Water Quality Improvement Plan

CLINCH RIVER & COVE CREEK WATERSHED

A plan to reduce bacteria in the water

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In Cooperation With Local Stakeholders MapTech, Inc.

LENOWISCO Planning District Commission

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INTRODUCTION

The Clean Water Act (CWA) requires that all of our streams, rivers, and lakes meet the state water quality standards.

The CWA also requires that states conduct monitoring to identify polluted waters or those that do not meet standards. Through a monitoring program, the state of Virginia has found that many streams do not meet state water quality standards for the protection of five beneficial uses: recreations, the production of edible and marketable natural resources, aquatic life, wildlife, and public water supply (drinking). When streams fail to meet water quality standards, they are placed on the state's impaired waters list, and the state must then develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL is a "pollution budget" for a stream, meaning that it sets limits on the amount of pollution as a stream can tolerate and still maintain water quality standards. In order to develop a TMDL, background concentrations, point source loadings, and non-point source loadings are considered. Non-point source pollution occurs when pollutants from multiple sources are transported across the land to a body of water then it rains. Point source pollution occurs when pollutants are directly discharged into a stream. Through the TMDL process, states establish water-quality based controls to reduce pollution and meet water quality standards.

Water Quality problems in the Clinch River and Cove Creek Watershed:

TMDLs were completed for the Clinch River and Cove Creek watershed in 2014 after water quality monitoring showed that the streams were violating the state's water quality standard for bacteria. This standard is based on the concentration of *E.coli* bacteria in the water, and is designed to minimize the risk of illness or infection after coming into contact with the water. The standard states that the *E.coli* bacteria count should not exceed a monthly geometric mean of 126 cfu per 100 mL of water. If there are insufficient data to calculate monthly geometric means in freshwater, no more than 10 % of the total samples in the assessment period shall exceed 235 cfu per 100 mL. In addition, a stream will be placed on Virginia's impaired waters list if over 10% of samples collected during a 6-year assessment window exceed 235 cfu per 100

mL. Table 1 shows the frequency at which the streams violated this standard based on monitoring by the Virginia Department of Environmental Quality (DEQ).

Table 1. Monitoring stations in the Clinch River and Cove Creek watershed and violation rates of *E.coli* water quality standard.

Stream	Station ID	Sampling Period	# of Samples	Violation[1] %
Blackwater Creek	6BBKW005.82	7/05 - 9/12	20	55.0%
Clinch River	6BCLN206.70	1/05 - 9/12	45	11.1%
Copper Creek	6BCOP047.75	8/05 - 8/12	17	41.2%
Copper Creek	6BCOP052.77	8/05 - 8/12	18	44.4%
Cove Creek	6BCOV001.68	8/05 - 9/12	20	35.0%
Moll Creek	6BMOL000.03	8/05 - 9/12	18	61.1%
North Fork Clinch River	6BNFC003.80	7/05 - 9/12	20	45.0%
North Fork Clinch River	6BNFC010.65	7/05 - 9/12	20	50.0%
North Fork Clinch River	6BNFC018.68	7/05 - 9/12	20	35.0%
Stock Creek	6BSTO000.45	7/05 - 9/12	20	40.0%
Valley Creek	6BVAL000.25	8/05 - 8/12	18	38.9%

[1] Based on the current instantaneous *E. coli* standard of 235 cfu/100mL.

Creating a Water Quality Improvement Plan

Once a TMDL is developed for a stream, the next step is to create a plan that identifies how the pollutant reductions identified in the TMDL can be achieved. A water quality improvement plan (also known as a TMDL Implementation Plan) describes the actions that can be taken by landowners in the watershed that will result in improved water quality in the stream.

There are nine components that must be included in an Implementation Plan in order to meet 319 funding requirements:

1. **Causes and sources of bacteria** that will need to be controlled to meet the water quality standards.
2. **Reductions in pollutants** needed to achieve water quality standards.
3. **Management measures (BMPs)** that will need to be implemented to achieve the pollutant reductions.
4. **Technical and financial assistance** needed, associated costs, and the authorities that will be relied upon to implement the plan.
5. An **information/education** component that will be used to enhance public understanding on the project and encourage participation in selecting and implementing best management practices.
6. A **schedule for implementation** of the practices identified in the plan.
7. **Goals and milestones** for implementing best management practices.
8. A **set of criteria** for determining if bacteria reductions are being achieved and if progress in being made towards attaining water quality standards.
9. A **monitoring program** to evaluate the effectiveness of the implementation effort.

(DCR & DEQ, 2003)

REVIEW OF TMDL STUDY

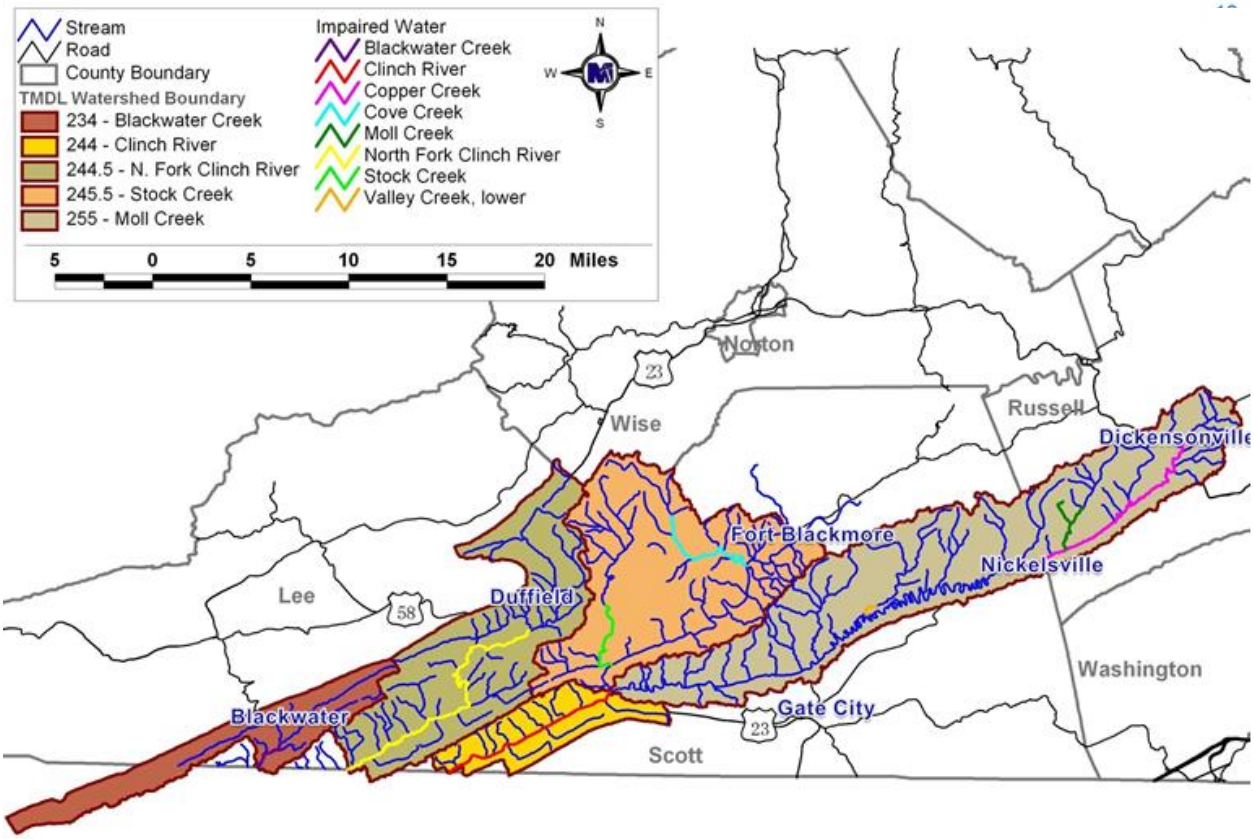

Figure 1. Location of the watershed

Watershed Characteristics

The Clinch River and Cove Creek Watershed area (USGS Hydrologic Unit Code 06010205) is located in Russell, Scott, and Lee Counties of Virginia. This watershed is a part of the Tennessee/Big Sandy River basin, which drains via the Mississippi River to the Gulf of Mexico. The drainage area flowing into the most downstream impairment in this project is approximately 235,880 acres. Forest and pasture/grassland are the predominant land uses in the watershed (66% and 27% respectively).

The Clinch River and Cove Creek TMDL study area consists of five (5) TMDL watersheds: 1) Blackwater Creek, 2) Clinch River, 3) North Fork Clinch River, 4) Stock Creek (includes Cove Creek), and 5) Moll Creek (includes Copper Creek and Valley Creek). The TMDL watershed names are the reference names used in this document, which includes the respective streams

listed above with each TMDL watershed. There are eleven (11) different impairment segments in this study area. Figure 1 shows the location of the impairments and TMDL watersheds in the Clinch River and Cove Creek TMDL Watershed. Each TMDL watershed correlates to a TDML equation and an allocated load. The impaired segments on the following streams: Clinch River, Cove Creek, Stock Creek, Moll Creek, Valley Creek, Blackwater Creek, Copper Creek and North Fork Clinch River. Each impaired segment is described below.

Clinch River (VAS-P13R_CLN01A02)

The Clinch River in Russell and Scott Counties flows southwest before it reaches the Virginia/Tennessee state line. The Clinch River is listed as impaired from the Copper Creek confluence near Speers Ferry downstream to the Tennessee state line near Shelby (9.69 stream miles) on the 2012 303(d) list as impaired for not supporting the recreation/swimming use. DEQ monitoring at station 6BCLN206.70 showed an 11.1% *E. coli* bacteria standard violation rate in the 2012 305(b) assessment.

Blackwater Creek (VAS-P16R_BKW01A02)

Blackwater Creek in Lee County flows in a horseshoe bend pattern before it reaches the Virginia/Tennessee state line. Blackwater Creek is listed as impaired from East Fork Blackwater Creek confluence downstream to the Tennessee state line (2.11 stream miles) on the 2012 303(d) list as impaired for not supporting the recreation/swimming use. DEQ monitoring at station 6BBKW005.82 showed a 66% *E. coli* bacteria standard violation rate in the 2012 305(b) assessment.

Cove Creek (VAS-P13R_COV01B08)

Cove Creek in Scott County flows southeast before its confluence with the Clinch River. Cove Creek from its confluence with Millstone Branch to confluence with Clinch River north of Starnes Slant (6.94 stream miles) was listed as impaired on the 2012 303(d) list for not supporting the recreation/swimming use. DEQ monitoring station 6BCOV001.68 had an *E. coli* bacteria standard violation rate of 35% in the 2010 assessment.

Stock Creek (VAS-P13R_STO01A00)

Stock Creek, in Scott County, flows south before its confluence with the Clinch River.

