a watershed-based plan be addressed in order for projects to be eligible for funding under Section 319 of the CWA.

- Identification of causes of impairment and pollutant source,
- An estimate of the load reductions expected from management measures,
- A description of the nonpoint source management measures needed to achieve the load reductions and the critical areas where needed,
- An estimate of the technical and financial assistance needed, associated costs, and sources and authorities that will be relied upon,
- An information and education component used to enhance public understanding and encourage participation,
- A schedule for implementation that is reasonably expeditious,
- Interim milestones for determining whether measures or control actions are being implemented,
- Criteria to determine whether reductions are being achieved and progress is being made toward attaining water quality standards, and
- A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under the item immediately above.

REVIEW OF THE TMDL

Watershed Characteristics

The Middle Fork Holston River and Wolf Creek watersheds are part of the Tennessee River Basin located within USGS hydrologic unit code 06010102 (Middle Fork Holston River). The Middle Fork flows 57 miles from western border of Wythe County, Virginia, traverses Smyth County, and joins the South Fork in Washington County southeast of Abingdon, VA. The Middle Fork and Wolf Creek watersheds are approximately 154,667 and 17,324 acres respectively. Land cover in the Middle Fork watershed is dominated by pasture and forest although rural residential development is widespread and small urban areas occur locally. The Wolf Creek watershed has substantial areas of pasture, forest, rural, and residential development and a small area of urban development in the Town of Abingdon. See **Figure 1** for maps of the Middle Fork Holston River and Wolf Creek impaired segments. **Table 1** describes the impairments in both watersheds addressed in this IP.

A portion of the Middle Fork Holston River watershed has already been addressed in a separate bacteria TMDL, the "Three Creeks TMDL", which has its own IP (2001). The impaired streams in that area are Hutton, Hall/Byers and Cedar Creeks. Hutton Creek is part of VAS-O05R-06, and Hall/Byers and Cedar Creeks comprise part of the VAS-O05-05R impairment. These subwatersheds to the Middle Fork Holston are not addressed in the current TMDL-IP.

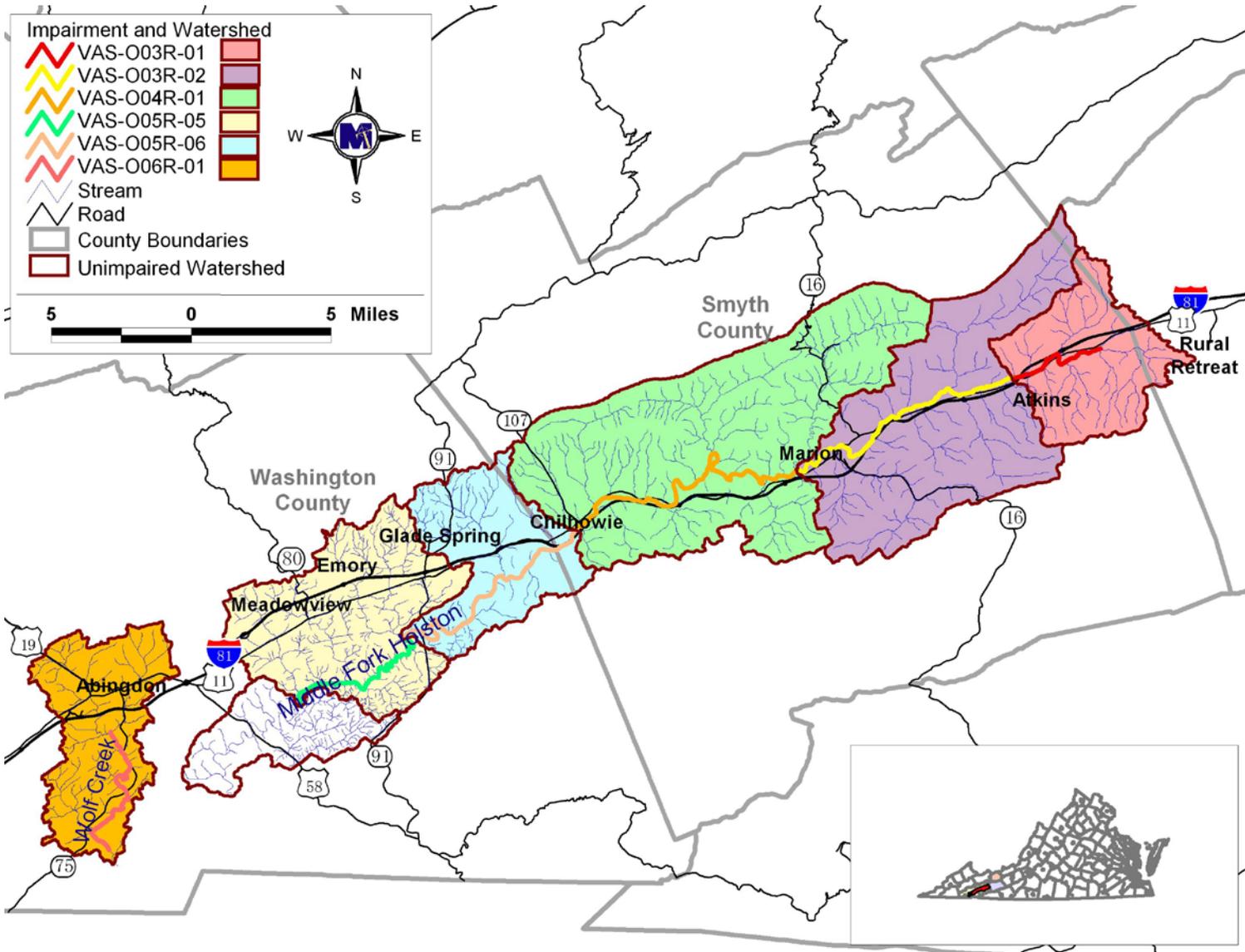


Figure 1 Location of impaired segments in the Middle Fork Holston River and Wolf Creek watersheds.

Table 1 Impaired segments of the Middle Fork Holston River and Wolf Creek.

Stream Name Impairment ID	Impairment(s)	Initial Listing Year	2010 River Miles	Impairment Location Description
Middle Fork Holston River VAS-O03- MFH05A04	Benthic Macroinvertebrate ¹	2010	3.26	The mainstem headwaters upstream of Dutton Branch confluence at Groseclose, WQS Sec. 5
Middle Fork Holston River \\VAS-003R-01	Fecal Bacteria	2002	3.26	From the Confluence with Dutton Branch downstream to the Snavelly Branch confluence.
Middle Fork Holston River \\VAS-003R-02	Fecal Bacteria	2002	5.44	From the Snavelly Branch Confluence downstream to the Hungry Mother Creek confluence at Marion.
Middle Fork Holston River \\VAS-004R-01	Fecal Bacteria	2002	5.17	From the Hungry Mother Creek confluence downstream to the Sulfur Spring Creek confluence.
Middle Fork Holston River \\VAS-005R-06	Fecal Bacteria	2002	4.18	From the Sulfur Spring Creek confluence downstream to the Byers Creek confluence.
Middle Fork Holston River \\VAS-005R-05	Fecal Bacteria/ Benthic Macroinvertebrate	2002	12.59	From the Byers Creek confluence downstream to the river mile 12.06 near Neff.
Middle Fork Holston River\ VAS-005R-05	Benthic Macroinvertebrate	2006	3.65	From the Sulphur Springs Creek confluence to just downstream of the Greenway Creek confluence.
Wolf Creek VAS-006R-01	Fecal Bacteria/ Benthic Macroinvertebrate	2006	7.83	South of Abingdon near Vance Mill at the confluence of Town Creek downstream to the backwaters of South Holston Lake.

Note: 1 ..This recently identified impairment is not covered by the Middle Fork Holston River TMDL or IP.

Pollutant Reduction Goals

TMDL studies were conducted because the Middle Fork Holston River and Wolf Creek was not meeting the state water quality standards for the recreation and aquatic life uses. In order to meet the water quality goals established by the TMDL study, any fecal bacteria water sample from the stream must be equal to or less than 235 colony forming units per 100 milliliters (cfu/100mL) for *E. coli* at all times. If multiple samples are collected within a 30-day period, a geometric mean is applied and it must be equal to or less than 126 cfu/100mL.

In addition the Middle Fork Holston River and Wolf Creek were also found to be in violation of the general standard for aquatic life use and remained on the 2010 303(d) list. The General Standard, as defined in Virginia state law 9 VAC 25-260-20, 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.*

Information from the TMDL studies established the water quality goals and associated pollutant reductions needed in the IP. The bacteria TMDL goals for the IP are to address those sources of bacteria that can be attributed to human activities. The correction of straight pipes and failing septic systems is necessary to meet the bacteria TMDL goals. In addition, the majority of livestock in the watershed will need to be excluded from the creeks. Runoff carrying *E. coli* into the creeks after rain events must also be addressed. Reductions to wildlife fecal bacteria are not addressed in this implementation plan since this source is considered as a natural condition. A summary of the final *E. coli* allocations for the different sources in the watersheds that resulted from the bacteria TMDL study is given in **Table 2**.

The General Standard use was analyzed by the Virginia Department of Environmental Quality (DEQ) through application of an index called the Virginia Stream Condition Index (VASCI). The health of the benthic macroinvertebrate community is assessed through measurement of eight biometrics statistically derived from numerous reference sites in the non-coastal regions of Virginia.

A stressor analysis was performed and found the aquatic life communities in the Middle Fork Holston River and Wolf Creek watershed were not meeting the General Standard because of excessive levels of fine sediment.

A summary of the final sediment allocations for different sources in the watersheds resulting from the TMDL studies are given in **Table 3**.

Table 2 Fecal bacteria load reductions allocated during TMDL development for the Middle Fork Holston River and Wolf Creek watersheds.

Percent Reductions to Existing Bacteria Loads						
Watershed	Human Direct	Residential	Livestock Direct	Agricultural	Wildlife Direct	Forest
Middle Fork Holston River						
VAS-O03R-01	100	97	97	97	0	0
VAS-O03R-02	100	96	96	96	0	0
VAS-O04R-01	100	98	98	98	0	0
VAS-O05R-06	100	98	98	98	0	0
VAS-O05R-05	100	98	98	98	0	0
Wolf Creek						
VAS-O06R-01	100	97	97	97	0	0

Table 3 Sediment load reductions allocated during TMDL development for the Middle Fork Holston River and Wolf Creek TMDLs.

Watershed	Middle Fork Holston River % Reduction	Wolf Creek % Reduction
Residential	62	78
Crop	62	78
Pasture/Hay	62	78
Barren	62	78
Forest	0	0
Developed	62	78
Streambank Erosion	62	78

Public Participation

The actions and commitments described in this document are compiled through input from citizens of the watershed, county government, DEQ, Virginia Department of Conservation and Recreation (DCR), Virginia Department of Health (VDH), Virginia

Cooperative Extension (VCE), Virginia Department of Forestry (DOF), Holston River and Evergreen Soil and Water Conservation Districts, Natural Resource Conservation Service (NRCS), and MapTech, Inc. Citizen in the watershed and interested parties are encouraged to become involved in the implementation process and contribute to restoring the health of the streams. Public participation in development of the plan took place on three levels: public meetings, working groups, and a steering committee.

