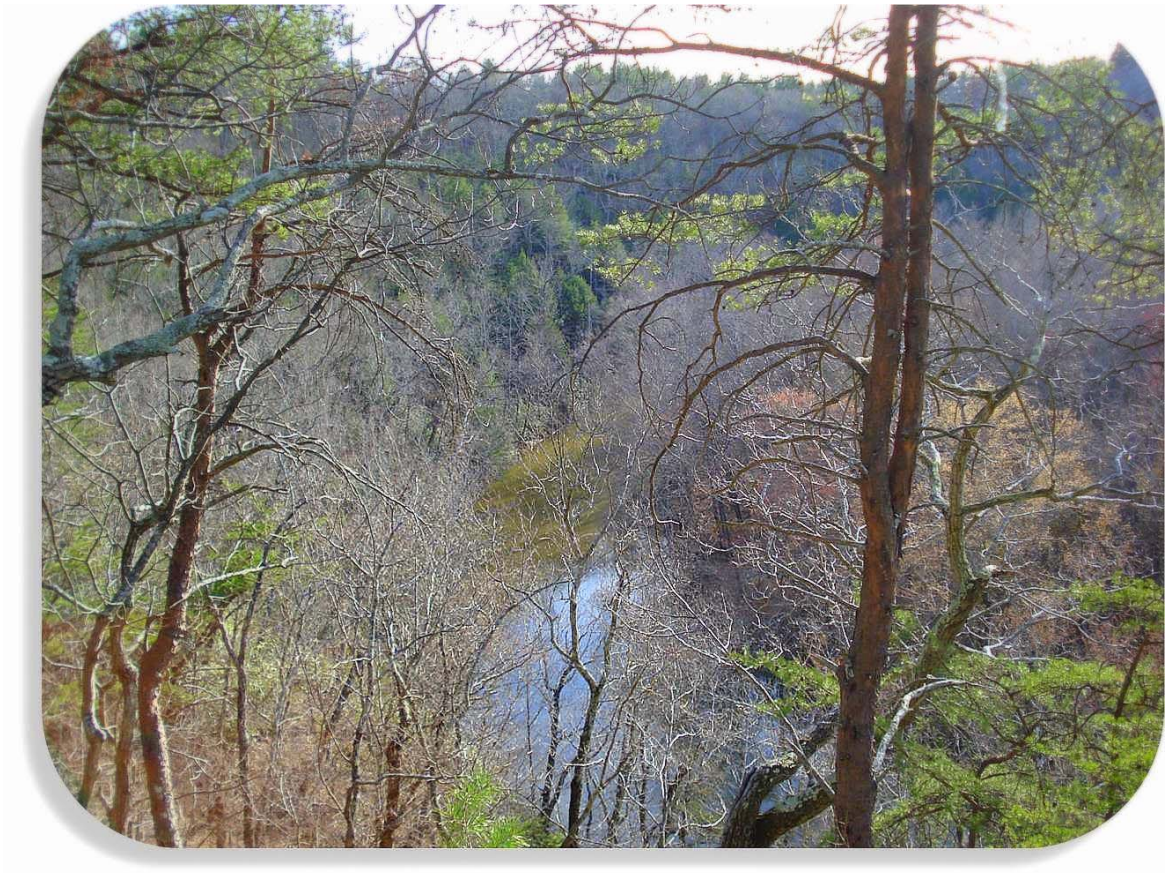
A Plan to Reduce Bacteria Sources in the Upper Banister River and Tributary Watersheds



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November 24th, 2011

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Executive Summary

The Upper Banister River and Tributaries watershed is located within Pittsylvania County. Segments of the Banister River, Bearskin Creek, Cherrystone Creek, Stinking River, and Whitethorn Creek were listed as impaired for bacteria on Virginia's 1996, 2002, 2004, and/or 2006 303(d) Impaired Waters Lists. These streams do not meet the primary contact recreation standard which is designed to protect human health and reduce the risk of illness or infections when swimming or splashing in the water.

The Upper Banister River (Virginia Watershed Identification Code, VAC-L65R) impaired segment is 11.67 miles in length. Bearskin Creek (Virginia Watershed Identification Code, VAC-L65R) impaired segment of 9.31miles, Cherrystone Creek (Virginia Watershed Identification Code, VAC-L66R) impaired segment of 8.44 miles, Stinking River (Virginia Watershed Identification Code, VAC-L69R) impaired segment of 8.99, and Whitethorn Creek (Virginia Watershed Identification Code, VAC-L68R) impaired segment of 0.82 miles, are tributaries to the Upper Banister River in the Roanoke River Basin. The TMDL study was approved by EPA in November 2007. Three additional bacteria impairments included in the TMDL study, Lower Banister River, Sandy Creek, and Polecat Creek in Halifax County will be addressed in an implementation plan to be completed in 2012.

Once a TMDL is developed for an impaired stream, the next step is to develop a plan identifying how and when the pollutant reductions in the TMDL can be achieved. A TMDL implementation Plan (IP) describes actions that can be taken by landowners in the watersheds along with local governments, which can include the use of better treatment technology, educational activities and programs, and the installation of best management practices (BMPs) that will ultimately result in improved water quality in the stream.

Sources of Bacteria in the Watersheds

Nonpoint sources of bacteria in the watersheds based on the TMDL study, detailed in Table ES-1, include agricultural runoff from cropland and pasture, direct deposition of fecal matter by livestock and wildlife in the streams, domestic pets, and human sources from straight pipes and failing septic systems.

Table ES-1 Bacteria reduction goals for the Upper Banister River and Tributaries.

Watershed	Percent Reduction in *E coli* Loading From Existing Conditions				
	Straight Pipes	Urban and Residential	Livestock Direct	Cropland and Pasture	Wildlife Direct
Banister River	**100**	**81**	**100**	**81**	**35**
Bearskin Creek	**100**	**83**	**100**	**83**	**40**
Cherrystone Creek	**100**	**94**	**100**	**94**	**25**
Stinking River	**100**	**83**	**100**	**83**	**35**
Whitethorn Creek	**100**	**94**	**100**	**94**	**30**

Implementation Actions

A number of implementation actions have been compiled in this plan. It is expected that the implementation of these practices to the extent defined will result in the restoration of the impaired streams. These actions are summarized under agricultural and residential land use categories. The recommended agricultural BMPs needed to remove the five impaired stream segments from the Impaired Waters List and attain the Stage I goal in the IP are as follows:

- Install 21 miles of livestock exclusion fence on perennial streams
- Install 58 livestock exclusion systems
- 22,095 acres of improved pasture management
- 2 additional waste storage units for dairies
- 8 additional waste storage units for beef
- 2 loafing lot management systems for dairies
- 4,286 acres of reforestation of erodible pasture

The recommended residential BMPs needed to remove the five impaired stream segments from the Impaired Waters List and attain the Stage I goal in the IP are as follows:

- Identify and replace 73 straight pipes with approved on-site sewage disposal systems
- Repair or replace 178 failing septic systems
- Connect 13 homes to public sewer
- 250 septic tank pump-outs
- Implement a pet waste education program
- Promote proper storage and disposal of dog feces at hunt clubs, kennels, and other confinement facilities

Costs and Benefits

The costs for implementation of individual agricultural BMPs were estimated based on data for the five impaired watersheds from the Virginia Department of Conservation and Recreation (DCR), Virginia Agricultural BMP Database. Cost of residential BMP practices were based on input from VDH representatives. Costs of agricultural and residential BMPs were reviewed and adjusted, as needed, based on stakeholder input to reflect costs relative to Pittsylvania County. Associated cost estimates of agricultural and residential BMPs are calculated by multiplying the unit cost of each practice by the number of needed units in each watershed.