Stock Creek from stream mile 4.56 downstream to the Clinch River confluence at Clinchport (4.51 stream miles) was listed as impaired on the 2010 303(d) list for not supporting the recreation/swimming use. DEQ monitoring station 6BSTO000.45 had an *E. coli* bacteria standard violation rate of 40% in the 2010 assessment.

Copper Creek (VAS-P14R_COP02B08)

Copper Creek, in Russell and Scott Counties, flows southwest before its confluence with the Clinch River. Copper Creek from the Grassy Creek confluence upstream to beginning of WQS Class V waters (9.70 stream miles) was listed as impaired on the 2012 303(d) list for not supporting the recreation/swimming use. DEQ monitoring station 6BCOP047.75 had an *E. coli* bacteria violation rate of 41.2% in the 2012 assessment.

Copper Creek (VAS-P14R_COP03A02)

The impaired segment is from mile 52.5 through Dickensonville upstream to mile 56.8 (4.3 stream miles) was listed as impaired on the 2012 303(d) list for not supporting the recreation/swimming use. DEQ monitoring station 6BCOP052.77 had an *E. coli* bacteria violation rate of 44.4% in the 2012 assessment.

Moll Creek (VAS-P14R_MOL01A08)

Moll Creek, in Russell County flows southwest before its confluence with Copper Creek.

Moll Creek from Copper Creek upstream, to second tributary, includes Porter Hollow (4.20 stream miles) was listed as impaired on the 2012 303(d) list for not supporting the recreation/swimming use. DEQ monitoring station 6BMOL000.03 had a violation rate of 61.1% in the 2012 assessment.

Valley Creek (VAS-P14R_VAL01A02)

Valley Creek, in Scott County, flows south before its confluence with Copper Creek. Valley Creek from near Farley Chapel to confluence with Copper Creek (1.01 stream miles) was listed as impaired on the 2012 303(d) list of impaired waters for not supporting the recreation/swimming use. DEQ monitoring station 6BVAL000.25 had a bacteria standard violation rate of 38.9% in the 2012 assessment.

North Fork Clinch River (VAS-P15R_NFC01B00)

The North Fork Clinch River, in Lee and Scott Counties flows southwest before it's confluence with the Clinch River. North Fork Clinch River from the Pattonsville Branch confluence downstream to the Cox Branch confluence (7.62 stream miles) was listed as impaired on the 2012 303(d) list of impaired waters for not supporting the recreation/swimming use. DEQ monitoring station 6BNFC010.65 had a bacteria standard violation rate of 50% in the 2012 assessment.

North Fork Clinch River (VAS-P15R_NFC01B08)

The North Fork Clinch River from Fraley Branch confluence downstream to the Pattonsville Branch confluence (3.39 stream miles) were listed as impaired on the 2012 303(d) list for not supporting the recreation/swimming use. DEQ monitoring station 6BNFC018.68 had a 35% violation rate in the 2012 assessment.

North Fork Clinch River (VAS-P15R_NFC01C02)

The North Fork Clinch River from the Cox Branch confluence near Fairview downstream to Tennessee state line near Dona (5.59 stream miles) was listed as impaired on the 2012 303(d) list for not supporting the recreation/swimming use. DEQ monitoring station 6BNFC003.80 had a 45% violation rate in the 2012 assessment.

Sources of Bacteria

Both urban and rural nonpoint sources of *E. coli* bacteria were considered in water quality modeling. Sources included residential sewage treatment systems, land application of waste, livestock, wildlife, and domestic pets. Point sources including individual residences can contribute bacteria to streams through permitted discharges. There are currently five (5) individual point sources permitted to discharge to surface water bodies in the Clinch River and Cove Creek watershed study area through the Virginia Pollutant Discharge Elimination System (VPDES). Permitted point discharges that may contain pathogens associated with fecal matter are required to maintain an *E. coli* concentration below 126 cfu/100mL, the current standard. In addition, there are 35 domestic general permits that discharge to the watershed. These permits allow treated residential wastewater to be discharges to surface waters.

Goals for Reducing Bacteria

The TMDL study identified goals for reducing bacteria from different sources in the watershed. The goals shown in Table 2 below are based on what it would take to remove the streams from the impaired waters list. A stream will be placed on Virginia's impaired waters list if over 10% of samples collected during a 6-year assessment window exceed 235 cfu per 100 mL

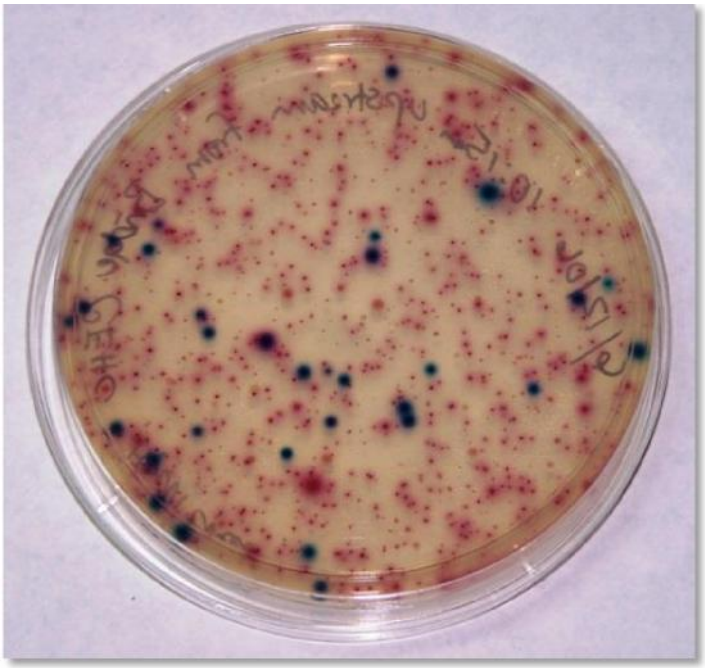

Photo showing Coliscan plate which reveals the presence and abundance of *E.coli* (blue dots) and coliform bacteria (red dots). Photo: Martha Chapman, DEQ

Greater reductions in non-point source pollution will be needed to achieve a 0% violation rate, which were also identified in the TMDL. Even though healthy streams can violate the water quality standard occasionally, and since the TMDL program does not address pollutant contributions from wildlife, the focus of planning efforts was on meeting the goals shown below. It should be noted that even these goals are considerable.

Table 2. Necessary *E. coli* reduction (%) by source category to achieve delisting (DEQ, 2014)

Watershed	Straight Pipes*	Failing Septic, Pet Waste and Stormwater*	Livestock Direct**	Pasture**	Wildlife Direct	Forest
Clinch River	100	63	99	0	0	0
Blackwater Creek	100	13	99	0	0	0
NF Clinch River	100	100	99	13	0	0
Stock Creek	100	0	17	0	0	0
Moll Creek	100	15	99	0	0	0

*Residential sources

**Agricultural Sources

COMMUNITY PARTICIPATION

Collecting input from the local community on conservation and outreach strategies to include in the water quality improvement plan was a critical step in this planning process.

Two public meetings were held simultaneously on the evening of March 10, 2016 at the Crooked Road Tech Center in Duffield and at Keith Memorial Park in Nickelsville to kick off the development of the plan. These meeting served as opportunities for local residents to learn more about the problems facing the watershed and to work together to come up with ideas to protect and restore water quality in their communities. The meetings were publicized through notices to local media outlets, email announcements, and fliers posted throughout the watershed. The meeting includes a general description of the TMDL process, a more detailed description of developing a water quality improvement plan, and a solicitation for participation in the working groups. Twenty people attended the two meetings. Final public meetings were held simultaneously on November 17, 2016 at the Crooked Road Tech Center in Duffield and at Keith Memorial Park in Nickelsville to present the completed draft plan to the public and collect local input. Eleven people attended the two meetings.

An agricultural and residential working group was formed to discuss implementation and outreach strategies suitable for different land uses in the watershed. The working group consisted of stakeholders who were familiar with land use management issues in the specific focus areas. The working group met on March 24, 2016.

The role of the agricultural and residential working group was to review conservation practices and outreach strategies from both an agricultural and residential perspective. First, the group

discussed the status of farming in the region and characteristics of typical farms in the watershed. Much of the conservation focused on livestock exclusion practices. Participants at the meeting then discussed the greatest obstacles to implementation of conservation practices. The cost of implementation and maintenance requirements were identified as some of the obstacles. The group also discussed the best methods for outreach to the local agricultural community.

Next, the working group identified strategies to reduce bacteria from human sources of bacteria entering the watershed, recommended methods to identify and correct or replace failing septic systems and straight pipes, and provide input on the BMPs to include in the plan. Much of the discussion focused on the rising cost of septic tank pumpouts and dealing with aging infrastructure of a minor municipal wastewater treatment plant. They discussed septic systems and straight pipes at length, specifically barriers to reaching residents. The group also discussed potential funding sources for residential BMPs. Participants agreed that pet waste stations would not be very successful in the watershed due to the rural nature and lack of areas where people walk their dogs.

The government working group met on April 13, 2016 at the USDA Service Center in Gate City. The focus on government working group led to a conversation about water quality in the Clinch River and Cove Creek watershed between local governments, regional organizations and representatives of state and federal agencies. The group reviewed conservation practices and outreach strategies as well as identified technical and financial resources needed to carry out implementation.

The Steering Committee met on October 27, 2016 at the Crooked Road Technical Center to discuss plans for the final public meeting and to review the draft of the Implementation Plan. The final public meetings were held on November 17, 2016 at the Crooked Road Technical Center and at Keith Memorial Park. During the meeting, DEQ staff provided an overview of the process used to develop the plan and a summary of its contents. The final public meeting kicked off a 30-day public comment period during which one written comment was received on the draft plan and was addressed in this final document (see Appendix A).

IMPLEMENTATION ACTIONS

An important part of the Implementation Plan is the identification of specific actions that will improve water quality in the watersheds.

This section provides a summary of what is needed to achieve the bacteria reductions specified in the TMDL study. Since this plan is designed to be implemented by landowners on a voluntary basis, it is necessary to identify actions including management strategies that are both financially and technically realistic and suitable for this particular community. As part of this process, the costs and benefits of these actions must be examined and weighed. Once the best actions were identified for implementation, estimates of the number of each action that would be needed in order to meet water quality goals were developed.

Management Actions Selected through Stakeholder Review

While management actions such as livestock exclusion and correction of failing onsite sewage treatment systems (e.g., septic systems and alternative waste treatment systems) were directly prescribed by the TMDL, a number of additional measures are needed to control bacteria coming from land-based sources. Various scenarios were developed that began with implementation of the measures indicated by the TMDL. Specific sources of fecal bacteria were addressed where highly economic practices were identified. For instance, a residential pet waste program was specified to educate citizens on proper disposal of pet wastes, for all but the Stock Creek watershed.