A public meeting was held on July 24, 2012 to inform the public about the water quality impairments in the Middle Fork Holston River and Wolf Creek watersheds and outline the goals for improving water quality through an IP. A second public meeting took place on March 28, 2013 to request feedback from citizens on the draft IP.

Specialized working groups were assembled to discuss specific implementation strategies for different sources of bacteria in this watershed and recommend actions for the plan. The working groups were divided into three focus areas: residential, agricultural and governmental.

A steering committee was formed with representation from DEQ, DCR and VDH, Holston River and Evergreen SWCDs and representatives from the working groups. This committee reviewed recommendations from the working groups and the draft implementation plan before it was made public.

IMPLEMENTATION ACTIONS

The following BMPs are needed to improve water quality to the point that the affected segments can be removed from the impaired waters list for bacteria and in some cases, aquatic life impairment. The point at which the segments can be delisted occurs when bacteria standards violations occur in less than 10.5% of collected samples during the assessment period.

Agricultural BMPs

Streamside fencing is one effective way to reduce fecal bacteria and sediment levels in streams in agricultural watersheds. Excluding livestock from having uncontrolled access to streams establishes a riparian buffer which prevents direct livestock defecation in the stream, prevents the trampling of the stream banks, and helps establish vegetation which filters pollutants from storm water. By allowing re-growth, streambanks are better protected from erosion during high flows.

Several different fencing options are available through state, federal, and private cost share programs. For example, the completion and approval of this plan allows for three additional livestock exclusion practices to become eligible for cost-share funding through Virginia's Agricultural Cost-share Program (VACS). These three practices are described below.

Livestock Exclusion with Riparian Buffers for TMDL Implementation (LE-1T) systems include streamside fencing, cross fencing, an alternative watering system, and a 35-ft buffer from the stream. It offers an 85% cost share rate.



Photos taken before (left) and after (right) a livestock exclusion system was installed on Hutton Creek (Middle Fork Holston watershed). Improved streamside vegetation and stream bank stability reduces water pollution from bacteria and sediment. (photos courtesy of Holston River SWCD).

Livestock Exclusion with Reduced Setback Practice for TMDL Implementation (LE-2T) involves 10 foot setback for stream fencing, and is more flexible in fencing materials allowed. Cost share is provided for stream fencing and cross fencing, and off stream waterers at a rate of 50%.

Streambank Protection for TMDL Implementation (WP-2T) systems include streamside fencing, hardened crossings, and a 35-ft buffer from the stream. This practice includes 75% cost-share and an up-front cost share payment of 50 cents per linear foot of fence installed to assist in covering anticipated fencing maintenance costs.

Financial assistance for streamside fencing is also available through federal cost-share programs such as the state-federal Conservation Reserve and Enhancement Program (CREP) and Environmental Quality Incentive Program (EQIP). In general, cost-share rates of 50% - 100% are available to help pay for fencing which excludes livestock from



Off-stream watering sources for livestock are typical for systems that exclude livestock from streams. In addition to helping improve water quality, alternative sources of water can lead to improved herd health and animal performance. (Photo courtesy of Holston River SWCD)

farmland adjacent to streams, creating a riparian buffer. LE-1T, WP-2T and SL-6T can also be applied to horse properties. The SL-6AT practice is appropriate for small grazing acreages with llamas and the like. Two cost share rates are available through CRSL-6. It is recommended that participants consult the experienced personnel at their local SWCD in order to choose the most applicable exclusion system and the funding sources to match. Several fencing practices are summarized in **Table 4**.

Table 4 Fencing cost-share practices comparison.

DCR Spec. #	Required Buffer Width	Maximum Cost Share
LE-1T	35	85%
LE-2T	10	50%
WP-2T	35	75%
SL-6T	35	75%
SL-6AT	35	50%
CRSL-6	100	35%
CRSL-6	100	75%

Environmental Quality Incentives Program (EQIP) is conservation program for farmers and landowners to address significant natural resource needs and offers 5 to 10-year contracts to landowners and farmers to provide 50% - 75% cost-share assistance, 25% tax credit, and/or incentive payments to implement conservation. Eligible land includes cropland, pasture, and forest in priority areas, or land that has an environmental need that matches one of the statewide concerns.

The length of fencing required on streams in the Middle Fork Holston River and Wolf Creek watersheds is approximately 286 and 27 miles respectively. Typically stream fencing estimates include only perennial (flowing all-year) stream channels. The estimated amount of livestock fencing for the Middle Fork Holston watershed includes both perennial and intermittent streams because the National Hydrography Dataset used to develop the fencing estimate for this watershed does not distinguish between perennial and intermittent streams. As a result, the amount of fencing for the Middle Fork Holston watershed may be overestimated and the number will be adjusted after implementation of the plan begins, as better information becomes available. The livestock fencing estimate for Wolf Creek was adjusted to include only perennial streams. In order to assess this goal, the state cost-share program for agricultural best management practices (BMPs) was utilized. **Table 5** shows the fencing systems required for the impaired watershed in order to meet the livestock exclusion goal.

Table 5 **Estimated amount of livestock exclusion fencing and corresponding number of exclusion systems needed to achieve the IP goals.**

Watershed	Stream Length Needing Protection (miles)	Systems
Middle Fork Holston River	286	848
Wolf Creek	27	80

Agricultural land-based reduction BMPs

In order to meet water quality goals for bacteria, additional BMPs for pasture and cropland are also needed. Estimates of all agricultural BMPs needed for Stage I (delisting of streams with bacteria impairments from the EPA Impaired Waters List), are listed in **Table 6**.

Stormwater runoff from farmland picks up fecal bacteria from grazing animals as well as manure applied to pasture and cropland, and causes soil-loss and erosion of valuable land along its path to the stream. There are several BMPs that can be applied to farmland that will help prevent soil and bacteria from ending up in streams.

Along with the infrastructure provided by a streamside fencing system, improved pasture management includes: maintaining minimum forage height during growing season based on type of forage, application of lime and fertilizer when needed, following a nutrient management plan, controlling woody vegetation, distribution of manure through managed rotational grazing, sacrifice area for feeding during winter and summer droughts, and reseeded if necessary. These practices can produce significant economic gains to producers at a very low investment cost.

Pasture and hayland planting involves establishing stands of cool season perennial grasses to be used for forage, hay, pasture, or wildlife habitat. Pasture and hayland

planting improves livestock nutrition, extends the grazing season, reduces soil erosion, and improves water quality.



**Standard livestock exclusion practices, such as this one along the Middle Fork Holston River, are effective at to reducing sediment and fecal bacteria pollution.
(Photo courtesy of Holston River SWCD)**

Conservation tillage involves managing the intensity (frequency and aggressiveness) of soil-disturbing activities related to residue management, seedbed preparation, nutrient application, planting, and pest control while planting and growing crops. Employing conservation tillage helps prevent erosion, which also helps keep bacteria found in manure fertilizers from running off the land. Benefits include improved soil quality and reductions in time, fuel, and production costs.



Animal waste storage units help reduce bacteria in run-off draining to streams.

Retention ponds on pasture-land allow time for the sediment and bacteria to settle out from the captured runoff, before it flows into streams. Retention ponds have several potential benefits, including: recreational uses such as fishing, water sources, and aesthetics.

Many agricultural BMPs qualify for financial assistance. It is recommended that participants discuss funding options with experienced personnel at their local SWCD in order to choose the best option.

Table 6 Agricultural land based reduction BMPs required to achieve the IP goals.

Control Measure	Unit	Middle Fork Holston River	Wolf Creek
Conservation Tillage	Acre	88	8
Improved Pasture Management	Acre	44,035	7,702
Reforestation of Erodible Pasture	Acre	715	35
Beef Waste Storage	System	5	2
Dairy Waste Storage	System	5	0
Perm. Veg. Cover, Cropland	Acre	73	8
Reforestation of Erodible Cropland	Acre	80	8
Retention Ponds, Pasture	Acre - Treated	12,570	4,800
Streambank Stabilization	Feet	5,000	13,055

Residential BMPs

The Middle Fork Holston River and Wolf Creek watersheds TMDL allocations call for large fecal bacteria reductions in runoff from residential areas. All straight pipes and failing septic systems must be identified and corrected during implementation since a 100% load reduction from these sources was deemed necessary by the TMDL. **Table 7** shows the number of failing septic systems and straight pipes that need correction in these watersheds. In order to achieve these reductions, the BMPs in **Table 7** are targeted. The BMPs include removing straight pipes, replacing failing septic systems, and proper disposal of pet waste by homeowners, kennel owners, hunt clubs, and so on. The BMPs also assume all houses with

Table 7 Estimated residential waste treatment systems required.

Watershed	Houses with Standard Septic Systems	Potential Failing Septic Systems	Straight Pipes
Middle Fork Holston River	5,830 ¹	803	85
Wolf Creek	1,493	183	25

Note: 1 .. Septic systems in Three Creeks IP removed.

Septic Systems

All failing septic systems and straight pipes must be identified and replaced during implementation since a 100 percent load reduction from direct and nonpoint source (NPS) human waste is required to meet the TMDL goals. In addition, straight pipes are illegal in the Commonwealth of Virginia. The estimated numbers of straight pipes and failing septic systems were reported in the TMDL study. Financial assistance could be provided through grants to provide cost-share for homeowners to pump out their septic tanks. While it is not likely that sufficient grant funds will be available to assist every homeowner in this watershed with a septic system pump-out, it is expected that this type of outreach will raise local awareness and lead homeowners to assume responsibility for maintaining their systems. In turn, septic pump outs are preventative maintenance and will help prevent future septic system failures.

Pet Waste

A Pet Waste Program includes distribution of information on proper disposal of pet waste, to pet owners, kennel operators and hunt clubs; signage regarding proper disposal of pet waste in public areas. A pet waste composter is also proposed to help eliminate pet waste in homeowners’ yards. The program includes the distribution of pet waste composters to households in this watershed with pets. This could be accomplished through partnerships with local stores selling pet food, the Smyth and Washington Counties Animal Shelters and the Society for the Prevention of Cruelty to Animals (SPCA).

Technical Assistance

Technical assistance needed for implementing the identified BMPs was measured in full-time equivalents (FTEs), with one FTE being equal to one forty-hour work week position. The Holston River and Evergreen SWCDs will continue to be responsible for implementation in their portions of the watersheds. Based on the annual workload, two technical assistants are allocated to the Smyth County area, and two are allocated to the Washington County area of the Middle Fork Holston River watershed. One technical assistant is allocated each year to the Wolf Creek watershed.