It was determined that it would require $50,000/year to support the salary, benefits, travel, training, and incidentals for one technical staff member to support the agricultural implementation goals. An additional $50,000/year for one technical staff member to support the residential implementation goals is also needed.

Table ES-2 shows the estimated cost of installing the recommended agricultural and residential BMPs in Stage I. Factoring in technical assistance costs, the total cost for de-listing the streams from the Impaired Waters List is $5.82 million.

Table ES-2 Costs to implement Stage I (years 1 - 6) for the Upper Banister River and Tributaries.

Impairment	Agricultural BMPs ($)	Residential BMPs ($)	Technical Assistance ($)	Total Cost ($)
Banister	$616,826	$226,770	$120,000	$963,596
Bearskin	$445,688	$105,620	$120,000	$671,308
Cherrystone	$897,637	$379,370	$120,000	$1,397,007
Stinking	$299,111	$198,720	$120,000	$617,831
Whitethorn	$1,539,784	$506,470	$120,000	$2,166,254
Total	**$3,799,046**	**$1,416,950**	**$600,000**	**$5,815,996**

The primary benefit of implementing this plan will be cleaner water in the Upper Banister River, Bearskin Creek, Cherrystone Creek, Stinking River, and Whitethorn Creek. Additionally, an important objective of the implementation plan is to provide cleaner water sources for livestock and improve streamside habitat by providing alternative water sources for cattle as opposed to cattle having access to streams and farm ponds. Additionally, residential practices recommended in this plan will correct deficiencies with local on-site sewage disposal systems and also improve maintenance of such systems. These types of actions will provide economic benefits to landowners and increase property values. By developing this plan the local community will be eligible for federal and or state grant funds that can be targeted to the specific milestones for each watershed addressed in the plan.

Implementation Timeline

The intended implementation goal is to restore the Upper Banister River and tributaries water quality to attain the bacteria standard and the removal of these streams from Virginia's Section 303(d) Impaired Waters List. Progress toward end goals will be assessed during implementation through tracking of BMP installation and continued water quality monitoring by the Virginia Department of Environmental Quality (DEQ).

Expected progress in implementation is established with implementation milestones and water quality improvements. Implementation milestones establish the amount of BMPs installed each year, while water quality milestones establish the corresponding improvements in water quality. The milestones described in the IP are intended to achieve full implementation of the TMDL within 10 years. Stage I and Stage II timelines extend out to 2022.

Stakeholders

The actions and commitments described in this plan were derived based on input from citizens of the watershed, Pittsylvania County, Town of Chatham, Town of Gretna, DEQ, DCR, Virginia Department of Health (VDH), the Natural Resources Conservation Service (NRCS), Pittsylvania Soil and Water Conservation District (Pittsylvania SWCD), and MapTech, Inc.

The most important stakeholders in implementing this plan are the landowners and businesses in each of the subject watersheds. Landowners can take various corrective actions and implement BMPs to reduce the bacteria source loadings from agricultural operations, on-site sewage disposal, and pets in the local communities. Every citizen in the watershed and interested party is encouraged to become involved in the implementation process and contribute to restoring the health of the streams. Public participation in development of the plan took place on three levels: two public meetings, two meetings of the agricultural and residential working groups, and a steering committee meeting.

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Introduction

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

When a stream fails to meet the water quality standards, it is listed as impaired, or "dirty", on the CWA's Section 303(d) list. When this occurs, the CWA and the U.S. Environmental Protection Agency (EPA) both require that states develop a Total Maximum Daily Load (TMDL) for each pollutant. A TMDL is a "pollution budget" for a stream. That is, it sets limits on the amount of pollution that a stream can tolerate and still maintain water quality standards. A TMDL accounts for seasonal variations and must include a margin of safety (MOS).

TMDL Process

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

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

Step one of the TMDL process was completed for the Upper Banister River and Tributaries Watershed with the completion of its TMDL study and the approval of the TMDL by the EPA in 2007. The results of the TMDL are summarized in the *Review of the TMDL Development Study* section of this booklet. Now that TMDL studies have been developed and approved by the EPA and the State Water Control Board (SWCB), measures must be taken to reduce pollution levels in the streams as specified in the TMDL.

Step two of the TMDL process is the development of the Implementation Plan. This booklet is an abbreviated version of the *Technical Report* which can be obtained by contacting the Virginia Department of Conservation and Recreation. In fulfilling the state's requirement for the development of an Implementation Plan, a framework has been established for reducing *E. coli* levels and achieving the water quality goals for the impaired stream segments of the Upper Banister River and Tributaries. This plan outlines how the TMDL goals can be accomplished in the watershed to improve water quality. The TMDL-IP describes corrective actions and the installation of BMPs to be implemented in a staged manner. Step two of the TMDL process will be concluded with the approval of the Implementation Plan by the SWCB and the EPA. The SWCB will verify that the IP meets the requirements outlined in the Water Quality Monitoring, Information, and Restoration Act (WQMIRA). The plan will be reviewed by the EPA since Clean Water Act Section 319 funds (provided by EPA) helped with implementation plan development.

Step three in the TMDL process is to meet these water quality goals through implementation of the plan. Having finalized the Implementation Plan increases the opportunities for implementation funding, and provides guidance to the residents of this watershed on how to improve water quality in their community and enhance their natural resources. The implementation of this plan will reduce

levels of bacteria in Upper Banister River and Tributaries watershed. The benefits of the implementation of this plan are described in detail in the *Implementation Benefits* chapter of this document. In short, the implementation of this plan may provide benefits to homeowners and farmers, as well as those that use the streams for recreation purposes.