Practices that require the control or treatment of runoff are the primary tools available. Improved pasture management was identified as an additional BMP since it is considered an enhancement of a grazing land management system. Along with the infrastructure provided by a grazing land management system, improved pasture management includes:

- Maintenance of an adequate forage height (suggested 3-inch minimum grass height) during growing season.
- Application of lime and fertilizer according to soil test results.
- Mowing of pastures to control woody vegetation.

- Distribution of manure through managed rotational grazing.
- Reseeding after severe drought if necessary.

Currently, pasture management is implemented through the USDA EQIP program as prescribed grazing (528) and as a "pilot" BMP in TMDL implementation project areas funded by DEQ. Funding is available as an incentive payment per acre when used in conjunction with the livestock exclusion systems and is considered an enhancement to grazing management. Employing pasture management can produce significant economic gains to producers at a very low investment cost.

The final set of control measures identified and the efficiencies used in this study to estimate needs are listed in Table 3. It should be noted that an adaptive management strategy will be utilized in the implementation of this plan. BMPs that are easiest to implement (lowest cost, quickest to implement, fewest landowners, greatest nutrient reduction, etc.), provide the greatest water quality benefits, and offer the greatest economic return to landowners will be implemented first. The water quality result of these practices will be continually evaluated, and adjustments of actions will be made as appropriate. As new technologies and innovative BMPs to address bacteria become available, these practices should also be evaluated for implementation in the watersheds.

Table 3. Bacteria (*E. coli*) reduction efficiencies for best management practices

BMP Type	Description	Bacteria Reduction	Reference
Agriculture: Livestock stream	**Livestock exclusion from waterways** (LE-1T, LE-2T, CREP/SL-6, WP-2T)	100%	1
Agriculture: Pasture	**Improved pasture management** (SL-10T, EQIP 528)	50%	4,6
Residential: Septic systems	**Septic tank pump-out** (RB-1)	5%	2
	Sewer System Connection (RB-2)	98%	1,4
	Septic system repair (RB-3)	100%	1,4
	Septic system installation/replacement (RB-4)	100%	1,2
	Alternative waste treatment system (RB-5)	98%	1,2
Residential stormwater	**Pet waste education program**	75%	3
	Rain gardens	85%	9
	Infiltration Trench	90%	8,5
	Bioretention Basins	85%	7,6

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LIVESTOCK STREAM EXCLUSION

An estimated total of 318 miles of stream exclusion fencing for livestock will be needed to de-list the Clinch River and Cove Creek watershed.

When livestock, especially cattle, have uncontrolled access to streams, they often deposit their feces nearby or directly into the stream. Their waste contains fecal bacteria, an indicator of other disease-causing bacteria that can harm human health. One of the ways to reduce direct deposition of waste into the stream is to limit livestock access to streams with fencing and providing alternative water sources.

To estimate fencing needs, stream segments that flowed through or were adjacent to pasture were identified using GIS mapping. Not every pasture has livestock on it at any given point in time; however, it is assumed that all pasture areas have the potential for livestock access, meaning that livestock exclusion fencing should be installed. DEQ provided estimates of fencing needs, as well as existing fencing efforts.

The Virginia Department of Conservation and Recreation (DCR) Agricultural BMP Database was utilized to determine typical characteristics (e.g., streamside fencing length per practice) of the different livestock exclusion systems offered through the state and federal agricultural cost share programs so that the number of different systems needed could be accurately estimated. An estimated 318 miles (1,678,333 feet) of fencing (includes fencing on both sides of stream where applicable) will be needed to remove the streams from the impaired waters list (Table

4). Note that Stock Creek needs only 17% livestock stream exclusion compared to the other watersheds. The relative load from livestock, while significant, has less impact on water quality than other loads, particularly the load from straight pipes. In contrast, other watersheds in the TMDL area have a relative load from livestock that is significant enough to warrant greater reduction to the load. This doesn't necessarily mean that these watersheds have a larger load, compared to Stock Creek, but, within the watershed it has a greater impact. It was determined that 100% removal of straight pipes, combined with 17% reduction in the direct deposition load from livestock, would be sufficient to achieve the goal for Stock Creek.

Table 4. Fencing needs assessment.

Description	Blackwater Creek	Clinch River	NF Clinch River	Stock Creek	Moll Creek
% livestock stream exclusion needed for de-listing	99%	99%	99%	17%	99%
Stream fencing needed (ft)	120,173 (23 mi)	156,157 (30 mi)	141,660 (27 mi)	83,169 (16 mi)	1,177,174 (223 mi)

Landowners who wish to exclude their livestock from the stream have several options through state and federal cost share programs. A summary of cost share programs is provided in the Potential Funding for Implementation section. Incentive payments vary based on the width of the streamside buffer that is installed between the fence and the stream, and the type of fencing that is installed. The portion of fencing that will be accomplished using a series of available fencing practices was based on historical data and input from the agricultural working group.

Farmers who cannot afford to give up 35 feet or more for a streamside buffer can receive 50% cost share for the installation of exclusion fencing with a 10 foot setback, cross fencing, and an alternative water source for their livestock. It is estimated that **46%** of total fencing in the watershed will be installed using this practice (code LE-2T). If a landowner can afford to give up 35 feet for a buffer along the stream, then they are eligible to receive cost share at a rate of 85% to cover the costs of the stream fencing, cross fencing and providing alternative water. It is estimated that **47%** of the total fencing will be installed using this practice (code LE-1T). For

those who are willing to install a 35 foot buffer or larger and plant trees in the buffer, USDA-NRCS's Conservation Reserve Enhancement Program (CREP) is an excellent option. This practice provides cost share and incentive payments ranging from 50% to 115% for fencing and planting materials. It is estimated that **6%** of total fencing in the watershed will be installed using this practice.

In cases where a watering system already exists, a stream protection system (code WP-2T) is a more appropriate choice. This system includes streamside fencing and a 35-ft buffer from the stream. This practice includes an up-front cost share payment of 50 cents per linear foot of fence installed to assist in covering fencing maintenance costs. Since financial assistance with development of alternative water sources is a significant incentive for farmers to install fencing, this practice is used infrequently because it does not provide cost share for the installation of a well. It is estimated that only **1%** of fencing would be accomplished using the WP-2T practice.

Table 5. Fencing BMPs by livestock exclusion system type (# of systems).

TMDL Watershed	LE-1T Systems	LE-2T Systems	SL-6/CREP Systems	WP-2T Systems
Blackwater Creek	50	50	7	1
Clinch River	66	65	8	1
NF Clinch River	59	59	8	1
Stock Creek	35	34	5	1
Moll Creek	493	492	64	9
Total	703 (47%)	700 (46%)	92 (6%)	13 (1%)

IMPLEMENTATION ACTIONS FOR PASTURE

Runoff from pastures can carry with it bacteria from manure deposited on the pasture on its way to the stream.

Improved pasture management can prevent overgrazing by livestock, thereby reducing runoff, increasing filtration and vegetative uptake of pollutants, and allowing farmers to better utilize

their pastures. Grazing animals deposit manure on any available pastureland, but waste tends to be most concentrated near feeding and watering areas. Poorly located or managed areas can quickly become barren, increasing the possibility of contaminated runoff (Alderfer and Robinson 1947). Pasture runoff carries bacteria from the livestock waste to nearby streams. Pasture BMPs can greatly reduce these pollutant loads as well as improve overall pasture production.

The only TMDL watershed in the Clinch River and Cove Creek TMDL area that requires reductions to land-based bacteria loads from agricultural lands is the North Fork Clinch River watershed. Specifically, a reduction of 13% of the load from pasture is needed. Part of this reduction is achieved through the stream buffer created when livestock are fenced out of the stream. These buffers will act as filters, trapping bacteria and sediment before it runs into the stream. When considering the effectiveness of a vegetated buffer in trapping pollutants, it is important to consider the area that will be draining to the buffer. For modeling purposes, it was assumed that a typical buffer would be capable of receiving and treating runoff from an area four times its width. For example, a buffer that was 35 feet wide and 1,000 feet long would treat runoff from an area that was 140 feet wide and 1,000 feet long. Beyond four times the buffer width, it was assumed that the runoff would be in the form of channelized flow rather than the sheet flow that a buffer can filter. The remaining reduction can be achieved through implementation of improved pasture management (code SL-10T; EQIP 528) on **50 acres** of pasture land. It is anticipated that this improvement will take the form of an intensively managed grazing system.

Currently, pasture management is implemented through the USDA EQIP program as prescribed grazing (528) and as a "pilot" BMP in TMDL implementation project areas funded by DEQ. Funding is available as an incentive payment per acre when used in conjunction with the livestock exclusion systems and is considered an enhancement to grazing management. Employing pasture management can produce significant economic gains to producers at a very low investment cost. Other funding resources such as the Conservation Reserve Enhancement Program (CREP) and the Regional Conservation Partnership Program (RCPP) offer financial incentives, cost-share and rental payments to farmers who voluntarily restore riparian buffers,

install livestock exclusions, stabilize streambanks and install other conservation practices. These, among other resources, are contingent on available funds so it's best to contact the local Soil and Water Conservation District for available resources.

STRAIGHT PIPES AND FAILING SEPTIC SYSTEMS

Since state law requires that failing septic systems and straight pipes be corrected once identified, a 100% reduction in bacteria from these sources is needed.

Estimates of the total number of households with failing septic systems and straight pipes (pipes directly discharging untreated sewage into the stream) in the watersheds are shown in Table 6. These estimates were developed as part of the TMDL study. They are based on the age of homes in the watershed, and in the case of straight pipes, the proximity of homes to the stream. Estimates of needed repairs and replacements of failing systems with conventional and alternative systems were based on input from the Health Department and observations from septic system maintenance projects in the region.

Table 6. Residential wastewater treatment BMPs (estimated total number).

Control Measure	Clinch River	NF Clinch River	Stock Creek	Moll Creek	Blackwater Creek
Total Potential Failing Septic Systems	10	48	39	87	7
Total Straight Pipes	38	155	187	235	50
Septic Systems Pump-Out (RB-1)	305	1,443	1,167	2,601	202
Sewer System Connection (RB-2)	0	0	0	3	0
Septic System Repair (RB-3)	7	34	27	61	5
Septic System Installation (RB-4, RB-4P)	31	128	151	197	40
Alternative Treatment System Installation (RB-5)	10	41	48	61	12

PET WASTE

In order to address bacteria from domestic pets in the streams, some form of pet waste management is needed.

Left on the ground, pet waste can easily be washed by runoff into storm drains or nearby waterbodies. Pet waste not only harbors bacteria, viruses, and parasites that can threaten the health of humans and wildlife, but it can also contain excess nutrients that promote extreme algal growth. A **pet waste education program** increases public awareness about these water quality issues and encourages pet owners to properly dispose of their pet's waste at home and in public dog walking areas. A fully implemented pet waste education program will include the development and distribution of educational materials. The addition of a pet waste education program will be a reasonable next step in reducing pet waste from entering the watersheds.