IMPLEMENTATION COSTS

Agricultural BMP Costs

The cost for implementation of individual agricultural BMPs were estimated based on data for these watersheds from the Virginia DCR Agricultural BMP Database. Associated cost estimates of agricultural and residential BMPs were calculated by multiplying the unit cost of each practice by the number of units in each watershed. Cost estimates were adjusted based on stakeholder comments and input (**Table 8** and **Table 9**).

Table 8 Estimated agricultural BMP costs by practice for the Middle Fork Holston watershed.

Agricultural Control Measure	Unit	Cost (\$) per Unit	Total Units	Total Cost
Livestock Exclusion				
Livestock Exclusion System (LE-1T)	System	\$20,600	402	\$8,281,200
Livestock Exclusion System (LE-2T)	System	\$11,500	395	\$4,542,500
CREP (CRSL-6)	System	\$20,000	42	\$840,000
Stream Protection System (WP-2T)	System	\$3,400	9	\$30,600
Fence Maintenance	Feet	\$3.50	56,628	\$396,396
Subtotal:				\$14,090,696
Runoff Control				
Conservation Tillage (SL-15)	Acre	\$100	88	\$8,800
Improved Pasture Management (EQIP 528)	Acre	\$75	44,035	\$3,302,625
Reforestation of Erodible Pasture (FR-1)	Acre	\$82	715	\$58,630
Beef Waste Storage (WP-4)	System	\$60,000	5	\$300,000
Dairy Waste Storage (WP-4)	System	100,000	5	\$500,000
Perm. Veg. Cover, Cropland (SL-1)	Acre	\$1,200	73	\$87,600
Reforestation of Erodible Cropland (FR-1)	Acre	\$82	80	\$6,560
Retention Ponds, Pasture (WP-5)	Acre-Treated	\$138	12,570	\$1,734,660
Streambank Stabilization	Feet	\$100	5,000	\$500,000
Subtotal:				\$6,498,875
Total:				\$20,589,571

In the Middle Fork watersheds, streambank stabilization was from agricultural areas. But in the Wolf Creek watershed it was divided between residential and agriculture land uses based on acreage.

Table 9 Estimated agricultural BMP costs by practice for the Wolf Creek watershed.

Agricultural Control Measure	Unit	Cost (\$) per Unit	Total Units	Total Cost
Livestock Exclusion				
Livestock Exclusion System (LE-1T)	System	\$20,600	38	\$782,800
Livestock Exclusion System (LE-2T)	System	\$11,500	37	\$425,500
CREP (CRSL-6)	System	\$20,000	4	\$80,000
Stream Protection System (WP-2T)	System	\$3,400	1	\$3,400
Fence Maintenance	Feet	\$3.50	10,692	\$37,422
Subtotal:				\$1,329,122
Runoff Control				
Conservation Tillage (SL-15)	Acre	\$100	8	\$800
Improved Pasture Management (EQIP 528)	Acre	\$75	7,702	\$577,650
Reforestation of Erodible Pasture (FR-1)	Acre	\$82	35	\$2,870
Beef Waste Storage (WP-4)	System	\$60,000	2	\$120,000
Perm. Veg. Cover, Cropland (SL-1)	Acre	\$1,200	8	\$9,600
Reforestation of Erodible Cropland (FR-1)	Acre	\$82	8	\$656
Retention Ponds, Pasture (WP-5)	Acre-Treated	\$138	4,800	\$662,400
Streambank Stabilization	Feet	\$100	13,055	\$1,305,500
Subtotal:				\$2,679,476
Total:				\$4,008,598

Residential BMP Costs

Cost of residential BMP practices were based on input from VDH representatives and adjusted based on stakeholder input to reflect costs relative to this area (**Table 10** and **Table 11**). For homes with septic systems, a reasonable expectation is that each home's septic tank would be pumped at least once during BMP implementation.

Table 10 Estimated residential BMP costs for the Middle Fork Holston River watershed.

Control Measure	Unit	Cost per Unit	Total Units	Total Cost
Septic Systems Pump-Out	System	\$260	5,830	\$1,515,800
Septic System Installation	System	\$6,500	218	\$1,417,000
Sewer System Connection	Connection	\$700/\$3,600 ¹	8	\$11,400
Alternative Treatment System Installation	System	\$20,000	100	\$2,000,000
Septic System Repair	System	\$3,500	562	\$1,967,000
Rain Gardens	System	\$3,000	10	\$30,000
Infiltration Trench	System	\$6,000	10	\$60,000
Bioretention Basins	Acre-Treated	\$19,000	10	\$190,000
Riparian Buffer (Residential)	Acre	\$1,000	0	\$0
Manufactured BMP (stormceptors)	Acre-Treated	\$9,000	5	\$45,000
Residential Pet Waste Composter	Composter	\$50	125	\$6,250
Residential Pet Waste Education Program	Program	\$3,750	2	\$7,500
Streambank Stabilization	Feet	\$100	0	\$0
Total				\$7,249,950

Note: 1 .. Connection costs are \$700 in Smyth County and \$3,600 in Washington County

Table 11 Estimated residential BMP costs for the Wolf Creek Watershed.

Control Measure	Unit	Cost per Unit	Total Units	Total Cost
Septic Systems Pump-Out	System	\$260	1,493	\$388,180
Septic System Installation	System	\$6,500	54	\$351,000
Sewer System Connection	System	\$3,600	2	\$7,200
Alternative Treatment System Installation	System	\$20,000	24	\$480,000
Septic System Repair	System	\$3,500	128	\$448,000
Residential Rain Gardens	System	\$3,000	10	\$30,000
Infiltration Trench	System	\$6,000	10	\$60,000
Bioretention Basins	Acre-Treated	\$19,000	10	\$190,000
Riparian Buffer (Residential)	Acre	\$1,000	10	\$10,000
Manufactured BMP (stormceptors)	Acre-Treated	\$9,000	5	\$45,000
Residential Pet Waste Composter	Composter	\$50	50	\$2,500
Residential Pet Waste Education Program	Program	\$3,750	2	\$7,500
Streambank Stabilization	Feet	\$100	3,470	\$347,000
Total				\$2,366,380

Technical Assistance Costs

It is estimated that it would require \$50,000 to support the salary, benefits, travel, training, and incidentals for one technical FTE. For the Middle Fork Holston River watershed impairments, **Table 12** and **Table 13** show the estimated cost of installing the recommended agricultural, industrial and residential BMPs in Stages I and II. The Wolf Creek impairment estimated costs are in **Table 14** and **Table 15** for Stage I and II. Factoring in technical assistance costs, the total cost for full implementation in the Middle Fork Holston River and Wolf Creek watersheds comes to \$37.5 million (**Table 14**).

Table 12 Costs to implement Stage I for the Middle Fork Holston River and Wolf Creek watersheds by impairment.

Impairment	Agricultural BMPs	Residential BMPs	Technical Assistance	Total Cost
Middle Fork Holston River	(\$)	(\$)	(\$)	(\$)
O03R-01	\$2,106,197	\$703,690	\$166,667	\$2,976,554
O03R-02	\$2,646,390	\$1,633,750	\$333,333	\$4,613,473
O04R-01	\$5,508,805	\$2,435,600	\$333,333	\$8,277,738
O05R-05	\$5,770,922	\$1,147,330	\$500,000	\$7,418,252
O05R-06	\$2,120,090	\$567,930	\$500,000	\$3,188,020
Subtotal	\$18,152,404	6,488,300	\$1,833,333	26,474,037
Wolf Creek	\$2,331,837	\$1,821,540	\$250,000	\$4,403,377
Total	\$20,484,241	\$8,309,840	\$2,083,333	\$30,877,414

Table 13 Costs to implement Stage II for the Middle Fork Holston River and Wolf Creek watersheds by impairment.

Impairment	Agricultural BMPs	Residential BMPs	Technical Assistance	Total Cost
Middle Fork Holston River	(\$)	(\$)	(\$)	(\$)
O03R-01	\$301,231	\$84,240	\$166,667	\$552,138
O03R-02	\$340,297	\$204,600	\$166,667	\$711,564
O04R-01	\$1,078,320	\$354,250	\$166,667	\$1,599,237
O05R-05	\$430,389	\$70,980	\$250,000	\$751,369
O05R-06	\$286,930	\$47,580	\$250,000	\$584,510
Subtotal	\$2,437,172	\$761,650	\$1,000,000	\$4,198,817
Wolf Creek	\$1,676,761	\$544,840	\$250,000	\$2,471,601
Total	\$4,113,933	\$1,306,490	\$1,250,000	\$6,670,418

Table 14 Total Stage I and Stage II costs for implementation in the Middle Fork Holston River and Wolf Creek watersheds by impairment.

Impairment	Agricultural BMPs (\$)	Residential BMPs (\$)	Technical Assistance (\$)	Total Cost (\$)
Middle Fork Holston River				
O03R-01	\$2,407,428	\$787,930	\$333,333	\$3,528,691
O03R-02	\$2,986,687	\$1,838,350	\$500,000	\$5,325,037
O04R-01	\$6,587,125	\$2,789,850	\$500,000	\$9,876,975
O05R-05	\$6,201,311	\$1,218,310	\$750,000	\$8,169,621
O05R-06	\$2,407,020	\$615,510	\$750,000	\$3,772,530
Subtotal	\$20,589,571	\$7,249,950	\$2,833,333	\$30,672,854
Wolf Creek	\$4,008,598	\$2,366,380	\$500,000	\$6,874,978
Grand Total	\$24,598,169	\$9,616,330	\$3,333,333	\$37,547,832

TIMELINE AND MILESTONES

The intended implementation goal is to restore the Middle Fork Holston River and Wolf Creek watersheds water quality to a degree where the streams can be removed from Virginia's Section 303(d) impaired waters list. Progress toward end goals will be assessed during implementation through tracking of BMP installations and continued water quality monitoring.

Expected progress in implementation is established with two types of milestones: implementation milestones and water quality milestones. Implementation milestones establish the amount of BMPs installed during an established time period while water quality milestones establish the corresponding improvements in water quality that can be expected. The milestones described here are intended to achieve full implementation of the TMDL within 15 years for impairments O03R-2, O04R-1, O05R-5 and O05R-6. For these impairments, BMP installation activity is planned for one ten-year stage followed by a five-year stage. Activity in impairments O03R-1 and O-6R-1 (Wolf Creek) has a 10 year timeline divided into two five-year periods. Stage I and Stage II timelines with expected pollutant reductions in the timeline of implementation milestones are shown in **Figure 2** through **Figure 7**.

The figures show both cost and pollutant reduction if the goals established are reached. All impairments reach the delisting point in Stage I except O03R-1 and O-6R-1 (Wolf Creek) which reach delisting between Stages I and II. Impairments O03R-1 and O-6R-1 also have a sediment target established by the TMDL.