Requirements for Implementation Plans

State Requirements

The TMDL-IP is a requirement of Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (§62.1-44.19:4 through 19:8 of the Code of Virginia), or WQMIRA. WQMIRA directs the State Water Control Board to "develop and implement a plan to achieve fully supporting status for impaired waters." In order for TMDL-IPs to be approved by the Commonwealth, they must meet the requirements as outlined by WQMIRA. WQMIRA requires that TMDL-IPs include the following:

- date of expected achievement of water quality objectives;
- measureable goals;
- necessary corrective actions, and
- associated costs, benefits, and environment impact of addressing the impairment.

Federal Requirements

Section 303(d) of the CWA and current EPA regulations do not require the development of implementation strategies. The EPA outlines the minimum elements of an approvable TMDL-IP in its 1999 Guidance for Water Quality-Based Decisions: The TMDL Process. The listed elements include:

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

Review of the TMDL

Watershed Characteristics

The TMDL study included TMDLs for eight impaired segments within the Banister River and Tributaries watershed. This Implementation Plan will account for the five upstream impairments from the TDML study. The three remaining downstream impairments will be accounted for in another Implementation Plan to be completed by June 2012.

The Upper Banister River and Tributaries watershed is part of the Roanoke River Basin and is located within USGS hydrologic unit code 0301010. Segments of the Banister River, Bearskin Creek, Cherrystone Creek, Stinking River, and Whitethorn Creek watersheds were listed as impaired for bacteria on Virginia's 1996, 1998, 2002, 2004, and/or 2006 303(d) Total Maximum Daily Load Priority Lists and Reports (VADEQ, 1996). See Figure 1 for a map of the Upper Banister River and Tributaries impaired segments. A copy of the TMDL study is posted at www.deq.virginia.gov.

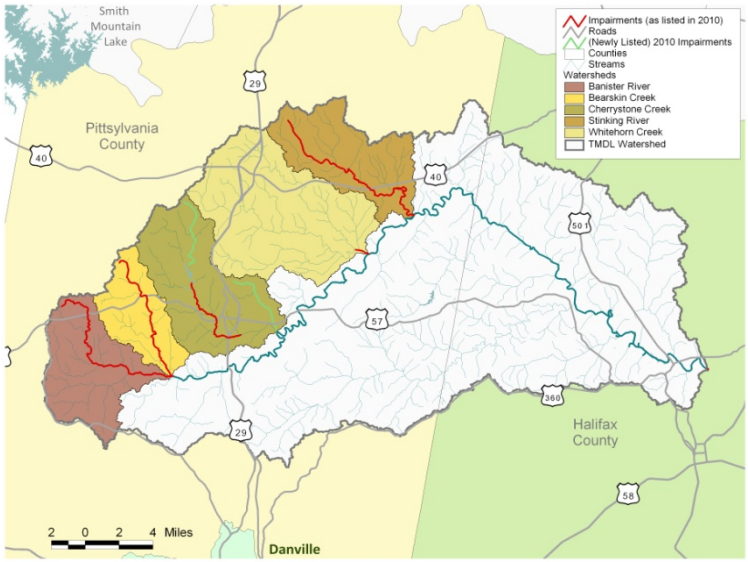

Figure 1 The Upper Banister River and Tributaries impaired segments.

These TMDL studies were conducted because the Upper Banister River and Tributaries were not meeting the state water quality fecal bacterial standard for recreational use (swimming). Segments of each stream have failed to meet the standard.

The current *E. coli* water quality standard states that no more than 10% of water samples may contain greater than 235 *colony forming units* [viable bacteria] per 100 milliliters (235 cfu/100mL). If 4 or more samples are collected within a calendar month, a geometric mean is applied, and it must have a concentration not greater than 126 cfu/100mL.

Sources of Bacteria in the Watersheds

During the TMDL study, bacteria source tracking (BST), a water quality analysis method, was performed on water samples from the watershed. BST is intended to aid in identifying the sources of fecal contamination in water bodies (i.e., human, pets, livestock, or wildlife). The BST results provided insight into the likely sources of fecal contamination and the distribution of fecal bacteria in the creeks. The major sources of bacteria are human, wildlife, pets and livestock.

Having this information improves the chances for success in implementing solutions by allowing better targeting of the sources of bacteria in this watershed. Figures 2 through 5 show the distribution of fecal bacteria among the various sources from the BST analysis, as taken from the TMDL report, in the Upper Banister River and Tributaries watershed. The BST data indicates that *E. coli* bacteria from human, wildlife, pet and livestock were present in each stream.

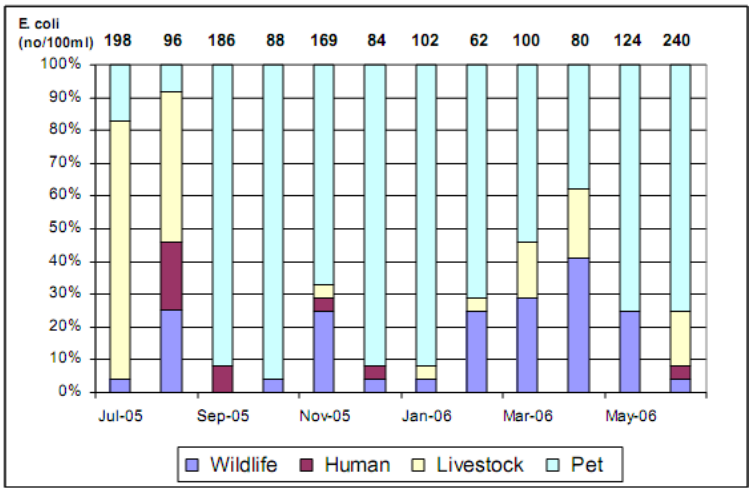

Figure 2 **BST Source Distributions at 4ABAN070.20 on Banister River from the TDML report.**

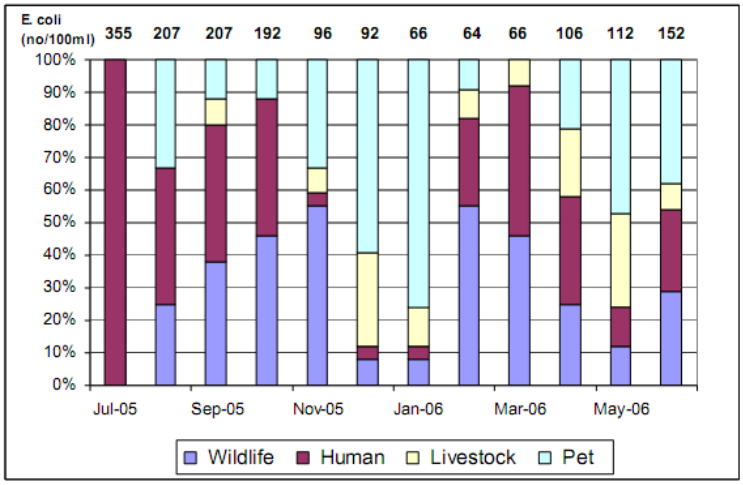

Figure 3 **BST Source Distributions at 4ACRR000.80 on Cherrystone Creek from the TDML report.**