Table 7. Pet waste BMPs.

Control Measure	Clinch River	NF Clinch River	Stock Creek	Moll Creek	Blackwater Creek
Total Dogs	160	816	631	1,362	111
Residential Pet Waste Education Program	1	1	-	1	1

IMPLEMENTATION ACTIONS FOR RESIDENTIAL STORMWATER

In order to treat bacteria running off of residential land, BMPs to reduce and filter stormwater will be necessary.

In the Clinch River and Cove Creek watersheds, there is a need to control bacteria in runoff from residential lands using structural practices. These practices include rain gardens, bioretention basins, and infiltration trenches. In regard to controlling fecal bacteria, all of these practices operate in the same way and with similar efficiency. Essentially, the runoff water is retained and allowed to seep into the ground, slowing the delivery to the stream. The longer travel time for the runoff water allows for die-off of the pollutant, and reduces the sudden "spike" of pollutant that is received by the stream during a rainfall event. Rain gardens are generally designed for smaller scales, and are more appropriate for residential settings, where

runoff from rooftops, driveways, and yards is controlled. Bioretention basins and infiltration trenches are generally used for larger scale projects that are needed in commercial areas.

Table 8. Residential stormwater BMPs.

Control Measure	Clinch River	NF Clinch River	Stock Creek	Moll Creek	Blackwater Creek
Residential Rain Gardens (ac-treated)	20	200	-	-	-
Infiltration Trench (ac-treated)	20	200	-	-	-
Bioretention Basins (ac-treated)	20	200	-	-	-

EDUCATION AND OUTREACH

In order to get landowners involved in implementation, education and outreach assistance with the design and installation of best management practices will be needed.

There must be a proactive approach to contact farmers and residents to identify the practices that will help meet the goal of improved water quality while also meeting their needs as private landowners. Economic costs and benefits must be considered in this process. The working group recommended several education/outreach techniques, which can be utilized during implementation. The following tasks associated with outreach programs were identified:

Agricultural Programs

- Make contact with landowners in the watersheds to make them aware of implementation goals, cost-share assistance, and voluntary options that are available to agricultural producers interested in conservation
- Provide technical assistance for agricultural programs (e.g., survey, design, layout)
- Develop and distribute educational materials through bulk mailings, local businesses, Farm Service Agency (FSA) and Virginia Cooperative Extension (VCE) newsletters, etc.
- Organize educational programs (e.g., farm tours, presentations at VCE events or club events)

Residential Programs

- Identify straight pipes and failing septic systems (e.g., contact landowners in older homes near the streams, septic pump-out program)
- Develop and distribute educational materials (e.g., septic system maintenance guide, pet waste disposal brochure)
- Organize educational programs (e.g., demonstration septic pump-outs, pet waste control)

Staffing Needed for Outreach and Technical Assistance

A critical component in the successful implementation of this plan is the availability of knowledgeable staff to work with landowners on implementing conservation practices. While this plan provides a general list of practices that can be implemented in the watershed, property owners face unique management challenges including both design challenges and financial barriers to implementation of practices. Consequently, technical assistance from trained conservation professionals is a key component to successful BMP implementation. Technical assistance includes helping landowners identify suitable BMPs for their property, designing BMPs and locating funding to finance implementation.

The staffing needs to implement the agricultural and residential components of the plan were estimated based on discussions with stakeholders and the staffing levels used in similar projects. Staffing needs were quantified using full time equivalents (FTE), with one FTE being equal to one forty-hour work week position. It was determined that one residential FTE and one agricultural FTE would be needed to provide technical assistance in the Clinch River and Cove Creek watershed during each year of the first 10 years of implementation. Should funding become available, the Scott County, Daniel Boone SWCD and Clinch Valley SWCDs could house an agricultural technician to manage outreach and technical assistance with design and implementation of agricultural BMPs. The position of a residential specialist to conduct outreach and work with landowners to address failing septic systems and straight pipes could also be housed at Scott County, Daniel Boone and Clinch Valley SWCDs.

IMPLEMENTATION COSTS

Costs: Agricultural BMPs

The costs of agricultural best management practices included in the Implementation Plan were estimated based on data for Scott, Russell and Lee Counties from the DCR Agricultural BMP Database, the USDA Natural Resources Conservation Service (NRCS) cost list, and considerable input from the Scott County and Clinch Valley SWCD staff. These costs are shown in Table 9 with DCR and DEQ TMDL BMP cost-share codes included.

Table 9. Estimated agricultural BMPs and costs.

Agricultural Control Measure	Unit	Cost ($) per Unit	Total Units	Total Cost
Pasture & Livestock Exclusion				
Livestock Exclusion with Riparian Buffer (LE-1T)	System	$20,600	703	$14,481,800
Livestock Exclusion with Reduced Setback (LE-2T)	System	$11,500	700	$8,050,000
Stream Exclusion with Grazing Land Mgnt (CREP; SL-6)	System	$20,000	92	$1,840,000
Stream Protection (WP-2T)	System	$3,400	13	$44,200
Fence Maintenance	Linear ft	$3.50[2]	125,875	$440,566
Subtotal:				**$24,856,566**
Agricultural Nonpoint Controls				
Improved Pasture Management (EQIP 528; SL-10T)	Acre	$75	50	$3,750
Subtotal:				**$3,750**
Total:				**$24,860,317**

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

[2] One-time fence payment over the 10-year lifespan

The majority of agricultural practices recommended in this plan are included in state and federal cost share programs. These programs offer financial assistance with implementing the practices and might also provide landowners with an incentive payment to encourage participation. However, it should be noted that these programs typically cover 75% of the cost of a BMP and require that the landowner cover the full cost of the practice up front and then receive reimbursement. Reimbursements are usually issued quickly; however, this may still be an obstacle for some landowners interested in participating.

Costs: Residential BMPs

The costs of recommended residential BMPs for treating failing septic systems and straight pipes were estimated using input from local Virginia Department of Health (VDH) staff and Scott County and Clinch Valley SWCDs as well as information from other recent TMDL Implementation Plans in Virginia. These costs are shown in Table 10 with DCR BMP cost-share codes included.

Table 10. Estimated residential BMPs and costs.

Control Measure	Unit	Cost per Unit	Total Units	Total Cost
Septic Systems Pump-Out (RB-1)	System	$400	5,718	$2,287,200
Septic System Installation (RB-4)	System	$6,500	547	$3,555,500
Sewer System Connection (RB-2)	Connection	$700	3	$2,100
Alternative Treatment System Installation (RB-5)	System	$20,000	172	$3,440,000
Septic System Repair (RB-3)	System	$3,500	134	$469,000
Total				**$9,753,800**

Costs: Residential Stormwater BMPs

Stormwater BMP cost estimates were developed using stakeholder input, information from other recent Implementation Plans and other available literature. The estimated total cost for stormwater BMPs is $6,160,000. Table 11 lists the various residential stormwater BMPs and their associated costs. Stormwater BMPs installed will meet the sediment reduction goal from

residential areas, and combined with the Residential BMPs will meet the bacteria goals from residential sources.

Table 11. Estimated residential stormwater BMP costs.

Control Measure	Unit	Cost per Unit	Total Units	Total Cost
Residential Rain Gardens	Acre-Treated	$3,000	220	$660,000
Infiltration Trench	Acre-Treated	$6,000	220	$1,320,000
Bioretention Basins	Acre-Treated	$19,000	220	$4,180,000
Pet Waste Education Program	Program	$3,750	4	$15,000
Total				**$6,175,000**

Costs: Technical Assistance

It was determined by stakeholders that it would require $50,000 to support the salary, benefits, travel, training, and incidentals for one technical FTE. It was determined there was a need for one full-time agricultural and one full-time residential technical FTE per year. This allocates 2 FTEs for each of the first ten years of implementation for a total of 20 FTE years. At the end of the first ten years, implementation should be complete. The total potential cost to provide technical assistance during implementation is expected to be approximately $1,000,000.

Costs: Total Implementation

The total estimated cost for the 10 years of implementation in the Clinch River and Cove Creek watersheds are shown in Table 12.

Table 12. Total estimated implementation cost.

TMDL Watershed	Agricultural BMPs	Residential BMPs	Technical Assistance	Total Cost
Blackwater Creek	$1,779,946	$602,050	$58,860	$2,440,394
Clinch River	$2,311,492	$1,111,750	$84,538	$3,507,167
NF Clinch River	$2,098,238	$7,951,950	$246,274	$10,296,582
Stock Creek	$1,237,233	$2,502,800	$89,442	$3,831,725
Moll Creek	$17,433,408	$3,760,250	$520,886	$21,713,249
Grand Total	**$24,860,316**	**$15,928,800**	**$1,000,000**	**$41,789,116**

IMPLEMENTATION BENEFITS

The primary benefit of implementing this plan will be cleaner water in the Cinch River and Cove Creek watershed. This may lead to enhanced quality of life for the local community as well as potential economic benefits.

Specifically, *E. coli* contamination in the creek will be reduced to meet water quality standards. It is hard to gauge the impact that reducing *E. coli* contamination will have on public health, as most cases of waterborne infection are not reported or are falsely attributed to other sources. However, the incidence of infection from *E. coli* sources through contact with surface waters should be reduced considerably following the implementation of the measures outlined in this plan.

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

Benefits: Agricultural Practices

It is recognized that every farmer faces unique management challenges that may make implementation of some BMPs more cost effective than others. Consequently, costs and

benefits of the BMPs recommended in this plan must be weighed on an individual basis. The benefits highlighted in this section are based on general research findings.

Restricting livestock access to streams and providing them with clean water source has been shown to improve weight gain in both nursing calves and steers. Studies have shown a nine percent higher weight gain in nursing calves where the drinking water for the cow-calf pairs came from a trough compared to pairs drinking directly from a pond. Steers in the same study with access to water troughs instead of ponds demonstrated a 16 to 19 percent increase in weight. A producer might find it profitable to install above-ground water systems if the above weight gains can be expected. A five percent weight gain due to good quality water would yield 25 extra pounds on a 500 pound steer. If steers of this size are selling for $1.55 per pound, good quality water would add $38.75 value to each steer. One hundred steers would sell for an added $3,875 which would likely cover the cost of a solar-operated submergible pump, 150 feet of piping and a concrete water trough (Fears 2013).

In addition, keeping cattle in clean, dry areas has been shown to reduce the occurrence of mastitis and foot rot. The VCE (1998) reports that mastitis costs producers $100 per cow in reduced quantity and quality of milk produced. Installation of streamside fencing and well managed loafing areas will reduce the amount of time that cattle have access to these areas. Implementing a prescribed grazing management strategy in conjunction with providing livestock with a clean water source will also provide economic benefits for the producer.