Following the idea of a staged implementation approach, resources and finances will be concentrated on the most cost-efficient control measures first. These measures will be the focus of Stage I. If de-listing is not yet attained following Stage I implementation, the steering committee should evaluate water quality improvements and determine how to proceed to implement additional BMPs during Stage II. Stage II focuses on BMPs that are necessary to return the streams to fully supporting status (a.k.a. delisting). **Table 15** through **Table 20** show the types and quantities of BMPs to be installed during each stage by impairment.

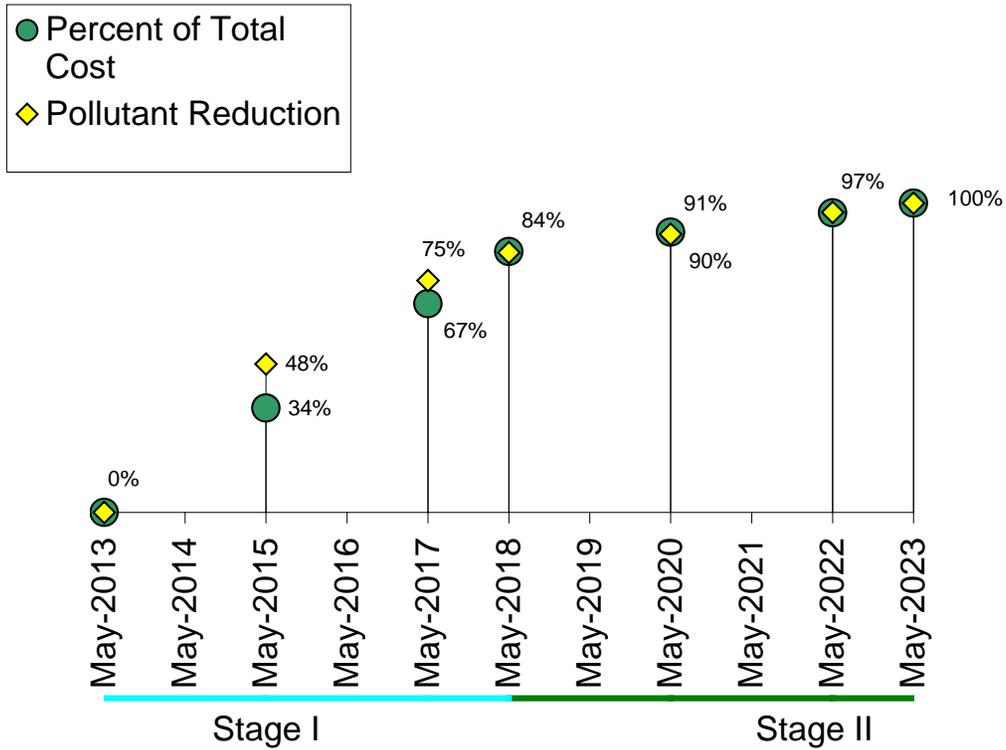


Figure 2 **10-year timeline for implementation in the Middle Fork Holston River impairment VAS-O03R-01.**

Table 15 Stage I and Stage II BMP implementation goals for the Middle Fork Holston River O03R-01 impairment.

Years:		1-5	6-10
Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Livestock Exclusion System (LE-1T)	System	45	
Livestock Exclusion System (LE-2T)	System	44	
CREP (CRSL-6)	System	5	
Stream Protection System (WP-2T)	System	1	
Fence Maintenance	Miles	1.2	1.2
Conservation Tillage	Acre	4	
Improved Pasture Management	Acre	5,245	637
Reforestation of Erodible Pasture	Acre		
Beef Waste Storage	System		
Dairy Waste Storage	System	1	
Perm. Veg. Cover, Cropland	Acre	3	
Reforestation of Erodible Cropland	Acre	3	10
Retention Ponds, Pasture	Acre-Treated		1,670
Streambank Stabilization	Feet	500	0
<i>Residential</i>			
Septic Systems Pump-Out	System	324	324
Septic System Installation	System	29	0
Sewer System Connection	System	1	0
Alternative Treatment System Installation	System	12	0
Septic System Repair	System	54	0
Residential Rain Gardens	System	0	0
Infiltration Trench	Acre-Treated	0	0
Bioretention Basins	Acre-Treated	0	0
Riparian Buffer (Residential)	Acre	0	0
Manufactured BMP (stormceptors)	Acre-Treated	0	0
Residential Pet Waste Education Program	Program	0	0
Residential Pet Waste Composter	Composter	25	0
<i>TMDL Bacteria %Violation Rate, Single Sample</i>		7.88%	4.82%

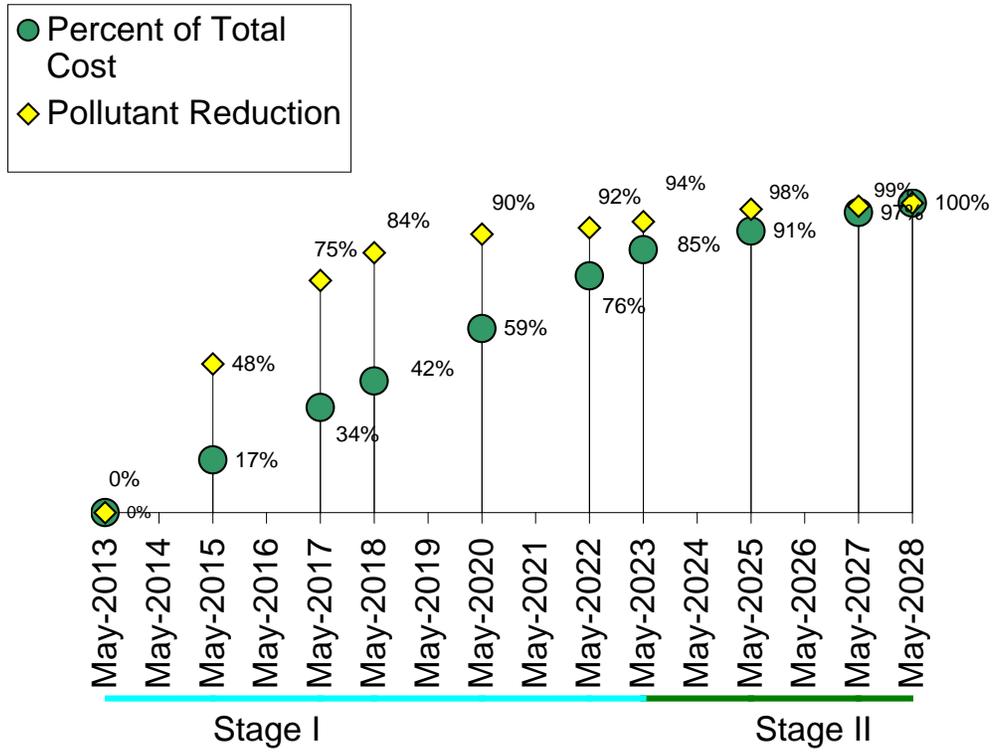


Figure 3 15-year timeline for implementation in the Middle Fork Holston River impairment VAS-O03R-02.

Table 16 Stage I and Stage II BMP implementation goals for the Middle Fork Holston River O03R-02 impairment.

Years:		1-10	11-15
Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Livestock Exclusion System (LE-1T)	System	50	
Livestock Exclusion System (LE-2T)	System	48	
CReP (CRSL-6)	System	5	
Stream Protection System (WP-2T)	System	1	
Fence Maintenance	Miles	1.3	1.3
Conservation Tillage	Acre	2	
Improved Pasture Management	Acre	7,091	
Reforestation of Erodible Pasture	Acre	355	
Beef Waste Storage	System		2
Dairy Waste Storage	System	1	
Perm. Veg. Cover, Cropland	Acre	4	
Reforestation of Erodible Cropland	Acre		1
Retention Ponds, Pasture	Acre-Treated	1,600	1,420
Streambank Stabilization	Feet	500	
<i>Residential</i>			
Septic Systems Pump-Out	System	773	773
Septic System Installation	System	61	
Sewer System Connection	System	2	
Alternative Treatment System Installation	System	27	
Septic System Repair	System	140	
Residential Rain Gardens	System		
Infiltration Trench	Acre-Treated		
Bioretention Basins	Acre-Treated		
Riparian Buffer (Residential)	Acre		
Manufactured BMP (stormceptors)	Acre-Treated		
Residential Pet Waste Education Program	Program	1	1
Residential Pet Waste Composter	Composter	25	
<i>TMDL Bacteria %Violation Rate, Single Sample</i>		10.18%	1.86%

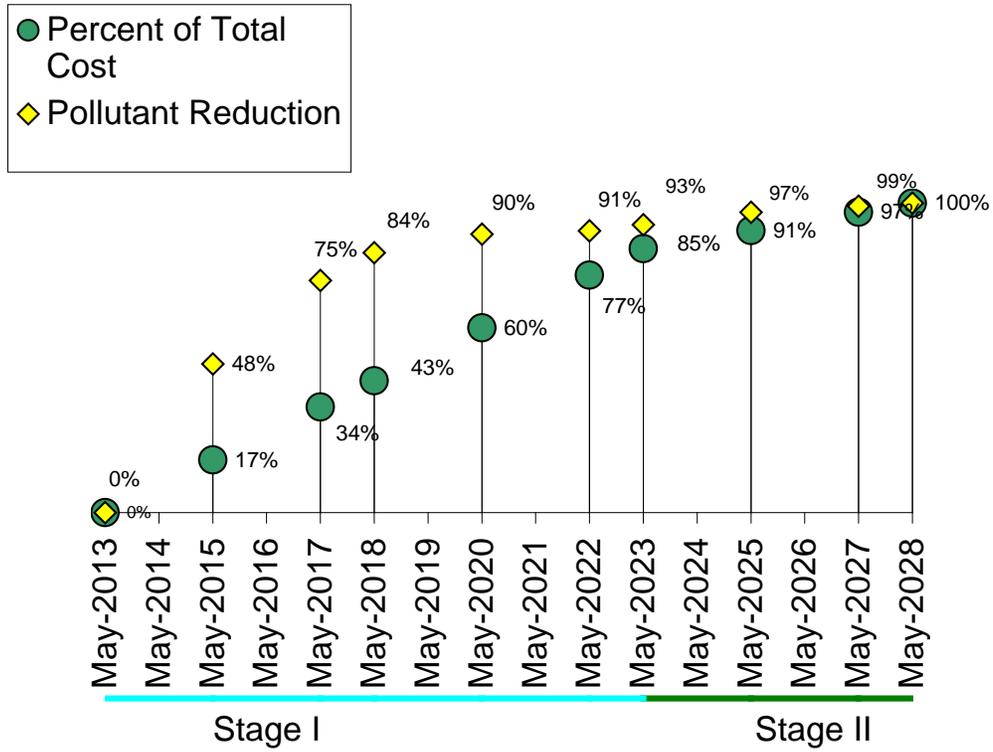


Figure 4 15-year timeline for implementation in the Middle Fork Holston River impairment VAS-004R-01.