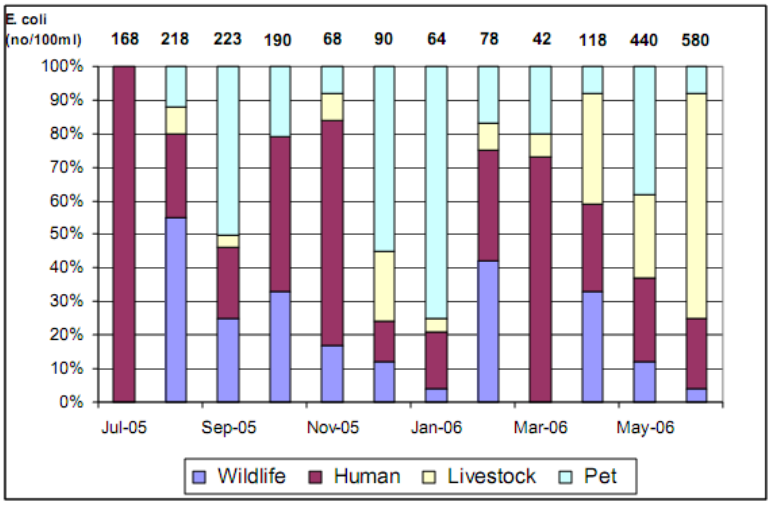

Figure 4 **BST Source Distributions at 4ASNE005.30 on Stinking River from the TDML report.**

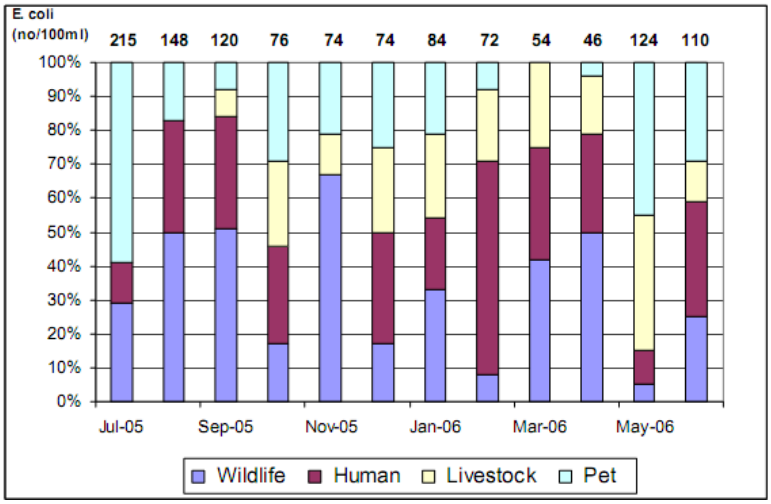

Figure 5 **BST Source Distributions at 4AWRN005.50 Whitethorn Creek from the TDML report.**

Bacteria Reduction Goals

The ultimate goal of this implementation plan is to bring all of the impaired streams from the TMDL study into compliance with the state water quality bacteria standard for primary contact recreation. Once an impaired stream attains the water quality standard it is removed from Virginia's Section 303(d) impaired waters list. This process is known as delisting.

The allocation shown in Table 1 is the principal result of the TMDL study and defines the estimated percent-reductions needed from each bacteria source to attain the water quality standard and delist each impaired stream included in the TMDL. This implementation plan outlines the actions which need to be taken to achieve the TMDL allocation.

Table 1 **Bacteria reduction goals for the Upper Banister River and Tributaries.**

	Percent Reduction in *E. coli* Loading From Existing Conditions				
Impairment	**Straight Pipes**	**Urban and Residential**	**Livestock Direct**	**Crop & Pasture Land**	**Wildlife Direct**
Banister River	**100**	**81**	**100**	**81**	**35**
Bearskin Creek	**100**	**83**	**100**	**83**	**40**
Cherrystone Creek	**100**	**94**	**100**	**94**	**25**
Stinking River	**100**	**83**	**100**	**83**	**35**
Whitethorn Creek	**100**	**94**	**100**	**94**	**30**

The current *E. coli* water quality standard states that no more than 10% of water samples may contain greater than 235 *colony forming units* [viable bacteria] per 100 milliliters (235 cfu/100mL). If 4 or more samples are collected within a calendar month, a geometric mean is applied, and it must have a concentration not greater than 126 cfu/100mL.

Implementation plans typically aim to achieve the TMDL allocations and simply cease implementation once the *goal* of delisting has been attained. Implementation in this IP may need to continue beyond delisting the streams. This is due to the impairments within this IP being part of a larger watershed containing a downstream impairment. The *downstream* impairment's ability to be delisted is *dependent upon* the upstream impairments meeting their allocation.

The goals of this IP therefore fall into two stages. Stage I concentrates on delisting the impairments within this IP. Stage II continues towards achieving the TMDL allocations in parallel with the goals of the **Lower Banister River, Sandy Creek, and Polecat Creek in the Halifax County Implementation Plan** (under development**)**. Please see the section titled "Timeline and Milestones" for more information on the implementation stages.

The Implementation Plan addresses those sources of bacteria that can be attributed to human activities. The correction of straight pipes and failing septic systems are necessary to meet the TMDL goals. In addition, all livestock in the watershed will need to be excluded from the creeks. Land-based bacteria loads carried to streams in runoff after rain events must also be addressed.

Although the TMDL allocation contained wildlife reductions, Virginia and the EPA do not propose the elimination of wildlife to allow for the attainment of water quality standards. Only anthropogenic sources, those related to the activities of humans, will be addressed throughout implementation. While managing overpopulations of wildlife remains as an option to local stakeholders, the reduction of wildlife or changing a natural background condition is not the intended goal of a TMDL.

Public Participation

Input from local community members and stakeholders are an integral part of the implementation process. The actions and commitments described in this document are drawn together through input from citizens of the watershed, Pittsylvania County, Town of Chatham, Town of Gretna, DEQ, DCR, Virginia Department of Health (VDH), the Natural Resources Conservation Service (NRCS), Pittsylvania Soil and Water Conservation District (Pittsylvania SWCD), and MapTech, Inc. Every citizen in the watershed and interested party is encouraged to become involved in the implementation process and contribute to restoring the health of the streams. Public participation in development of the plan took place on three levels: public meetings, working groups, and a steering committee.

A public meeting was held on March 3rd, 2011 to inform the public about the water quality impairments in the Banister River watershed and outline the goals for improving water quality through an Implementation Plan. It was attended by 24 people. A second public meeting took place on October 25th 2011 to request feedback from citizens on the draft Implementation Plan. It was attended by 20 people.