Benefits: Residential Practices

The residential program will play an important role in improving water quality since human waste can carry human viruses in addition to bacterial and protozoan pathogens. In terms of economic benefits to homeowners, an improved understanding of on-site sewage treatment systems, including knowledge of what steps can be taken to keep them functioning properly, will give homeowners the tools needed for extending the life of their systems and

reducing the overall cost of ownership. The average septic system will last 20 to 25 years if properly maintained. Proper maintenance includes: knowing the location of the system components and protecting them (e.g., not driving or parking on top of them), not planting trees where roots could damage the system, keeping hazardous chemicals out of the system, and pumping out the septic tank every 3 to 5 years. The cost of proper maintenance, as outlined here, is relatively inexpensive ($260 per pump-out) in comparison to repairing or replacing a system ($5,000 to $15,000).

In addition to the benefits to individual landowners, the local economy will be stimulated through expenditures made during implementation, and the infusion of dollars from funding sources outside of the watershed. Building contractors and materials suppliers who deal with septic-system pump-outs, private sewage system repair and installation, fencing, and other BMP components can expect to see an increase in business during implementation.

Benefits: Watershed Health

Focusing on reducing bacteria in the Clinch River and Cove Creek watershed will not only make the water safer for swimming, it will improve the overall health of the watershed. Reductions in streambank erosion, excessive nutrient runoff, and water temperature are additional benefits associated with streamside buffer plantings and livestock stream exclusion. In turn, reduced nutrient loading and erosion and cooler water temperatures improves habitat for fisheries, which provides benefits to anglers and the local economy.

Riparian buffers can also improve habitat for wildlife such as ground-nesting quail and other sensitive species. Data collected from Breeding Bird Surveys in Virginia indicate that the quail population declined 4.2% annually between 1966 and 2007. Habitat loss has been cited as the primary cause of this decline. As a result, Virginia has experienced significant reductions in economic input to rural communities from quail hunting. The direct economic contribution of quail hunters to the Virginia economy was estimated at nearly $26 million in 1991, with the total economic impact approaching $50 million. Between 1991 and 2004, the total loss to the Virginia economy was more than $23 million from declining quail hunter expenditures (VDGIF, 2009).

GOALS AND MILESTONES

The end goal of implementation is restored water quality in the Clinch River and Cove Creek watershed. It is expected that this will occur over a 10-year period.

Two types of milestones will be used to evaluate progress over the implementation period: *implementation milestones* and *water quality milestones*. The implementation milestones establish goals for the extent of the different best management practices installed within certain time frames, while the water quality milestones establish the corresponding goals for improvements in water quality. The milestones described here are intended to achieve full implementation within 10 years.

Following the idea of a staged implementation approach, resources and finances will be concentrated on the most cost-efficient control measures and areas of highest interest first. For instance, concentrating on eliminating straight pipes and correcting failing septic systems within the first years may provide the highest return on water quality improvement with less cost to landowners. The Stage I goals for implementation will focus on correcting straight pipes and failing septic systems, fencing cattle out of the streams, improving pasture management and implementing a pet waste education program. Stage II focuses on continuing these efforts and implementing stormwater controls (i.e., rain gardens, infiltration trenches, and bioretention basins).

The BMP implementation goals associated with the milestones are listed by watershed in Table 14 through Table 18. The first milestone will be five years after implementation begins, whereby some of the more cost-efficient control measures will be installed, with significant reductions in bacteria anticipated. The hope is that this stage will provide a water quality results that may lead to delisting an impairment.

Table 13. Stage I and Stage II implementation goals for **Blackwater Creek**.

Control Measure	Unit	Stage I	Stage II
Agricultural			
Livestock Exclusion with Riparian Buffer (LE-1T)	System	25	25
Livestock Exclusion with Reduced Setback (LE-2T)	System	25	25
Stream Exclusion with Grazing Land Mgnt (CREP; SL-6)	System	7	
Stream Protection (WP-2T)	System	1	
Residential			
Septic Systems Pump-Out (RB-1)	System	101	101
Septic System Installation (RB-4)	System	20	20
Sewer System Connection (RB-2)	System	0	0
Alternative Treatment System Installation (RB-5)	System	6	6
Septic System Repair (RB-3)	System	3	2
Residential Rain Gardens	Acre-Treated	0	0
Infiltration Trench	Acre-Treated	0	0
Bioretention Basins	Acre-Treated	0	0
Residential Pet Waste Education Program	Program	1	0

Table 14. Stage I and Stage II implementation goals for the **Clinch River**.

Control Measure	Unit	Stage I	Stage II
Agricultural			
Livestock Exclusion with Riparian Buffer (LE-1T)	System	33	33
Livestock Exclusion with Reduced Setback (LE-2T)	System	33	32
Stream Exclusion with Grazing Land Mgnt (CREP; SL-6)	System	4	4
Stream Protection (WP-2T)	System	1	0
Residential			
Septic Systems Pump-Out (RB-1)	System	153	152
Septic System Installation (RB-4)	System	15	16
Sewer System Connection (RB-2)	System	0	0
Alternative Treatment System Installation (RB-5)	System	5	5
Septic System Repair (RB-3)	System	4	3
Residential Rain Gardens	Acre-Treated	0	20
Infiltration Trench	Acre-Treated	0	20
Bioretention Basins	Acre-Treated	0	20
Residential Pet Waste Education Program	Program	1	0

Table 15. Stage I and Stage II implementation goals for the **North Fork Clinch River**.

Control Measure	Unit	Stage I	Stage II
Agricultural			
Livestock Exclusion with Riparian Buffer (LE-1T)	System	30	29
Livestock Exclusion with Reduced Setback (LE-2T)	System	30	29
Stream Exclusion with Grazing Land Mgnt (CREP; SL-6)	System	4	4
Stream Protection (WP-2T)	System	1	0
Improved Pasture Management (EQIP; SL-10T)	Acre	25	25
Residential			
Septic Systems Pump-Out (RB-1)	System	722	721
Septic System Installation (RB-4)	System	64	64
Sewer System Connection (RB-2)	System	0	0
Alternative Treatment System Installation (RB-5)	System	21	20
Septic System Repair (RB-3)	System	17	17
Residential Rain Gardens	Acre-Treated	0	200
Infiltration Trench	Acre-Treated	0	200
Bioretention Basins	Acre-Treated	0	200
Residential Pet Waste Education Program	Program	1	0

Table 16. Stage I and Stage II implementation goals for the **Stock Creek**.

Control Measure	Unit	Stage I	Stage II
Agricultural			
Livestock Exclusion with Riparian Buffer (LE-1T)	System	35	0
Livestock Exclusion with Reduced Setback (LE-2T)	System	34	0
Stream Exclusion with Grazing Land Mgnt (CREP; SL-6)	System	5	0
Stream Protection (WP-2T)	System	1	0
Residential			
Septic Systems Pump-Out (RB-1)	System	584	583
Septic System Installation (RB-4)	System	76	75
Sewer System Connection (RB-2)	System	0	0
Alternative Treatment System Installation (RB-5)	System	24	24
Septic System Repair (RB-3)	System	14	13
Residential Rain Gardens	Acre-Treated	0	0
Infiltration Trench	Acre-Treated	0	0
Bioretention Basins	Acre-Treated	0	0
Residential Pet Waste Education Program	Program	0	0

Table 17. Stage I and Stage II implementation goals for the **Moll Creek.**

Control Measure	Unit	Stage I	Stage II
Agricultural			
Livestock Exclusion with Riparian Buffer (LE-1T)	System	247	246
Livestock Exclusion with Reduced Setback (LE-2T)	System	246	246
Stream Exclusion with Grazing Land Mgnt (CREP; SL-6)	System	32	32
Stream Protection (WP-2T)	System	5	4
Residential			
Septic Systems Pump-Out (RB-1)	System	1,301	1,300
Septic System Installation (RB-4)	System	99	98
Sewer System Connection (RB-2)	System	2	1
Alternative Treatment System Installation (RB-5)	System	31	30
Septic System Repair (RB-3)	System	31	30
Residential Rain Gardens	Acre-Treated	0	0
Infiltration Trench	Acre-Treated	0	0
Bioretention Basins	Acre-Treated	0	0
Residential Pet Waste Education Program	Program	1	0

Table 19 presents a breakdown of the costs for Stage I. Following Stage I implementation, the steering committee should evaluate water quality improvements and determine how to proceed to complete implementation (Stage II). Costs for Stage II are presented in Table 20. Based on completing both implementation stages, the final milestone would be achieving the bacteria reductions required by the TMDLs and this is anticipated by 2027.

Table 18. Costs to implement **Stage I** for the Clinch River and Cove Creek watersheds.

TMDL Watershed	Agricultural BMPs	Residential BMPs	Technical Assistance	Total Cost
Blackwater Creek	$1,764,173	$302,900	$29,199	$2,096,272
Clinch River	$1,155,746	$277,750	$41,963	$1,475,459
NF Clinch River	$1,049,119	$1,177,850	$123,197	$2,350,166
Stock Creek	$618,617	$1,251,400	$45,846	$1,915,863
Moll Creek	$8,716,704	$1,882,000	$259,796	$10,858,500
Grand Total	**$13,304,358**	**$4,891,900**	**$500,000**	**$18,696,258**

Table 19. Costs to implement **Stage II** for the Clinch River and Cove Creek watersheds.

TMDL Watershed	Agricultural BMPs	Residential BMPs	Technical Assistance	Total Cost
Blackwater Creek	$15,773	$299,150	$29,199	$344,122
Clinch River	$1,155,746	$834,000	$41,963	$2,031,709
NF Clinch River	$1,049,119	$6,774,100	$123,197	$7,946,416
Stock Creek	$618,617	$1,251,400	$45,846	$1,915,863
Moll Creek	$8,716,704	$1,878,250	$259,796	$10,854,750
Grand Total	**$11,555,958**	**$11,036,900**	**$500,000**	**$23,092,858**

Water Quality Monitoring

Improvements in water quality will be determined in the Clinch River and Cove Creek Watershed 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 organic and inorganic 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 in the streams of the Clinch River and Cove Creek Watershed.

The DEQ monitoring stations in the Clinch River and Cove Creek Watershed are described in **Error! Reference source not found.**. Up-to-date monitoring results are available to residents by requesting the information from DEQ. All of these stations are ambient water quality stations, however one trend station exists in the watershed at Speers Ferry. Implementation monitoring will generally be done in the same manner as that done during TMDL development. However, modifications may be made to reflect the needs of the implementation plan. The selection of sites and the frequency and duration of implementation monitoring will be determined by the TMDL staff, in cooperation with regional monitoring staff and representatives from other agencies.