Table 17 Stage I and Stage II BMP implementation goals for the Middle Fork Holston River O04R-01 impairment.

Years:		1-10	11-15
Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Livestock Exclusion System (LE-1T)	System	119	
Livestock Exclusion System (LE-2T)	System	118	
CREP (CRSL-6)	System	13	
Stream Protection System (WP-2T)	System	3	
Fence Maintenance	Miles	3.2	3.2
Conservation Tillage	Acre	18	
Improved Pasture Management	Acre	16,260	1,785
Reforestation of Erodible Pasture	Acre		35
Beef Waste Storage	System		3
Dairy Waste Storage	System	1	
Perm. Veg. Cover, Cropland	Acre		10
Reforestation of Erodible Cropland	Acre		10
Retention Ponds, Pasture	Acre-Treated		5,000
Streambank Stabilization	Feet	500	
<i>Residential</i>			
Septic Systems Pump-Out	System	1,363	1,363
Septic System Installation	System	80	
Sewer System Connection	System	3	
Alternative Treatment System Installation	System	38	
Septic System Repair	System	228	
Residential Rain Gardens	System		
Infiltration Trench	Acre-Treated		
Bioretention Basins	Acre-Treated		
Riparian Buffer (Residential)	Acre		
Manufactured BMP (stormceptors)	Acre-Treated		
Residential Pet Waste Education Program	Program		
Residential Pet Waste Composter	Composter	25	
<i>TMDL Bacteria %Violation Rate, Single Sample</i>		10.45%	5.53%

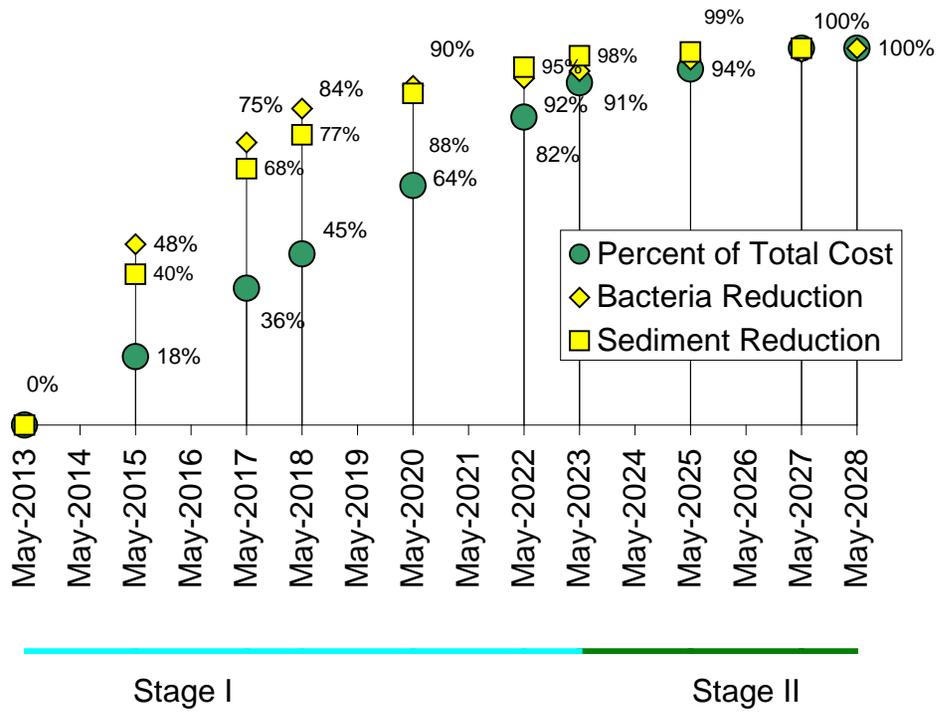


Figure 5 15-year timeline for implementation in the Middle Fork Holston River impairment VAS-O05R-05.

Table 18 Stage I and Stage II BMP implementation goals for the Middle Fork Holston River O05R-05 impairment.

Years:		1-10	11-15
Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Livestock Exclusion System (LE-1T)	System	145	
Livestock Exclusion System (LE-2T)	System	144	
CREP (CRSL-6)	System	15	
Stream Protection System (WP-2T)	System	3	
Fence Maintenance	Miles	3.9	3.9
Conservation Tillage	Acre	44	
Improved Pasture Management	Acre	4,550	2,007
Reforestation of Erodible Pasture	Acre		
Beef Waste Storage	System		
Dairy Waste Storage	System	1	
Perm. Veg. Cover, Cropland	Acre		6
Reforestation of Erodible Cropland	Acre		6
Retention Ponds, Pasture	Acre-Treated		1,450
Streambank Stabilization	Feet	3,000	
<i>Residential</i>			
Septic Systems Pump-Out	System	273	273
Septic System Installation	System	28	
Sewer System Connection	System	1	
Alternative Treatment System Installation	System	13	
Septic System Repair	System	87	
Residential Rain Gardens	System	10	
Infiltration Trench	Acre-Treated	10	
Bioretention Basins	Acre-Treated	10	
Riparian Buffer (Residential)	Acre		
Manufactured BMP (stormceptors)	Acre-Treated	5	
Residential Pet Waste Education Program	Program		
Residential Pet Waste Composter	Composter	25	
<i>TMDL Bacteria %Violation Rate, Single Sample</i>		10.29%	5.75%

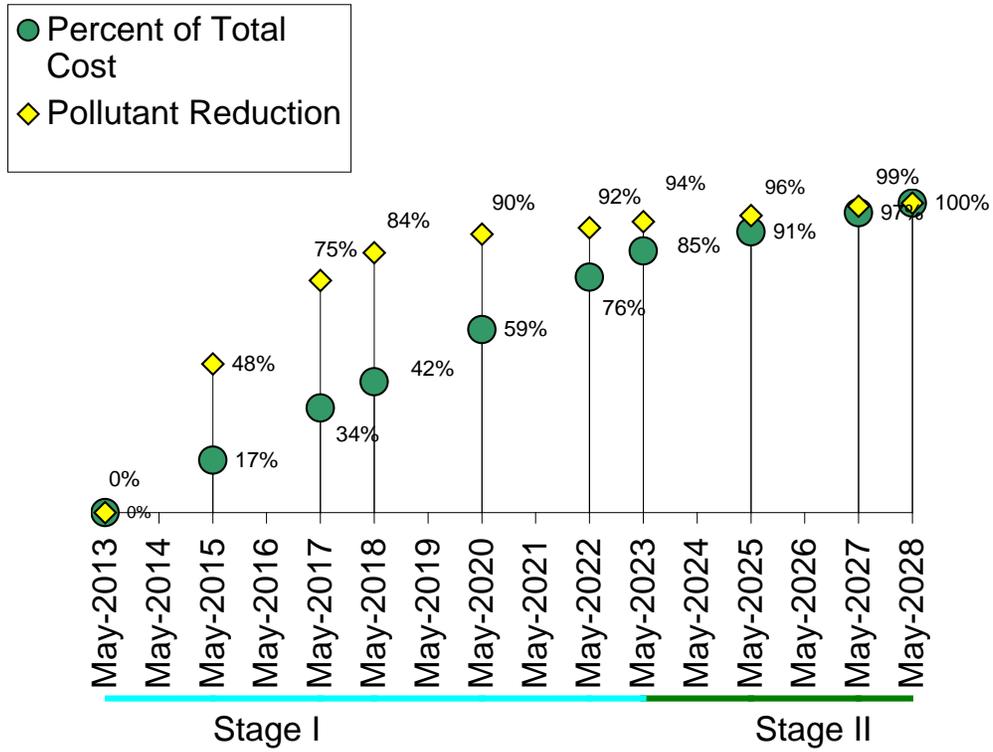


Figure 6 15-year timeline for implementation in the Middle Fork Holston River impairment VAS-O05R-06.

Table 19 Stage I and Stage II BMP implementation goals for the Middle Fork Holston River O05R-06 impairment.

Years:		1-10	11-15
Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Livestock Exclusion System (LE-1T)	System	43	
Livestock Exclusion System (LE-2T)	System	41	
CREP (CRSL-6)	System	4	
Stream Protection System (WP-2T)	System	1	
Fence Maintenance	Miles	1.1	1.1
Conservation Tillage	Acre	20	
Improved Pasture Management	Acre	5,900	562
Reforestation of Erodible Pasture	Acre		325
Beef Waste Storage	System		
Dairy Waste Storage	System	1	
Perm. Veg. Cover, Cropland	Acre	50	
Reforestation of Erodible Cropland	Acre	50	
Retention Ponds, Pasture	Acre-Treated		1,430
Streambank Stabilization	Feet	500	
<i>Residential</i>			
Septic Systems Pump-Out	System	183	183
Septic System Installation	System	20	
Sewer System Connection	System	1	
Alternative Treatment System Installation	System	10	
Septic System Repair	System	53	
Residential Rain Gardens	System		
Infiltration Trench	Acre-Treated		
Bioretention Basins	Acre-Treated		
Riparian Buffer (Residential)	Acre		
Manufactured BMP (stormceptors)	Acre-Treated		
Residential Pet Waste Education Program	Program		
Residential Pet Waste Composter	Composter	25	
<i>TMDL Bacteria %Violation Rate, Single Sample</i>		12.97%	7.61%

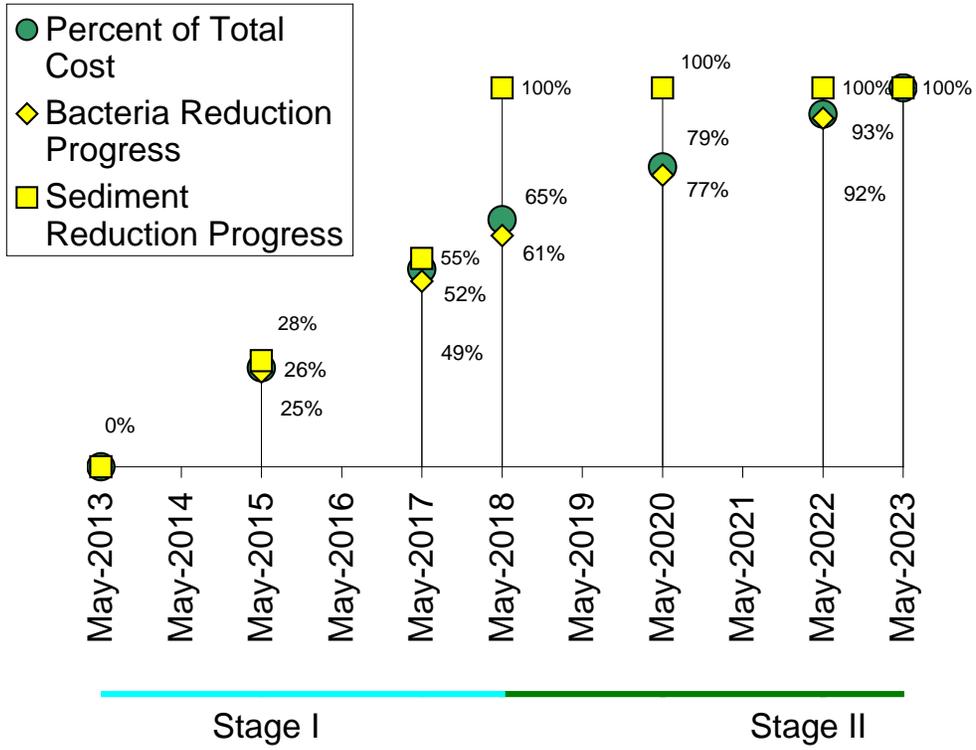


Figure 7 10-year timeline for implementation in impairment O06R-01 in the Wolf Creek watershed.