Specialized working groups were assembled to discuss specific implementation strategies for different sources of bacteria in this watershed and recommend actions for the plan. These include a residential working group which met on March 3rd and July 28th, 2011; agricultural working group which met on March 3rd and July 28th, 2011; and a government working group which met on May 5th.

A steering committee was formed with representation from Virginia Department of Environmental Quality (VADEQ), Department of Conservation and Recreation, (DCR), Virginia Department of Health (VDH), Pittsylvania SWCD, Pittsylvania County government representatives, and working

group's representatives. This committee met on September 29, 2011 and reviewed recommendations from the working groups and the draft Implementation Plan before it was made public.

Implementation Actions

The following BMPs are recommended to meet the bacteria reductions required in the TMDL to meet water quality goals.

Agricultural BMPs

Agricultural Streamside Fencing

Livestock exclusion systems, or streamside fencing as shown in Figure 6, are one of the best ways to reduce bacteria levels in streams in agricultural watersheds. Some form of stream exclusion is needed to achieve the bacteria reductions from pastureland in the watershed. From an environmental perspective, the best scenario would be to establish a vegetated buffer and exclude livestock from the stream and stream banks. This eliminates direct-deposition by livestock and helps reduce bacteria and sediment loads in runoff. It also prevents livestock from eroding the stream bank, provides a filter strip of vegetation which captures pollutants and improves water quality, and establishes a healthy environment for aquatic life.

Figure 6 Livestock Exclusion Fencing

Several different fencing options are available through state and federal programs.

- *Livestock Exclusion with Riparian Buffers for TMDL Implementation* (**LE-1T**) systems include streamside fencing, cross fencing, an alternative watering system, and require a 35-ft buffer from the stream. This practice offers 85% cost share and is only available in targeted TMDL watersheds with Implementation Plans.

- The *Stream Exclusion with Grazing Land Management* (**SL-6T**) practice has similar features as the LE-1T practice, but offers waste storage and cost-share up to 75%.

- *Livestock Exclusion with Reduced Setback Practice for TMDL Implementation* (**LE-2T**) systems are only available in targeted TMDL areas with Implementation Plans. This practice requires a 10 foot setback for stream fencing. Cost share is provided for stream fencing, cross fencing, and off-stream water (shown in Figure 7) at a rate of 50%.

- The *Streambank Protection for TMDL Implementation* (**WP-2T**) systems include streamside fencing, hardened crossings (shown in Figure 8), and a 35-ft buffer from the stream. The WP-2T practice is only available in TMDL targeted implementation areas (like this watershed). This practice includes a 75% cost-share and an up-front cost share payment of 50 cents per linear foot of fence installed to assist in covering anticipated fencing maintenance costs. In cases where a watering system already exists, a WP-2T system is a more appropriate choice.

- The *Conservation Reserve Enhancement Program* (**CREP**) is a federal cost-share option. CREP systems include streamside fencing, watering troughs, and buffer-area tree plantings. It requires excluding livestock from the stream and maintaining the minimum 35-ft buffer for the length of the contract period. This practice includes up to a 75% cost-share, one-time payment of 40% of eligible costs, a one-time sign-up payment of $100 per acre, and an annual rental payment of up to $100 per acre.

Figure 7 Off stream watering source.

In general, cost-share assistance of 50% - 100% is available to help pay for fencing which excludes livestock from farmland adjacent to streams, creating a riparian buffer. It is recommended that participants consult the experienced personnel at their local SWCD in order to choose the most applicable exclusion system and the funding sources to match. Several fencing practices are summarized in Table 2.

The quantity of streamside fencing needed was determined through spatial analyses of land uses, the stream network, and archived data. Additionally, input from local agency representatives and citizens were used to verify the analyses.

Figure 8 Hardened Stream Crossing.

The length of fencing required on perennial streams (those that flow year round) in the Upper Banister River and Tributaries watershed is approximately 21 miles. There is currently approximately 24 miles of livestock exclusion fencing installed within the watershed. In order to assess the amount of fencing that has been installed within the watershed, the DCR BMP database for state cost-share programs was utilized. The total fencing needed was divided among the different fencing BMPs offered through the various cost-share programs. Table 2 shows the fencing systems required for the impaired watershed in order to meet the livestock exclusion goal.

Table 2 Livestock exclusion systems required for Upper Banister River and Tributaries watershed.

BMPs	Unit	Banister	Bearskin	Cherrystone	Stinking	Whitethorn	Total
LE-1T	System	5	4	7	1	22	39
LE-2T	System	0	0	1	0	2	3
WP-2T	System	0	0	0	0	2	2
CRP	System	0	1	0	0	1	2
CREP	System	2	1	2	0	7	12

[1] The average livestock exclusion system installed within the area is 1,880 ft in length.

Agricultural land-based reduction BMPs

Due to the large reductions needed on land-based loads of *E. coli* bacteria, additional BMPs for pasture and cropland are also needed. Estimates of the needed land-based agricultural BMPs are listed in Table 3.

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

Along with the infrastructure provided by a streamside fencing system, improved *pasture management* includes: maintaining forage height during growing season, application of lime and fertilizer when needed, controlling woody vegetation, distribution of manure through managed

rotational grazing, and reseeding if necessary. Employing these pasture management practices can produce significant economic gains to producers at a very low investment cost.

Prescribed Grazing and *Pasture and Hayland Planting* are two NRCS BMPs which go hand in hand with pasture management. Prescribed grazing is managing the harvest of vegetation with grazing and/or browsing animals. Among the benefits of prescribed grazing are maintaining a desired vegetation species composition, improved quantity and quality of forage for grazing, and reduced soil erosion. Pasture and Hayland Planting involves establishing stands of cool season perennial grasses to be used for forage, hay, pasture, or wildlife habitat. Pasture and hayland planting improves livestock nutrition, extends the grazing season, reduces soil erosion, and improves water quality.

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

It was noted during implementation plan development, that all cropland receiving manure in the watershed is no-till cropland. If there is any conventional-till cropland receiving manure, it should be a priority to implement conservation tillage or no-till on those lands, as these practices have an indirect, but substantial impact on reducing bacteria loads by reducing soil erosion and run-off.

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

Waste Storage Facilities allow manure to be properly collected, contained, and stored until the appropriate time when it can be applied.

Many agricultural BMPs qualify for financial assistance. It is recommended that participants discuss funding options with experienced personnel at their local SWCD in order to choose the best option out of the many available. A brief description of two funding sources is noted here.

Environmental Quality Incentives Program (EQIP) is a federal conservation program for farmers and landowners to address significant natural resource needs and objectives. This program offers 1 to 10-year contracts to landowners and farmers to provide 75% cost-share assistance, 25% tax credit, and/or incentive payments to implement conservation. 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.

Table 3 Agricultural land based reduction BMPs.