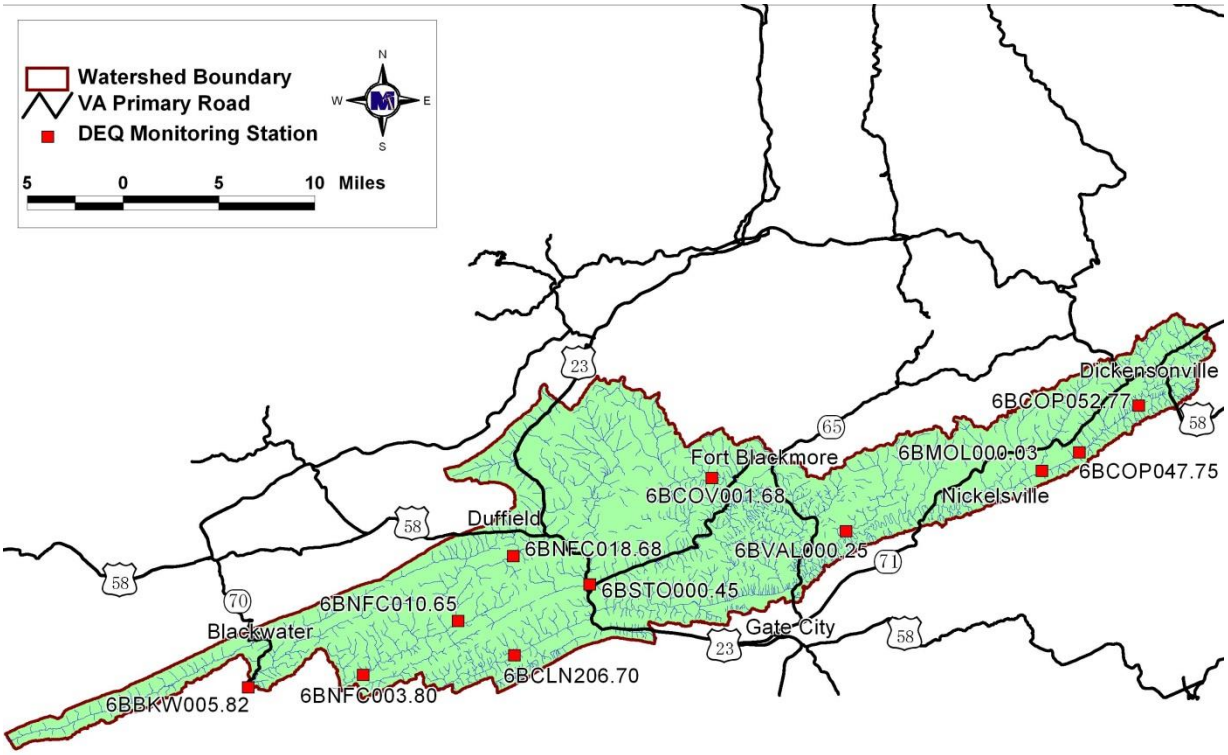

Figure 2: DEQ water quality monitoring stations

Table 20. DEQ monitoring station ID and station locations.

Station ID	Stream Name	Location
6BCLN206.70	Clinch River	Off Rt. 627, 4.3 miles downstream of USGS gage
6BBKW005.82	Blackwater Creek	Bridge on Rt. 70
6BCOV001.68	Cove Creek	Bridge #6479 on Rt. 827 Off Rt. 649 off Rt. 65
6BSTO000.45	Stock Creek	Bridge #6404 on Rt. 794
6BCOP047.75	Copper Creek	Low water private bridge off Rt. 678 off Rt. 58
6BCOP052.77	Copper Creek	Private bridge off Rt. 678 off Rt. 671 off Rt. 58
6BMOL000.03	Moll Creek	Bridge #6248 on Rt. 678 off Rt. 58
6BVAL000.25	Valley Creek	Bridge #6092 on Rt. 670 off Rt. 71
6BNFC010.65	North Fork Clinch River	Bridge #6005 on Rt. 600 off Rt. 58
6BNFC018.68	North Fork Clinch River	Bridge #6039 on Rt. 624 off Rt. 604 off Rt. 58
6BNFC003.80	North Fork Clinch River	Ford on Rt. 621 off Rt. 600

Targeting Implementation: Livestock exclusion

Implicit in the process of a staged implementation is targeting of best management practices. Targeting ensures optimal utilization of limited technical and financial resources. Excluding livestock from streams can be very resource intensive with varying results with respect to water quality depending on characteristics of the site where livestock are excluded. This makes targeting of outreach and financial resources very important when addressing livestock access to streams.

Targeting of critical areas for livestock fencing was accomplished through analysis of livestock population and the fencing requirements. The Clinch River and Cover Creek were divided into 17 subwatersheds and were ranked based on the animal numbers per fence length required. Figure 3 shows the fencing prioritization that was determined for the subwatersheds. If feasible, effort should be made to prioritize resources in the highest prioritized areas first. However, regardless of the prioritization, any interested parties should be encouraged to apply since prioritization may shift due to changing circumstances in prioritization.

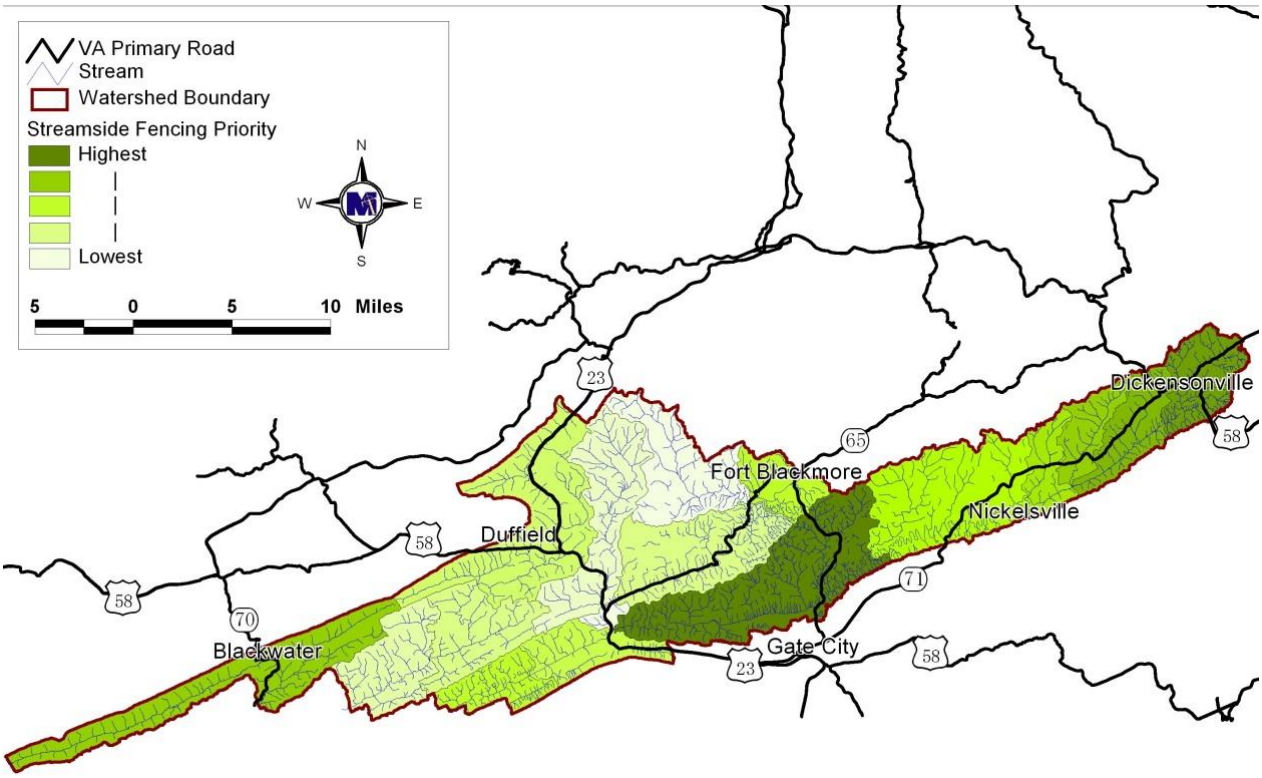

Figure 3. Streamside fencing prioritization.

Targeting Implementation: Septic system maintenance

Outreach to encourage landowners to properly maintain septic systems is frequently conducted through mailings to homeowners including postcards and brochures. Experience with outreach and cost share programs in surrounding counties has shown that often times, landowners must be contacted 2-4 times before they follow up on opportunities for technical and financial assistance with septic system maintenance. This can prove costly when conducting mailings in large watersheds including the Clinch River and Cove Creek watershed. Identifying areas in the watershed with older homes and aging septic systems to target with outreach materials can be helpful in maximizing response rates from homeowners and corrections of failing septic systems.

Figure 4 shows the septic system maintenance prioritization within the subwatersheds. This order was derived from ranking the sum of loads from failing septic systems and straight pipes in each subwatershed.

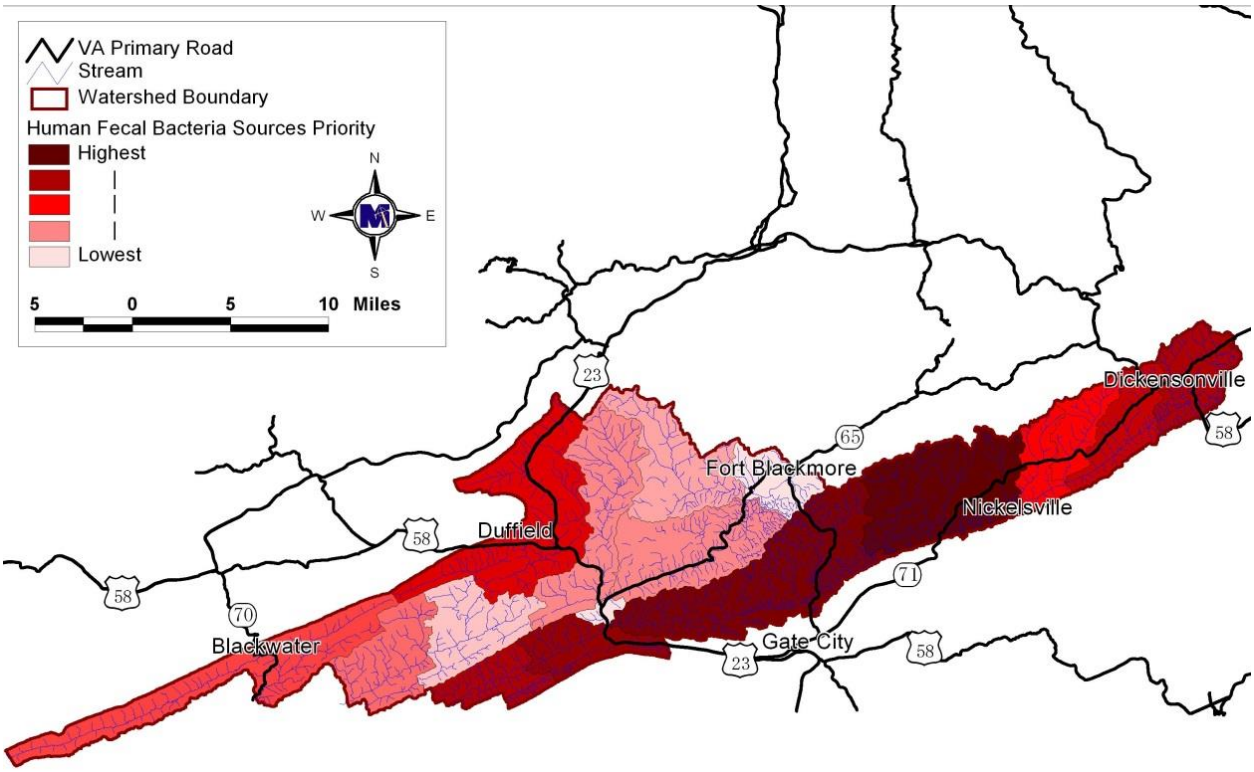

Figure 4. Septic system maintenance prioritization.