Table 20 Stage I and Stage II BMP implementation goals for impairment O06R-01 in the Wolf Creek watershed.

Years:		1-5	6-10
Control Measure	Unit	Stage I	Stage II
<i>Agricultural</i>			
Livestock Exclusion System (LE-1T)	System	38	
Livestock Exclusion System (LE-2T)	System	37	
CREP (CRSL-6)	System	4	
Stream Protection System (WP-2T)	System	1	
Fence Maintenance	Miles	1.0	1.0
Conservation Tillage	Acre	8	
Improved Pasture Management	Acre	7,500	202
Reforestation of Erodible Pasture	Acre	35	
Beef Waste Storage	System		2
Dairy Waste Storage	System		
Perm. Veg. Cover, Cropland	Acre	8	
Reforestation of Erodible Cropland	Acre	8	
Retention Ponds, Pasture	Acre-Treated	2,500	2,300
Streambank Stabilization	Feet	1,000	12,005
<i>Residential</i>			
Septic Systems Pump-Out	System	747	747
Septic System Installation	System	54	
Sewer System Connection	System	2	
Alternative Treatment System Installation	System	24	
Septic System Repair	System	128	
Residential Rain Gardens	System	10	
Infiltration Trench	Acre-Treated	10	
Bioretention Basins	Acre-Treated	10	
Riparian Buffer (Residential)	Acre	10	
Manufactured BMP (stormceptors)	Acre-Treated	5	
Residential Pet Waste Education Program	Program	1	1
Residential Pet Waste Composter	Composter	50	
Streambank Stabilization	Feet		3,470
<i>TMDL Bacteria %Violation Rate, Single Sample</i>		10.89%	3.34%

IMPLEMENTATION BENEFITS

The primary benefit of implementation is cleaner waters in the Middle Fork Holston River and Wolf Creek. Implementation will provide safer, cleaner waters for recreational use, and reduce the incidence of infection through contact with the water. Specifically, fecal bacteria contamination and sediment loads in the Middle Fork Holston River and Wolf Creek will be reduced to raise stream quality to delisting status and allow for recreational and agricultural use.

It is difficult to gauge the impact that reducing fecal 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 required reductions, the incidence of infection from fecal sources, through contact with surface waters, should be considerably reduced.

Additionally, because of streambank protection that will be provided through exclusion of livestock from streams, the aquatic habitat will be improved in these waters. The vegetated buffers that are established will also serve to reduce bacteria runoff to the stream from upslope locations. In addition, as trees and shrubs in vegetated buffers grow, they serve as excellent shade sources for streams. This in turn reduces water temperature in the stream and increases dissolved oxygen, thereby improving aquatic habitat for numerous aquatic organisms. In areas where pasture management is improved, fewer bacteria will be washed into streams following precipitation events. Bacteria concentrations in the stream should thereby meet delisting status.

A clean water source has been shown to improve herd health. Fresh clean water is the primary nutrient for livestock. Many livestock illnesses can be spread through contaminated water supplies. A clean water source can prevent illnesses that reduce production and incur the added expense of avoidable veterinary bills. Beef producers in several Virginia counties have reported weight gains in cattle after providing alternative water sources. Studies also show increased milk and butterfat production from dairy cattle drinking from a clean and reliable source.

Taking the opportunity to initiate 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 and consequently, improve the profitability of the operation. 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 forage costs to producers, intensive pasture management can boost profits by increasing the quality and amount of forage and productivity per acre.

The residential programs will play an important role in improving water quality, since human waste can carry human viruses in addition to the bacterial and protozoan pathogens that all fecal matter can potentially carry with it. In terms of economic

benefits to homeowners, an improved understanding of private sewage 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. 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 three to five years. The cost of proper maintenance, as outlined here, is relatively inexpensive in comparison to repairing or replacing the entire system.

Implementation of this plan will help foster continued local economic vitality and strength based on the recognition that clean water improves 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 practices recommended in this document are expected to provide economic and environmental benefits to the landowner. Specifically, alternative (clean) water sources, exclusion of livestock from streams, intensive pasture management, and private sewage system maintenance will each provide economic benefits.

Monitoring

Improvements in water quality will be evaluated in the Middle Fork Holston River and Wolf Creek watersheds through monitoring conducted by the DEQ's ambient monitoring program. The monitoring data include bacteria, physical parameters (dissolved oxygen, temperature, pH, and conductivity), nutrients and suspended solids. The DEQ 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 and sediment in the streams of the Middle Fork Holston River and Wolf Creek watersheds. Benthic monitoring is provided by DEQ at the stations indicated in **Table 22**.

The DEQ monitoring stations in the Middle Fork Holston River and Wolf Creek watersheds are identified in **Table 22** and shown in **Figure 7** and **Figure 8**. "Ambient" water quality monitoring follows a 6 year schedule. Stations will be monitored every month for 1 year, cycle off for 5 years, then in the 6th year monitored every month for 1 year. "Trend" stations are monitored on a continuing basis every other month. "Biological" stations will be revisited as data needs and gaps are identified.

Currently, no volunteer monitoring is occurring in the Middle Fork Holston River and Wolf Creek watersheds but it is highly encouraged to provide support for tracking IP success.

Table 21 DEQ’s 2013 monitoring stations in the Middle Fork Holston River and Wolf Creek watersheds.

Impairment Watershed	Stream	Station	Monitoring Schedule
VAS-O03R	Middle Fork Holston River	6CMFH040.67	Ambient
VAS-O03R	Middle Fork Holston River	6CMFH045.72	Ambient
VAS-O04R	Middle Fork Holston River	6CMFH033.40	Trend
VAS-O05R	Middle Fork Holston River	6CMFH011.31	Biological
VAS-O05R	Middle Fork Holston River	6CMFH013.21	Trend
VAS-O06R	Wolf Creek	6CWLF007.55	Ambient
VAS-O06R	Wolf Creek	6CWLF006.75	Ambient
VAS-O06R	Wolf Creek	6CWLF004.10	Biological
VAS-O06R	Wolf Creek	6CWLF001.18	Ambient

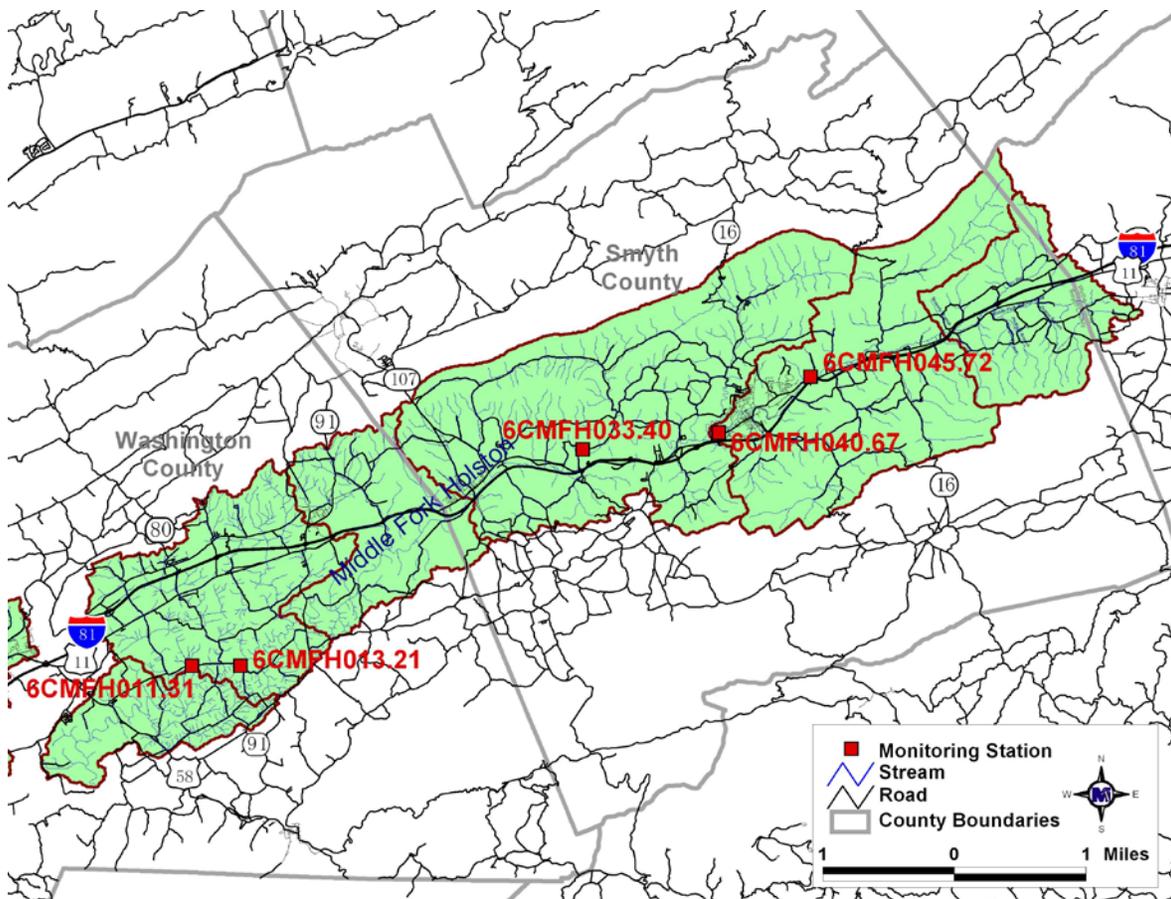


Figure 8 DEQ’s Proposed Monitoring Stations in the Middle Fork Holston River Watershed.