Control Measure	Unit	Banister	Bearskin	Cherrystone	Stinking	Whitethorn
Improved Pasture Management	Acres	5,200	4,375	9,500	3,750	14,000
Retention Ponds – Pasture	Acre - Treated	3,600	2,800	6,200	2,450	9,300
Dairy Waste Storage	System	1	0	1	0	0
Beef Waste Storage	System	1	2	1	2	2
Loafing Lot Management System	System	1	0	1	0	0
Reforestation of Erodible Pasture	Acres	669	557	1,052	480	1,528

Residential BMPs

In order to achieve the necessary residential reductions, the BMPs in Table 5 are targeted. The Banister River and Tributaries TMDL allocations call for a 100 percent reduction in bacteria sources in the watershed from straight pipes and failing septic sytstems. Residential BMPs include removing straight pipes, replacing failing septic systems, and proper disposal of pet waste by homeowners, kennel owners, and hunt clubs.

Septic Systems

All failing septic systems and straight pipes must be identified and replaced during implementation since a 100 percent load reduction from direct and nonpoint source (NPS) human waste is required to meet the TMDL goals. In addition, straight pipes are illegal in the Commonwealth of Virginia. Residential bacteria sources estimated in consultation with the Pittsylvania County Department of Health (VDH) are shown in Table 4. The number of estimated potential failing septic systems and straight pipes is derived based on census data and data on the age of houses and their respective septic fields within the watershed.

Table 4 Estimated residential bacteria sources.

Impairment	Potential Failing Septic Systems	Potential Straight Pipes	Dogs
Banister River	31	12	434
Bearskin Creek	15	6	367
Cherrystone Creek	48	19	1,159
Stinking River	28	9	365
Whitethorn Creek	69	27	1,326
Total	**191**	**73**	**3,651**

Input from the Working Groups Meetings and local Virginia Department of Health (VDH) representatives estimated that 70% of failing septic systems could be corrected with repairs and 30% would need to be replaced. Of those replacements, 85% are expected to be standard septic systems, 10% would require replacement with a pumping system, and 5% would require replacement with alternative wastewater systems. For straight pipes, it was estimated that 80% would be corrected with the installation of septic systems, 10% would require septic installations with pumps, and 10% would require alternative wastewater system installations.

A basic spatial analysis, done by MapTech, Inc using Geographic Information System software, estimated a number of failing septic systems that could potentially be connected to available sewer systems. This analysis yielded the potential for 8 sewer connections in Chatham (within the Cherrystone Creek impairment) and 5 sewer connections in Gretna (within the Whitethorn Creek impairment).

Financial assistance could be provided through grant programs to provide cost-share for homeowners to pump out their septic tanks (shown in Figure 9). While it is not likely that sufficient grant funds will be available to assist every homeowner in this watershed with a septic system pump-out, it is expected that this type of outreach will raise local awareness and foster homeowners to conduct routine maintenance of their septic systems. In turn, this will help to prevent septic system failures in the future.

Figure 9 Septic tank pump-out

DCR and Map Tech proposed including cost in the IP to pump out 5% of the septic tanks in the watershed. This number is arbitrary and obviously a very small fraction of the need. It is, however, hopefully enough to create momentum, and raise awareness in the community about septic system operation and maintenance, without spending too much on a practice that many feel should be the responsibility of the homeowner. No modifications to the percentage were suggested by members of the residential working group. Several citizens agreed that this is indeed a homeowner's responsibility, but hoped that agencies would be as helpful as possible when responding to residents facing failing systems.

Pet Waste

There are a significant number of dogs in the watershed (i.e. 3,651). A Community Pet Waste Education Program involves the distribution of educational materials on proper disposal of pet waste to pet owners, kennel operators, and hunt clubs. A Pet Waste Composter program is also proposed to help eliminate pet waste in homeowners' yards and in public places where dogs may be present, by using pet waste composters (shown in Figure 10). These composters are better suited for the Towns of Chatham and Gretna with smaller residential lots. This could be accomplished through

partnerships with local pet supply stores, Pittsylvania County Animal Control, the Society for the Prevention of Cruelty to Animals (SPCA). Estimates of the needed residential BMPs are summarized in Table 5. No parks or walking areas for dogs were identified in the watershed for the placement of disposal stations (plastic pick up bags and trash receptacles) along with educational kiosks on the importance of disposing of pet waste.

Photograph and diagram courtesy of Doggie Dooley®.

Figure 10 An example pet waste composter system.

Table 5 Estimated residential waste treatment systems.

Control Measure	Unit	Banister	Bearskin	Cherrystone	Stinking	Whitethorn
Septic Systems Pump-outs	Sys	37	25	75	38	75
Connection to Public Sewer	Sys	0	0	5	0	8
Septic System Repair	Sys	22	11	30	20	43
Septic System Installation/Replacement	Sys	15	7	21	11	31
Septic System Installation/Replacement w/ Pump	Sys	4	3	6	4	9
Alternative Waste Treatment System Installation	Sys	2	0	5	2	5
Community Pet Waste Education Program	Program	1 Program throughout the Impaired Watersheds				
Residential Pet Waste Composters	Sys	5	10	165	40	55

Implementation Costs

Agricultural BMP Costs

The cost for implementation of individual agricultural BMPs were estimated based on data for these watersheds from the DCR Virginia Agricultural BMP Database and are outlined in Table 6. Associated cost estimates of agricultural and residential BMPs are calculated by multiplying the unit cost of each practice by the number of needed units in each watershed. Cost estimates were adjusted based on stakeholder comments and input.

Table 6 Estimated cost for recommended agricultural BMPs.

Control Measure	Unit	Cost per unit
LE-1T – Livestock Exclusion	System[1]	$20,600
LE-2T – Livestock Exclusion	System[1]	$14,000
WP-2T – Livestock Exclusion	System[1]	$8,000
CRP – Livestock Exclusion	System[1]	$22,500
CREP – Livestock Exclusion	System[1]	$26,500
Fence Maintenance	Feet	$4
Improved Pasture Management	Acres	$75
Dairy Waste Storage System	System	$100,000
Beef Waste Storage System	System	$35,000
Retention Ponds - Pasture	Acre - Treated	$150
Loafing Lot Management System	System	$35,000
Reforestation of Erodible Pasture	Acres	$82

[1] The average livestock exclusion system installed within the area is 1,880 ft in length.

Residential BMP Costs

Cost of residential BMP practices are outlined in Table 7. These values were based on input from VDH representatives and adjusted based on stakeholder input to reflect costs relative to this area.

Table 7 Estimated cost for residential BMPs.