PARTNERS AND THEIR ROLE IN IMPLEMENTATION

Achieving the goals of this effort (*i.e.,* improving water quality and removing these waters from the impaired waters list) is dependent upon stakeholder participation. Both the local stakeholders charged with implementation of control measures and the stakeholders charged with overseeing our nation's human health are key elements of a successful Implementation Plan. The first step is to acknowledge that a water quality problem exists and realize that needed changes must be made in operations, programs, and legislation to address these pollutants.

Scott County, Clinch Valley and Daniel Boone Soil & Water Conservation Districts and USDA Natural Resource Conservation Service

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

Lee, Scott and Russell Counties

Decisions made by local government staff and elected officials regarding land use and zoning will play an important role in the implementation of this plan. This makes the Lee, Scott and Russell County Boards of Supervisors and the Planning Commissions key partners in long term implementation efforts. Local government support of land conservation will become increasingly important as greater numbers of conservation measures are implemented across

the watersheds. Ensuring that land remains in agriculture and forest will allow the practices installed to continue to benefit water quality.

Virginia Department of Environmental Quality

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

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

Virginia Department of Conservation and Recreation

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

Virginia Department of Health

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

Other Potential Local Partners

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

- VA Cooperative Extension
- County and city schools
- Trout Unlimited
- Virginia Department of Forestry
- Virginia Department of Game and Inland Fisheries
- The Nature Conservancy
- Clinch-Powell Clean Rivers Initiative
- Clinch River Valley Initiative
- Upper Tennessee River Roundtable

INTEGRATION WITH OTHER WATERSHED PLANS

Each watershed in the state is under the jurisdiction of a multitude of water quality programs and activities, many of which have specific geographic boundaries and goals. Coordination of implementation efforts with these programs could make additional resources available and increase participation by local landowners. Such efforts include, but are not limited to, watershed implementation plans, TMDLs, Roundtables, Water Quality Management Plans, Erosion and Sediment Control Regulations, Stormwater Management Programs, Source Water Protection Plans, local comprehensive and strategic plans, and local environmentally-focused organizations. These efforts should be evaluated to determine their potential impacts on the implementation goals.

POTENTIAL FUNDING FOR IMPLEMENTATION

Below is a list of potential funding sources available for implementation. Detailed descriptions can be obtained from the Scotty County, Clinch Valley and Daniel Boone SWCD, VA Department of Conservation and Recreation, Natural Resources Conservation Service, and Virginia Cooperative Extension.

Federal

Federal Clean Water Act 319 Incremental Funds

Through Section 319 of the Federal Clean Water Act, Virginia is awarded grant funds to implement the nonpoint source programs. DEQ administers the money to fund watershed projects, demonstration and educational programs, nonpoint source pollution control program development, and technical and program staff. DEQ reports annually to the EPA on the progress made in nonpoint source pollution prevention and control.

Community Development Block Grant Program

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

Conservation Reserve Program (CRP)

Offers are accepted and processed during fixed signup periods that are announced by FSA. All eligible (cropland) offers are ranked using a national ranking process. If accepted, contracts are developed for a minimum of 10 and not more than 15 years. Payments are based on a per-acre soil rental rate. Cost-share assistance is available to establish the conservation cover of tree or

herbaceous vegetation. The per-acre rental rate may not exceed the Commodity Credit Corporation's maximum payment amount, but producers may elect to receive an amount less than the maximum payment rate, which can increase the ranking score. To be eligible for consideration, the following criteria must be met: 1) cropland was planted or considered planted in an agricultural commodity for two of the five most recent crop years, and 2) cropland is classified as "highly-erodible" by NRCS. Eligible practices include planting these areas to trees and/or herbaceous vegetation. Application evaluation points can be increased if certain tree species, spacing, and seeding mixtures that maximize wildlife habitats are selected. Land must have been owned or operated by the applicant for at least 12 months prior to the close of the signup period. The payment to the participant is up to 50% of the cost for establishing ground cover. Incentive payments for wetlands hydrology restoration equal 25% of the cost of restoration.

Conservation Reserve Enhancement Program (CREP)

This program is an "enhancement" of the existing USDA CRP Continuous Sign-up. It has been "enhanced" by increasing the cost-share rates from 50% to 75% and 100%, increasing the rental rates, and offering a flat rate incentive payment to place a permanent "riparian easement" on the enrolled area. Pasture and cropland (as defined by USDA) adjacent to streams, intermittent streams, seeps, springs, ponds and sinkholes are eligible to be enrolled. Buffers consisting of native, warm-season grasses on cropland, to mixed hardwood trees on pasture, must be established in widths ranging from the minimum of 30% of the floodplain or 35 feet, whichever is greater, to a maximum average of 300 feet. Cost-sharing (75% - 100%) is available to help pay for fencing to exclude livestock from the riparian buffer, watering facilities, hardwood tree planting, filter strip establishment, and wetland restoration. In addition, a 40% incentive payment upon completion is offered and an average rental rate of $70/acre on stream buffer area for 10-15 years. The State of Virginia will make an additional incentive payment to place a perpetual conservation easement on the enrolled area. The statewide goal is 8,000 acres.

The landowner can obtain and complete CREP application forms at the FSA center. The forms are forwarded to local NRCS and SWCD offices while FSA determines land eligibility. If the land

is deemed eligible, NRCS and the local SWCDs determine and design appropriate conservation practices. A conservation plan is written, and fieldwork is begun, which completes the conservation practice design phase.

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

Environmental Quality Incentives Program (EQIP)

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

Regional Conservation Partnership Program (RCPP)

USDA's Natural Resources Conservation Service (NRCS) encourages partners to work with producers to increase the restoration and sustainable use of soil, water, wildlife and related natural resources on regional or watershed scales. Through the program, NRCS and its partners

help producers install and maintain conservation activities in selected project areas. An example project in Southwest Virginia is on the Clinch and Powell Watershed in Lee, Scott and Russell County. In cooperation with The Nature Conservancy (TNC), this Regional Conservation Partnership Program (RCPP) project seeks to improve aquatic habitat and protect the biodiversity of the Clinch and Powell rivers through strategic implementation of BMPs. Focal practices will include fencing, watering systems, and establishing/maintaining vegetative areas along waterways in targeted portions of the above counties. These resources may be expired by the implementation stage of this IP so it's best to contact the local Soil and Water Conservation District office for more information.

Wildlife Habitat Incentive Program (WHIP)

WHIP is a voluntary program for landowners and land users who want to develop or improve wildlife habitat on private agriculture-related lands. Participants work with NRCS to prepare a wildlife habitat development plan. This plan describes the landowner's goals for improving wildlife habitat and includes a list of practices and a schedule for installation. A 10-year contract provides cost-share and technical assistance to carry out the plan. In Virginia, these plans will be prepared to address one or more of the following high priority habitat needs: early grassland habitats that are home to game species such as quail and rabbit as well as other non-game species like meadowlark and sparrows; riparian zones along streams and rivers that provide benefits to aquatic life and terrestrial species; migration corridors which provide nesting and cover habitats for migrating songbirds, waterfowl and shorebird species; and decreasing natural habitat systems which are environmentally sensitive and have been impacted and reduced through human activities. Cost-share assistance of up to 75% of the total cost of installation (not to exceed $10,000 per applicant) is available for establishing habitat. Applicants will be competitively ranked within the state and certain areas and practices will receive higher ranking based on their value to wildlife. Types of practices include: disking, prescribed burning, mowing, planting habitat, converting fescue to warm season grasses, establishing riparian buffers, creating habitat for waterfowl, and installing filter strips, field borders and hedgerows. For cost-share assistance, USDA pays up to 75% of the cost of installing wildlife practices.

State

Clean Water State Revolving Fund

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

Virginia Agricultural Best Management Practices Cost-Share Program

This program is funded with state and federal monies through local SWCDs. SWCDs administer the program to encourage landowners to use BMPs, on their land to better control transportation of pollutants into pour waters due to excessive surface-flow, erosion, leaching, and inadequate animal waste management. Program participants are recruited by SWCDs based upon those factors, which have a great impact on water quality. Cost-Share is typically 75% of the actual cost, not to exceed local caps.

Virginia Agricultural Best Management Practices Tax Credit Program

For all taxable years, any individual or corporation engaged in agricultural production for market, who has in place a soil conservation plan approved by the local SWCD, shall be allowed a credit against the tax imposed by Section 58.1-320 of an amount equaling 25% of the first $70,000 expended for agricultural best management practices by the individual. The amount of such credit shall not exceed $17,500 or the total amount of the tax imposed by this program (whichever is less) in the year the project was completed. This program can be used in

conjunction with other cost-share programs on the stakeholder's portion of BMP costs. It is also approved for use in supplementing the cost of repairs to streamside fencing.

Virginia Small Business Environmental Assistance Fund Loan Program

The Fund, administered through DEQ, is used to make loans or to guarantee loans to small businesses for the purchase and installation of environmental pollution control equipment, equipment to implement voluntary pollution prevention measures, or equipment and structures to implement agricultural BMPs. Loans are available in amounts up to $50,000 and will carry an interest rate of 3%, with repayment terms based on the borrower's ability to repay and the life of the equipment or the BMP. To be eligible for assistance, a business must employ 100 or fewer people and be classified as a small business under the federal Small Business Act.

Virginia Water Quality Improvement Fund

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

Private

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

The mission of this project is to promote, cultivate, and encourage the development of water and wastewater facilities to serve low-income residents at affordable costs and to support other development activities that will improve the quality of life in rural areas. Staff members of other community organizations complement the SE/R-CAP central office staff across the region. They can provide (at no cost to a community): on-site technical assistance and consultation, operation and maintenance/management assistance, training, education, facilitation, volunteers, and financial assistance. Financial assistance includes $1,500 toward repair/replacement/installation of a septic system and $2,000 toward

repair/replacement/installation of an alternative waste treatment system. Funding is only available for families making less than 125% of the federal poverty level. The federal poverty threshold for a family of four is $25,813.