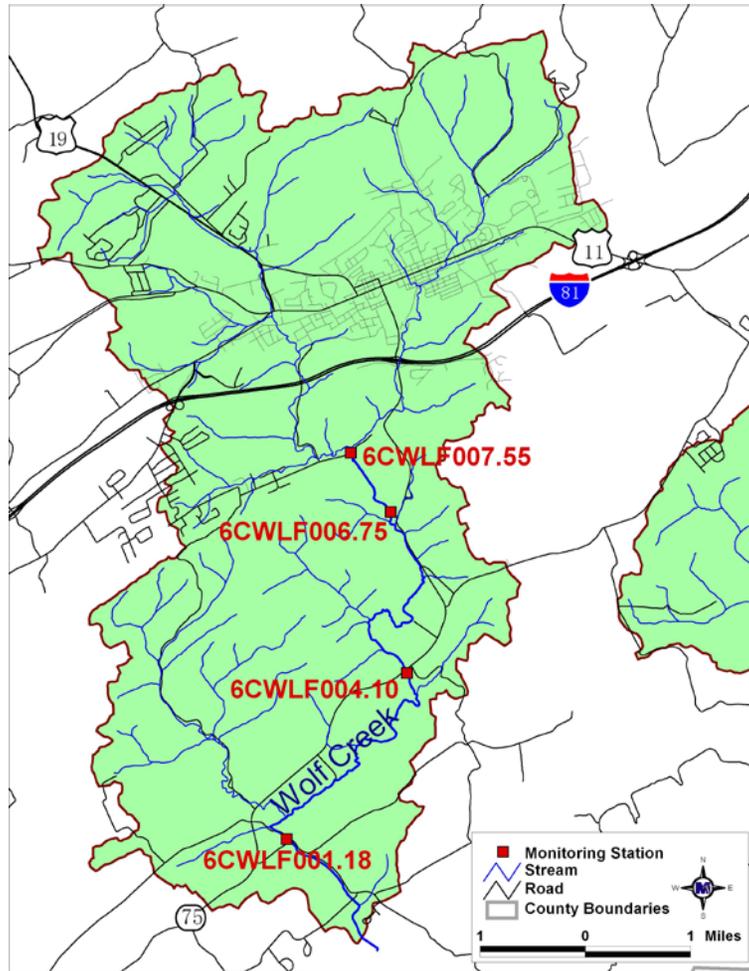


Figure 9 DEQ’s Proposed Monitoring Stations in the Wolf Creek Watershed.

Education

Personnel from the Holston River (Washington County area), Evergreen (Smyth County area), and Big Walker SWCDs, and the Natural Resources Conservation Service will initiate contact with farmers in this watershed to encourage the installation of agricultural BMPs. This one-on-one contact will facilitate communication of the water quality problems and the corrective actions needed. Technical staff should conduct a number of outreach activities in the watershed to raise local awareness, encourage community support and participation in reaching the implementation plan milestones. Such activities can include information exchange through newsletters, postcard mailings, field days and presentations at local Ruritan and Rotary Clubs. The technical staff should also work with organizations such as Virginia Cooperative Extension to sponsor farm tours and field days.

Stakeholders' Roles and Responsibilities

Stakeholders are individuals who live or have land management responsibilities in the watershed, including government agencies, businesses, private individuals and special interest groups. Stakeholder participation and support is essential for achieving the goals of this TMDL implementation plan effort.

ENVIRONMENTAL PROTECTION AGENCY

The EPA has the responsibility for overseeing the various programs necessary for the success of the Clean Water Act. 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 seven state agencies responsible for regulating activities that impact water quality with regard to this implementation plan. These agencies include: DEQ, DCR, DMME, VDH, VCE, DOF, and Virginia Department of Agriculture and Consumer Services (VDACS).

DEPARTMENT OF ENVIRONMENTAL QUALITY

DEQ has responsibility for monitoring the waters to determine compliance with state standards and for requiring permitted point dischargers to maintain loads within permit limits. They have the regulatory authority to levy fines and take legal action against those in violation of permits. Beginning in 1994, animal waste from confined animal facilities 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 groundwater contamination. In response to increasing demand from the public to develop new regulations dealing with animal waste, in 1999 the Virginia General Assembly passed legislation requiring DEQ 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 the Virginia Department of Environmental Quality (DEQ) assumed regulatory oversight of all land application of treated sewage sludge, commonly referred to as biosolids. 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.

DEPARTMENT OF CONSERVATION AND RECREATION

DCR is a major participant in the TMDL process. DCR has a lead role in the development of IPs to address non-point source pollutants such as bacteria from failing septic systems, pet waste, and livestock operations that contribute to water quality impairments. DCR provides available funding and technical support for the implementation of NPS components of IPs.

HOLSTON RIVER AND EVERGREEN SOIL AND WATER CONSERVATION DISTRICTS

The Holston River and Evergreen SWCDs will provide outreach, technical and financial assistance to farmers and property owners in the Middle Fork Holston River and Wolf Creek watersheds through the Virginia Agricultural BMP Cost-Share and Tax Credit programs. 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 BMPs. Education and outreach activities are a significant portion of their responsibilities.

VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

Through Virginia's Agricultural Stewardship Act, the VDACS 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 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. The enforcement of the Agricultural Stewardship Act is entirely complaint-driven. This Act is considered as a state regulatory tool that can support implementing conservation practices to address pollutant sources in TMDL impaired watersheds even though the Act does not specifically reference pathogens as a pollutant.

VIRGINIA DEPARTMENT OF HEALTH

VDH is responsible for maintaining safe drinking water measured by standards set by EPA. Their duties also include septic system regulation and, in the past, regulation of biosolids land application. Like VDACS, VDH's program is complaint-driven. Complaints can range from a vent pipe odor that is not an actual sewage violation and takes very little time to investigate, to a large discharge violation that may take many weeks or longer to effect compliance. In the scheme of this TMDL IP, VDH has the responsibility of enforcing actions to correct or eliminate failed septic systems and straight pipes, respectively. VDH staff also issue permits for the repair and installation of septic systems and the installation of alternative waste treatment systems.

LOCAL GOVERNMENTS

Local governments can develop ordinances involving pollution prevention measures and play a very active role in the TMDL implementation process.

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. The county government could also play an active role in the proper disposal of pet waste. Future subdivisions should be developed with sustainable growth practices that minimize or eliminate storm water runoff.

Successful implementation depends on stakeholders taking responsibility for their role in the process. This could include using pet waste composters if they have dogs, getting septic tanks pumped on a regular basis and talking with friends and neighbors about things they can do to protect water quality. While the primary role falls on the landowner, local, state and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. While it is unreasonable to expect that the natural environment (e.g., streams and rivers) can be made 100% free of risk to human health, it is possible and desirable to minimize man-in problems. Virginia's approach to correcting NPS pollution problems has been, and continues to be, encouragement of participation through education and financial incentives. However, if progress is not made toward restoring water quality using this voluntary approach, regulatory controls may be established and enforced.

WATER QUALITY PROGRAMS AND ACTIVITIES

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, a 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.

FUNDING FOR IMPLEMENTATION

Potential funding sources available to assist with implementation were identified during implementation plan development. Detailed descriptions can be obtained from the Holston River and Evergreen SWCDs, DCR, NRCS, and VCE. Sources include:

Federal

Community Development Block Grant Program
Conservation Reserve Program (CRP)
Conservation Reserve Enhancement Program (CREP)
Environmental Quality Incentives Program (EQIP)
Section 319(h) Grant Program
Wildlife Habitat Incentive Program (WHIP)
Wetland Reserve Program (WRP)

State

Clean Water State Revolving Fund
Virginia Agricultural Best Management Practices Cost-Share Program
Virginia Agricultural Best Management Practices Tax Credit Program
Virginia Agricultural Best Management Practices Loan Program
Virginia Natural Resources Conservation Fund
Virginia Small Business Environmental Assistance Fund Loan Program
Virginia Water Quality Improvement Fund

Local

Indoor Plumbing Rehabilitation Program
Tennessee Valley Authority

Private

Small Watershed Grants Program
National Fish and Wildlife Foundation

STAKEHOLDER PARTICIPATION

The meetings conducted during the course of the IP development are listed below. Individuals representing agricultural, residential, commercial, environmental, and government interests on a local, state, and federal level contributed substantial amounts of their time towards IP meeting attendance. The input from these individuals is greatly appreciated.

The water quality improvement actions compiled in this document are formulated through input from citizens of the watershed, the Holston River Soil and Water Conservation District (HRSWCD), the Evergreen Soil and Water Conservation District (ESWCD), the Virginia Department of Conservation and Recreation (VADCR), the Virginia Department of Environmental Quality (VADEQ), the Virginia Department of Health (VDH), the U.S.D.A. Natural Resources Conservation Service (NRCS), local county and town governments, and the Nature Conservancy (TNC).

Stakeholder participation occurred through the IP development process. Public meetings were held to inform the stakeholders about the purpose and need for the plan and to provide an overview of plan components such as the types and amounts of best management practices that are needed to improve water quality. Agricultural/Residential and Government working groups were formed to provide a venue for discussing details of the plan's components. The working groups provided input on: the selection of control measures and their associated costs; prioritization of implementation activities; funding/partnering opportunities; regulatory programs related to plan implementation; existing resources for implementing the plan; potential obstacles for implementing the plan; and potential opportunities for facilitating plan implementation. A representative

from DCR coordinated each working group in order to facilitate the process and integrate information collected from the various stakeholders. A Steering Committee was formed with representation from the Agricultural, Residential, and Governmental Working Groups. The committee reviewed the input from the working groups and provided recommendations for using the input to inform the content of the plan. For example, the Steering Committee had responsibility for reviewing the identified control measures; the timeline needed to ensure a reasonable rate of implementation; and the measurable goals and milestones for attaining water quality standards.

Table 22 Meetings held during the TMDL IP development process

Date	Meeting Type	Location	Attendance	Time (hr)
07/24/12	Public Meeting/Ag. & Residential Work Group	DEQ/DCR Office, Abingdon	13	2
10/02/12	Government Working Group	DEQ/DCR Office, Abingdon	12	2
12/18/12	Agricultural & Residential Work Group	Hemlock Haven Conf. Center, Marion	5	3
12/20/12	Agricultural & Residential Working Group	Community Center, Glade Spring	4	3
03/20/13	Steering Committee	DEQ/DCR Office, Abingdon	11	2.5
03/28/12	Public Meeting	DEQ/DCR Office, Abingdon		

The following section summarizes input provided by the agricultural work group, the residential/urban work group, and steering committee meetings. More detailed meeting summaries are provided as an attachment to the TMDL IP technical report, which is a separate, expanded version of this document.