Residential Control Measure	Unit	Cost per Unit
Septic Systems Pump-outs	System	$200
Connection to Public Sewer	System	$3,200
Septic System Repair	System	$3,000
Septic System Installation/Replacement	System	$6,000
Septic System Installation/Replacement w/ Pump	System	$8,000
Alternative Waste Treatment System Installation	System	$15,000[†]
Community Pet Waste Education Program	Program	$2,000
Residential Pet Waste Composters	Composter	$50

[†] Does not include annual maintenance-contract cost of approx. $500-$600 per system.

Technical Assistance Costs

It is estimated that two full-time support staff are needed throughout implementation. Much of the technical assistance could be provided through the local Pittsylvania Soil and Water Conservation District and Pittsylvania County Health Department.

It was determined that it would require $50,000 to support the salary, benefits, travel, training, and incidentals for education for one technical staff member. With quantification analysis yielding a need for two staff members per year for the duration of implementation, the maximum total cost to provide technical assistance over a 10-year implementation period is expected to be $1,000,000.

Tables 8 and 9 show the estimated cost of installing the recommended agricultural and residential BMPs in Stages I and II factoring in technical assistance costs, the total cost for full implementation in this watershed comes to just over $11 million (Table 10).

Table 8 Costs to implement Stage I (years 1 - 6) for the Upper Banister River and Tributaries.

Impairment	Agricultural BMPs ($)	Residential BMPs ($)	Technical Assistance ($)	Total Cost ($)
Banister	$616,826	$226,770	$120,000	$963,596
Bearskin	$445,688	$105,620	$120,000	$671,308
Cherrystone	$897,637	$379,370	$120,000	$1,397,007
Stinking	$299,111	$198,720	$120,000	$617,831
Whitethorn	$1,539,784	$506,470	$120,000	$2,166,254
Total	**$3,799,046**	**$1,416,950**	**$600,000**	**$5,815,996**

Table 9 Costs to implement Stage II (years 7 - 10) for the Upper Banister River and Tributaries.

Impairment	Agricultural BMPs ($)	Residential BMPs ($)	Technical Assistance ($)	Total Cost ($)
Banister	$697,312	$0	$80,000	$777,312
Bearskin	$552,409	$0	$80,000	$632,409
Cherrystone	$1,216,782	$0	$80,000	$1,296,782
Stinking	$480,267	$0	$80,000	$560,267
Whitethorn	$1,821,192	$0	$80,000	$1,901,192
Total	**$4,767,962**	**$0**	**$400,000**	**$5,167,963**

Table 10 Total cost for implementation in the Upper Banister River and Tributaries watershed.

Impairment	Agricultural BMPs ($)	Residential BMPs ($)	Technical Assistance ($)	Total Cost ($)
Banister	$1,314,138	$226,770	$200,000	$1,740,908
Bearskin	$998,097	$105,620	$200,000	$1,303,717
Cherrystone	$2,114,420	$379,370	$200,000	$2,693,790
Stinking	$779,379	$198,720	$200,000	$1,178,099
Whitethorn	$3,360,977	$506,470	$200,000	$4,067,447
Total	**$8,567,011**	**$1,416,950**	**$1,000,000**	**$10,983,959**

Timeline and Milestones

The intended implementation goal is to attain the bacteria water quality standard for Upper Banister River and its tributaries, in order to remove these streams from Virginia's Section 303(d) impaired waters list. Progress toward this goal will be assessed during implementation through tracking of BMP installations and continued water quality monitoring throughout implementation.

Following the staged approach, implementation will be divided into two stages, in an effort to concentrate resources and finances on the most cost-efficient control measures in the first stage (first 6 years). Full implementation of the TMDL will occur by implementing stage II (years 7-10), ending in 2022.

If de-listing of the impaired segments is not attained following Stage I implementation, the steering committee should evaluate water quality improvements and determine how to proceed in order to implement additional BMPs during Stage II, however it is anticipated that after Stage I implementation, the violation rate of the E. coli water quality standard in these impaired streams will be low enough to remove these streams from the state's impaired waters list.

Table 11 shows the estimated violation rates of the standard after Stage I implementation. It is clear that after Stage I implementation, the violation rates are very low for these upstream impairments, however implementation may need to continue into Stage II in order to meet the standard for the *lower* segment of the Banister River.

Table 11 Estimated violation rates of the standard after Stage I Implementation.

Impairment	Standard Violation Rate
Banister River	1%
Bearskin Creek	0%
Cherrystone Creek	0%
Stinking River	1%
Whitethorn Creek	0%

Stage II contains any remaining implementation required to bring these impaired segments into compliance with the standard and continuing towards achieving the TMDL allocations in parallel with the goals of the **Lower Banister River, Sandy Creek, and Polecat Creek in Halifax County Implementation Plan,** to delist the Lower Banister impairment.

Continuing towards achieving the TMDL allocations will allow the entire Banister River watershed to attain the water quality standard; including the impaired downstream segment of the Banister River.

Expected progress in implementation is established with two types of milestones: implementation milestones and water quality milestones. Implementation milestones establish the amount of BMPs installed each year, while water quality milestones establish the corresponding improvements in water quality that can be expected.

Tables 12 through 16 show the types and quantities of BMPs to be installed during each stage for each impairment watershed.

Table 12 Stage I and Stage II implementation goals for Banister River.

Control Measure	Unit	Stage I	Stage II
Agricultural		1st 6 years	Final 4 years
LE-1T Livestock Exclusion	System[1]	5	0
LE-2T Livestock Exclusion	System[1]	0	0
WP-2T Livestock Exclusion	System[1]	0	0
CRP Livestock Exclusion	System[1]	0	0
CREP Livestock Exclusion	System[1]	2	0
Livestock Exclusion Maintenance	Feet	562	375
Improved Pasture Management	Acres	3,120	2,080
Retention Ponds - Pasture	Acres-	0	3,600
Waste Storage Facilities	System	2	0
Loafing Lot Management System	System	1	0
Reforestation of Erodible Pasture	Acres	669	0
Residential			
Septic Systems Pump-out Program (RB-1)	System	37	0
Connection to Public Sewer (RB-2)	System	0	0
Septic System Repair (RB-3)	System	22	0
Septic System Installation/Replacement (RB-4)	System	15	0
Septic Tank System Installation/Replacement w/ Pump (RB-4P)	System	4	0
Alternative Waste Treatment System Installation (RB-5)	System	2	0
Residential Land Vegetated Buffers	Acres	2	0
Community Pet Waste Education Program	Program	Ongoing	Ongoing
Residential Pet Waste Composters	System	5	0

[1] The average livestock exclusion system installed within the area is 1,880 ft in length.

Table 13 Stage I and Stage II implementation goals for Bearskin Creek.