National Fish and Wildlife Foundation

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

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APPENDIX A

Public Comments Received by Mr. Braven Beaty (The Nature Conservancy) on the Draft Clinch River and Cove Creek Watershed Water Quality Improvement Plan (Public Document)

DEQ considered the formatting feedback, as necessary, and addressed the contextual feedback that required revisions or clarity to the draft Implementation Plan. The following feedback has been addressed by DEQ and its contractor, MapTech, Inc.

Overarching Comments:

1. **Beaty comment:** The Moll Creek TMDL watershed should be called Copper Creek. That is the main stream name and that is what everyone in the area knows the area by. If you use

the term Moll Creek, folks will think of only the tributary to Copper Creek. If you use the term Copper Creek, folks will think about the whole TMDL watershed.
DEQ Response: The TMDL watershed designated as "Moll Creek" includes the entire Copper Creek drainage. This watershed was referenced as “Moll Creek” in the development of the TMDL and for consistency, it was also referenced as “Moll Creek” in the development of the Implementation Plan (IP). To help clarify, the IP has been revised to include the following: “The Clinch River and Cove Creek TMDL study area consists of five (5) TMDL watersheds: 1) Blackwater Creek, 2) Clinch River, 3) North Fork Clinch River, 4) Stock Creek (includes Cove Creek), and 5) Moll Creek (includes Copper Creek and Valley Creek). The TMDL watershed names are the reference names used in this document, which includes the respective streams listed above with each TMDL watershed.” When each creek is discussed individually, they’re referenced as their individual name.

2. **Beaty comment:** The document specifically outlines the estimated costs of implementing reduction practices. It also refers to benefits to stakeholders. However, there is no valuation of the benefits to stakeholders which would be very informative for deciding the relative cost benefit of strategies. For example, improved grazing practices cost some amount per practice to implement, reduce sediment and nutrient loading by some amount, and save cattle managers some amount (through faster cattle growth, reduced vet bills, lower haying costs, not losing land to the stream, etc.). Those monetary benefits should be enumerated, at least as estimates, and presented in a table (perhaps with the costs).
DEQ response: This is an interesting analysis that will be considered for future Implementation Plans.

<u>Section: Creating a Water Quality Improvement Plan</u>

1. **Beaty comment:** The graphic table has 8 components listed and the text says 9. This mismatch makes the reader suspicious of the document.
DEQ response: The table has been updated to include the 9th component that is required in an IP in order to be eligible for 319 funding.

2. **Beaty comment:** The Watershed Characteristics statement that “the impaired segments are . . .” should be changed to something like “the measured impaired segments are . . .” since some of the remainder would likely measure impaired, they just haven’t been evaluated. The lay reader may interpret the statement to mean the rest are all within criteria.
DEQ Response: Pages 7-10 in the public document and Table 1.2 in the technical document refer to the length of each impaired segment. However, this is a good suggestion and will be considered for future IPs.

3. **Beaty comment:** For the segment descriptions, be sure the text and tables match or the differences are completely explained and present the range of station data for all stations with statistically meaningful sample sizes. Currently, it appears that some stations may have been 'cherry picked'.
   DEQ response: Corrections have been made in the text in order to match the violation rates in the tables.

4. **Beaty comment:** Be consistent on the name of Moll Branch or Moll Creek. It is currently listed differently in the table and the text.
   DEQ response: All references have been revised to use Moll Creek.

<u>Section: Goals for Reducing Bacteria</u>

5. **Beaty comment:** Removing streams from the impaired waters list "when the WQ std. for E. coli (235 cfu/100 ml) is violated no more than 10.5% of the time" does not match the stated standard of "should not exceed 235 cfu per 100 ml of water at any time". The careful reader will doubt the validity of the implementation plan due to this statement.
   DEQ response: Language has been revised in the technical and public documents to be consistent: "The standard states that the '*E.coli* bacteria count shall not exceed a monthly geometric mean of 126 cfu per 100 mL in freshwater. Geometric means shall be calculated using all data collected during any calendar month with a minimum of four weekly samples. If there are insufficient data to calculate monthly geometric means in freshwater, no more than 10.5% of the total samples in the assessment period shall exceed 235 cfu per 100 mL.' In addition, a stream will be placed on Virginia's impaired waters list if over 10.5% of the total samples collected during a 6-year assessment window exceed 235 cfu per 100 mL."

   Beaty comment: The title of table 2 is confusing. I suggest changing it to "Necessary Reduction by Source to Achieve Goal" or "Necessary Reduction by Source to Achieve Delisting".

   DEQ response: Changed to "Necessary reduction by source to achieve delisting".

<u>Section: Management Actions Selected through Stakeholder Review</u>

6. **Beaty comment:** For the phrase "BMPs that are easiest to . . .", define easiest. Is this lowest cost, quickest to implement, fewest landowners, greatest nutrient reduction, etc.?
   DEQ response: Your assumption is correct and we've included "lowest cost, quickest to implement, fewest landowners, greatest nutrient reduction, etc." into the document.

7. **Beaty comment:** "The effectiveness of these practices . . ." should be changed to "The water quality result of these practices . . ."

DEQ response: Revised to "The water quality result of these practices…"

8. **Beaty comment:** Is it feasible to expect 100% bacteria reduction achievement from cattle exclusion? Probably not.
   DEQ response: The Clinch River and Cove Creek TMDL states a 100% bacteria reduction from cattle exclusion. It has been recommended for future TMDLs or IPs that a 100% reduction of bacteria with cattle exclusion will not be expected since it's not realistic nor regulated.

9. **Beaty comment:** What is the source of bacteria from residential stormwater other than pet waste, which is included in the table line above?
   DEQ response: Pet waste is the source of bacteria so it has been included with the residential stormwater in Table 3.

<u>Section: Livestock Stream Exclusion</u>

10. **Beaty comment:** Why does Moll Creek watershed (I assume the entire Copper Creek watershed) only need 17% cattle exclusion to achieve delisting while the others need 99%? This doesn't make any sense.
    MapTech, Inc. response: The TMDL watershed designated as "Moll Creek" does include the entire Copper Creek drainage. During development of the TMDL, several allocation scenarios were run. The first removed 100% of straight pipes. This scenario very nearly achieved compliance with the water quality standard. The next scenario removed 100% of direct deposition from livestock, which, combined with straight pipe removal, achieved the water quality goal. An iterative succession of scenarios was run to determine the minimum amount of reduction necessary from livestock direct deposition. Through this process, it was determined that 100% removal of straight pipes, combined with 17% reduction in the direct deposition load from livestock, would be sufficient to achieve the goal.

    In more general terms, regarding the Moll Creek TMDL watershed, the relative load from livestock, while significant, had less impact on water quality than other loads, particularly the load from straight pipes. In contrast, other TMDL watersheds in the study area, had a relative load from livestock that was significant enough to warrant (require) greater reduction to the load. This doesn't necessarily mean that these watersheds had a larger load, compared to Moll Creek, but, within the watershed it was having a greater impact. This explanation has been incorporated into the public document.

11. **Beaty comment:** Varied incentive payments and buffer widths explains why the 100% reduction from cattle exclusion in Table 3 is unrealistic.

DEQ response: The assumption with the cattle exclusion is if all of the prescribed livestock stream exclusion BMPs are installed a 100% reduction of bacteria will be achieved. Yes there are varied incentive payments and buffer widths but despite these variables, a reduction in bacteria will occur if these BMPs are installed and managed properly.

Section: Implementation Actions for Pasture

12. **Beaty comment:** The last sentence in paragraph 2 should read "It is anticipated that this improvement will take . . ." to better clarify the practice is only needed on the 50 acres.
    DEQ response: Revised last sentence in paragraph 2 to "It is anticipated that this improvement will take . . ."

13. **Beaty comment:** There are additional funding opportunities for pasture management than those listed, including CREP, RCPP, etc.
    DEQ response: Additional language has been added to include other potential funding opportunities such as CREP and RCPP. These resources come and go and are dependent on available funding at the local Soil and Water Conservation Districts (SWCD) and NRCS offices. Interested parties are encouraged to contact their local SWCD office to learn about more specific funding sources that may be available at that time that may not be listed in the IP.

Section: Education and Outreach

14. **Beaty comment:** Residential education programs must be done in concert with funding assistance or they will fall on deaf ears. This should probably be stated in the text.
    DEQ response: All residential educational programs listed in the Implementation Plan (IP) would be eligible for 319 funding (as applicable). Once approved by EPA, organizations can apply for 319 funding to implement BMPs included in the IP. So it would be expected that the educational program would be done in concert with funding assistance.

Section: Implementation Costs: Agricultural BMPs

15. **Beaty comment:** Is the estimated streamside fence maintenance cost of $3.50/ft meant to be per year or over a 10-year lifespan? This is unclear.
    DEQ response: It is a one-time fence maintenance payment over the 10-year lifespan. A footnote has been included in the documents to clarify this point.

16. **Beaty comment:** There are some higher paying programs than 75% for agricultural BMPs.
    DEQ Response: Higher paying programs may become available during the implementation of the IP but eligibility depends on many factors such as individual income level, funding

allocations, etc. Typically, BMP cost-share covers 75% but again, it can depend on several factors what an individual is eligible to receive. Also, see response to comment #14.

Section: Implementation Benefits: Agricultural Practices

17. **Beaty comment:** The discussion of dairies is not appropriate since almost all cattle in the study area are beef cattle. Producing more milk is not relevant to the target landowners.
    DEQ Response: The discussion of milk production is not meant to be specific to dairies, but rather to show overall health benefits to all cattle. The document has been revised to include a study done on the benefits of clean water on beef cattle since beef production is more relevant for this area.

18. **Beaty comment:** Table 13 could list time-to-market cost reductions as alternatives to increased weight.
    DEQ Response: This table has been deleted. See comment #18.

Section: Targeting Implementation: Livestock exclusion

19. **Beaty comment:** The last sentence before Figure 3 suggests that prioritization is not meaningful and that all projects are going to be done. The purpose of prioritization is to effectively address the problem with the least amount of resource input.
    DEQ response: True but all interested parties are encouraged to apply since prioritization can shift due to unforeseen circumstances or additional funds become available and lower prioritized areas can be addressed.

20. **Beaty comment:** Figure 3 is conceptually very good. However, I question the result showing that the lower part of Copper Creek watershed is the highest fencing priority based on land use analysis we have done and reviewing aerial images. This data should be double checked.
    MapTech, Inc. response: The fencing prioritization was based on getting the greatest load reduction with the least expense. The analysis looked at the ratio of the number of cattle in a subwatershed to the length of fencing needed to exclude them. The highest ranking subwatershed was the one that required the least amount of fencing to exclude the largest number of cattle.