Summary of Agricultural Comments

- Most farmers already use cover crops and no-till practices, and its use predates the TMDL.
 - Crop rotation (NRCS code 328) No-Till/Strip-Till/Direct-Seed (NRCS code 329) are practices that could be added to the TMDL IP to reduce sediment and bacteria loads.
 - It was suggested that cropland conversion to grassland (SL-1) should be added as a control measure.
- Due to increasing numbers of horses on small parcels of land, it might be worthwhile to have an equine veterinarian host an educational program for horse owners to address the impacts to streams from horses.
- The CREP program is popular in the IP area; tracts not eligible for CREP are eligible for EQIP. The federal EQIP program (NRCS) appears to be underutilized in the IP

area. Oftentimes, both CREP and SL-6 are implemented on a single farm tract because they have complimentary benefits. Caution must be used when prescribing CREP in the TMDL IP because its availability is dependent upon a new Farm Bill.

- Bacteria from livestock along the mainstem Middle Fork may have a strong influence on WQ monitoring results at nearby DEQ monitoring stations. Reducing livestock access to the mainstem Middle Fork Holston River from Marion downstream by installing fencing is complicated by the relatively higher risk of flood damage to fences
 - Farmers would be more receptive to livestock exclusion if the cost-share rate for fencing this area was greater (e.g. up to 100%), if fencing options were more flexible (e.g. allow 1 or 2 strand high tensile electric fence that can be replaced cheaply), and alternative water was provided.
 - The Virginia Enhanced Cost-Share Initiative (VECI) provides 100% cost share for livestock exclusion practices. This may be a viable option for achieving fencing goals for the mainstem Middle Fork Holston River; because the funding source is not permanent at this point, it was suggested that it may be a good strategy to target the mainstem while VECI funds are still available.
- Constructing retention ponds throughout the IP area to reduce bacteria is not cost-effective because of the undulating topography and the cumulative cost. Small farms might want to install the ponds but large ones would not because of the number of ponds it would take to treat the farm.
 - A better practice would be improved pasture management, i.e. an incentive payment for farmers to implement a prescribed grazing management plan. DCR has a pasture management BMP, SL-10T that offers a one-time incentive payment for 3 years and could be used in the area.
- For sediment reductions, it was suggested that the VA ag. cost-share practice- SL-11 (critical area treatment) should be added as a control measure
- Among funding, personnel, and farmer participation, increasing the amount of farmer participating in BMP installation is the major challenge for achieving water quality protection goals.
 - It is estimated by Soil and Water Conservation District and NRCS staff that one-third to one-half of agricultural producers in Smyth and Washington Counties are interested and eligible for participating in state/federal cost-share programs for implementing management practices that protect and improve water quality.
 - Most of the farmers that are interested in these programs have already participated in the installation of one or more practices.
 - A substantial portion of farm tracts are either ineligible for cost-share programs.
 - A substantial portion of farm tracts are so small that installing practices such as a 35 foot livestock exclusion buffer along streams would significantly reduce land available for production.

- HRSWCD tries to use federal CREP and EQIP funding as much as possible and then supplement or fund federal-ineligible projects with state cost-share funds. Cost-share is more successful in areas where producers can see demonstration projects and have adequate time to make a decision. Stream exclusion has been successful in the IP area; often, producers approach the District seeking help.
- The Holston River and Evergreen SWCDs can envision meeting the timelines for achieving IP goals for agriculture (generally 15 years) under the following assumptions:
 - If funding for BMPs and technical assistance provided to the SWCDs was increased to match the estimated budget outlined in the IP.
 - If greater cost-share (e.g. the ability to provide up to 100%) was available on livestock exclusion systems that provide watering systems.
- The Agricultural Stewardship Act (ASA) is a complaint-driven law administered by VDACS which relies on either their own staff or SWCDs to investigate. The law addresses any water quality issues caused by agricultural operations that are not permitted by the Department of Environmental Quality. In cases of founded impairments, the operator needs to develop & implement an agricultural stewardship plan (SWCD can develop one for them). Producers can apply for eligible state and/or federal funding to help correct problems. There were four to five complaints filed in this IP area during the past year. Civil penalties may be assessed if the producer refuses to develop/implement a plan.

Summary of Residential/Urban Land Use Comments

- Based on the number of septic repair applications VDH receives in Washington County and the size of the impaired watershed, estimates of failing septic systems and straight pipes appear to be inflated.
- Gray water is defined as sewage that needs to be treated. Violations fall under Class 1 misdemeanors of criminal law; VDH can take offenders to court for noncompliance.
- Once people hear about funding opportunities, they are much less reluctant to come forward to address septic system problems and straight pipes. Poor soils for septic drainage tend to be site-specific. Straight pipes are difficult to find and must be addressed a case-by-case basis.
- Washington County does not have a mandatory hook up ordinance, but customers who have access to sewer and choose not to connect are charged a minimum usage fee. Some towns in the watershed may have mandatory hook up policies.

- Additional assessment work is needed to determine if leaking sewer lines occur upstream of the confluence of Town Creek and Wolf Creek.
- Some areas in the watershed have received water lines to residences but not sewer. Water & sewer rates may be increasing substantially in the near future in Washington County. Many water lines in Washington County are 50+ years old and need replacement.
- A lower rate of people choosing to connect to sewer connection should be assumed for sub-watersheds in Washington County since the hook-up fee is much greater than that of Smyth County.
- Most of the south half of Wolf Creek watershed is non-sewered, but probably will need to become sewered at some point in the future. Lower Wolf Cr. watershed has dense homes along Rt. 75, and Westwood is old with septic systems on 1/2 acre lots. Westwood is being sewered right now.
- Pet ordinances and the use of pet waste composters are aimed at urban areas; it is impractical for rural landowners on larger parcels to pick up dog feces, while in urban areas, efforts are aimed at educating pet owners on the implications of not picking up dog waste
 - Abingdon has an animal waste disposal ordinance for public property. Abingdon has bag distribution boxes located around town.
 - Personal bag dispensers which an owner can clip on to a leash may be a good item to distribute.
 - Direct mailing attempts in the past have not been successful as an outreach tool and are complicated by watershed boundaries. Social media may be a potential outreach tool.
 - Potential locations to promote pet waste clean-up and initiate BMPs include the Abingdon Dog Park, the River Walk public use area in Marion, and Hungry Mother State Park.
 - A pet waste education and composter program in the Beaver Creek area was relatively unsuccessful. Attendees were not aware of any kennels in the Middle Fork Holston and Wolf Creek watersheds.
- Older homes around the perimeter of Hungry Mother State Park have the potential to be contributing to bacteria loads due to outdated waste treatment systems. Waterfowl are not a problem in the Hungry Mother watershed. VDH monitors water quality at Hungry Mother State Park, in-season.
- There are several places in Abingdon where unnatural numbers of ducks and geese reside (e.g. in Town Creek along Green Spring Drive). Ponds that attract waterfowl contribute to bacteria levels in samples collected by DEQ. No-mow zones around ponds can discourage geese from entering streams on foot. There is significant potential to reduce sediment loading o wolf Creek by reducing stream bank erosion in and around Abingdon.

- Manufactured BMPs for treating stormwater quality are effective but expensive and require a large capacity and regular maintenance.
- The Town of Abingdon is on the state’s waiting list to become an MS4 community. The Town currently has an E & S program. Now that the census block surrounding Abingdon meets MS4 criteria, they will be required to develop a stormwater program by EPA, unless they get a waiver from EPA.
 - MS4 designation would require the town to control its stormwater. The Town of Abingdon has implemented some stormwater BMPs including street sweeping and a few rain gardens.
 - Washington County recently was awarded a stormwater grant. A primary component of this grant includes the development of a stormwater ordinance. At least in the near term, the stormwater program will cover the Town of Abingdon since the Town does not currently have a stormwater program.
 - The Town has received a grant from the Army Corps to map stormwater to address water quantity/flooding issues. This effort may have the potential to be used or expanded to address stormwater quality issues and develop effective strategies to address hotspots through installation of BMPs.
- Stakeholders felt the residential implementation cost-share program in the Three Creeks area was successful, especially septic pump-outs which help to identify needs for repairs. The wastewater treatment plant also waived tipping fees on pumped septage from the area.
- Public sewer is available in Abingdon, Emory, Glade Spring, Marion, and Chilhowie. Sewer was recently extended to the Westwood subdivision (appears to be in Wolf Creek watershed). This project may bring in Lee Highway commercial connections.

Summary of General Comments

- Some funding from the Department of Game and Inland Fisheries Landowner Incentive Program has been used on the projects in the watershed. DGIF is interested in completing additional projects benefitting fisheries in the Middle Fork Holston.
- DEQ performs ongoing monitoring at 4 sites on Wolf Creek and five on the mainstem Middle Fork Holston River (in addition to sites on tributaries). Of the listing stations for these watersheds, two on the MFH and one on WC are trend stations, which will be monitored every other month indefinitely. Two MFH stations and one WC station are ambient stations which will likely be monitored again beginning in 2013 or 2014. There is one biological station on the MFH and one on WC; each was last monitored in 2008. To delist impaired segments, water quality standards must be achieved at listing stations.
- DCR would be supportive of continuous water quality & biological monitoring rather than allowing large time-gaps the ability to demonstrate water quality improvement

facilitates the ability to obtain federal and or state grant funds for ongoing implementation work.

- Given the geographic expanse of the watershed, insufficient monetary resources are available to implement a strong TMDL implementation effort throughout the IP area. A potential strategy for making progress towards meeting WQ goals for one or more impaired stream segments is to target sub-watersheds for TMDL implementation work. The idea is that the likelihood of being able to demonstrate WQ improvement increases as funds and BMPs are concentrated into a smaller watershed area and being able to clearly show improvement increases the ability to obtain additional funding. However, focusing TMDL implementation efforts in one or two sub-watersheds in each district would increase the difficulty of administering the TMDL implementation effort.

LIST OF ACRONYMS

BMP	Best Management Practice
CREP	Conservation Reserve and Enhancement Program
CWA	Clean Water Act
DCR	Virginia Department of Conservation and Recreation
DEQ	Virginia Department of Environmental Quality
DOF	Virginia Department of Forestry
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
FTE	Full Time Equivalent
IP	Implementation Plan
NPS	Nonpoint Source Pollution
NRCS	Natural Resources Conservation Service
LE-1T	Livestock Exclusion System
LE-2T	Livestock Exclusion with Reduced Setback Practice for TMDL Implementation
SPCA	Society for the Prevention of Cruelty to Animals
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
VASCI	Virginia Stream Condition Index
VCE	Virginia Cooperative Extension
VDACS	Virginia Department of Agriculture and Consumer Services
VDH	Virginia Department of Health
WP-2T	Streambank Protection
WQMIRA	Water Quality Monitoring, Information, and Restoration Act

LIST OF CONTACTS

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Smyth County Health Department 201 Francis Marion Lane Marion, VA 24354	(276) 781-7460
Town of Abingdon Town Hall 133 W. Main St. Abingdon, VA 24210	(276) 628-3167
Town of Chilhowie 325 East Lee Highway; P.O. 5012 Chilhowie, VA 24319	(276) 646-3232
Town of Marion 110 E. Chilhowie St. Marion, VA 24354	(276) 783-3759
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