Control Measure	Unit	Stage I	Stage II
Agricultural		1st 6	Final 4
LE-1T Livestock Exclusion	System[1]	4	0
LE-2T Livestock Exclusion	System[1]	0	0
WP-2T Livestock Exclusion	System[1]	0	0
CRP Livestock Exclusion	System[1]	1	0
CREP Livestock Exclusion	System[1]	1	0
Livestock Exclusion Maintenance	Feet	497	331
Improved Pasture Management	Acres	2,625	1,750
Retention Ponds - Pasture	Acres-	0	2,800
Waste Storage Facilities	System	2	0
Loafing Lot Management System	System	0	0
Reforestation of Erodible Pasture	Acres	557	0
Residential			
Septic Systems Pump-out Program (RB-1)	System	25	0
Connection to Public Sewer (RB-2)	System	0	0
Septic System Repair (RB-3)	System	11	0
Septic System Installation/Replacement	System	7	0
Septic Tank System	System	3	0
Alternative Waste Treatment System	System	0	0
Residential Land Vegetated Buffers	Acres	2	0
Community Pet Waste Education Program	Program	Ongoing	Ongoing
Residential Pet Waste Composters	System	10	0

[1]The average livestock exclusion system installed within the area is 1,880 ft in length.

Table 14 Stage I and Stage II implementation goals for Cherrystone Creek.

Control Measure	Unit	Stage I	Stage II
Agricultural		1st 6 years	Final 4
LE-1T Livestock Exclusion	System[1]	7	0
LE-2T Livestock Exclusion	System[1]	1	0
WP-2T Livestock Exclusion	System[1]	0	0
CRP Livestock Exclusion	System[1]	0	0
CREP Livestock Exclusion	System[1]	2	0
Livestock Exclusion Maintenance	Feet	764	509
Improved Pasture Management	Acres	5,700	3,800
Retention Ponds - Pasture	Acres-Treated	0	6,200
Waste Storage Facilities	System	2	0
Loafing Lot Management System	System	1	0
Reforestation of Erodible Pasture	Acres	1,052	0
Residential			
Septic Systems Pump-out Program (RB-1)	System	75	0
Connection to Public Sewer (RB-2)	System	5	0
Septic System Repair (RB-3)	System	30	0
Septic System Installation/Replacement	System	21	0
Septic Tank System	System	6	0
Alternative Waste Treatment System	System	5	0
Residential Land Vegetated Buffers	Acres	2	0
Community Pet Waste Education Program	Program	Ongoing	Ongoing
Residential Pet Waste Composters	System	165	0

[1]The average livestock exclusion system installed within the area is 1,880 ft in length.

Table 15 Stage I and Stage II implementation goals for Stinking River.

Control Measure	Unit	Stage I	Stage II
Agricultural		1st 6 years	Final 4 years
LE-1T Livestock Exclusion	System[1]	1	0
LE-2T Livestock Exclusion	System[1]	0	0
WP-2T Livestock Exclusion	System[1]	0	0
CRP Livestock Exclusion	System[1]	0	0
CREP Livestock Exclusion	System[1]	0	0
Livestock Exclusion Maintenance	Feet	115	76
Improved Pasture Management	Acres	2,250	1,500
Retention Ponds - Pasture	Acres-Treated	0	2,450
Waste Storage Facilities	System	2	0
Loafing Lot Management System	System	0	0
Reforestation of Erodible Pasture	Acres	480	0
Residential			
Septic Systems Pump-out Program (RB-1)	System	38	0
Connection to Public Sewer (RB-2)	System	0	0
Septic System Repair (RB-3)	System	20	0
Septic System Installation/Replacement (RB-4)	System	11	0
Septic Tank System Installation/Replacement w/ Pump (RB-4P)	System	4	0
Alternative Waste Treatment System Installation (RB-5)	System	2	0
Residential Land Vegetated Buffers	Acres	2	0
Community Pet Waste Education Program	Program	Ongoing	Ongoing
Residential Pet Waste Composters	System	40	0

[1]The average livestock exclusion system installed within the area is 1,880 ft in length.

Table 16 Stage I and Stage II implementation goals for Whitethorn Creek.

Control Measure	Unit	Stage I	Stage II
Agricultural		1st 6 years	Final 4
LE-1T Livestock Exclusion	System[1]	22	0
LE-2T Livestock Exclusion	System[1]	2	0
WP-2T Livestock Exclusion	System[1]	2	0
CRP Livestock Exclusion	System[1]	1	0
CREP Livestock Exclusion	System[1]	7	0
Livestock Exclusion Maintenance	Feet	2,654	1,769
Improved Pasture Management	Acres	8,400	5,600
Retention Ponds - Pasture	Acres-	0	9,300
Waste Storage Facilities	System	2	0
Loafing Lot Management System	System	0	0
Reforestation of Erodible Pasture	Acres	1,528	0
Residential			
Septic Systems Pump-out Program (RB-1)	System	75	0
Connection to Public Sewer (RB-2)	System	8	0
Septic System Repair (RB-3)	System	43	0
Septic System Installation/Replacement (RB-4)	System	31	0
Septic Tank System Installation/Replacement	System	9	0
Alternative Waste Treatment System	System	5	0
Residential Land Vegetated Buffers	Acres	2	0
Community Pet Waste Education Program	Program	Ongoing	Ongoing
Residential Pet Waste Composters	System	55	0

[1]The average livestock exclusion system installed within the area is 1,880 ft in length.

Implementation Benefits

The primary benefit of implementation is cleaner waters within the Upper Banister River and its Tributaries. Implementation will provide safer, cleaner waters for recreational use, and reduce the incidence of infection through contact with the water. Specifically, fecal bacteria contamination in the Upper Banister River and Tributaries will be reduced to meet water quality standards and allow for safe recreational use.

It is difficult to gauge the impact that reducing fecal contamination will have on public health, as most cases of waterborne infection are not reported or are falsely attributed to other sources. However, because of the required reductions, the incidence of infection from fecal sources, through contact with surface waters, should be considerably reduced.

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

A clean water source has been shown to improve herd health. Fresh clean water is the primary nutrient for livestock. Many livestock illnesses can be spread through contaminated water supplies. A clean water source can prevent illnesses that reduce production and incur the added expense of avoidable veterinary bills. Beef producers in several Virginia counties have reported weight gains in

cattle after providing alternative water sources. Studies also show increased milk and butterfat production from dairy cattle drinking from a clean and reliable source.

Taking the opportunity to initiate an improved pasture management system in conjunction with installing clean water supplies will also provide economic benefits for the producer. Improved pasture management can allow a producer to feed less hay in winter months, increase stocking rates and consequently, improve the profitability of the operation. Standing forage utilized directly by the grazing animal is always less costly and of higher quality than the same forage harvested with equipment and fed to the animal. In addition to reducing forage costs to producers, intensive pasture management can boost profits by increasing the quality and amount of forage and productivity per acre.

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

Implementation of this plan will help foster continued local economic vitality and strength based on the recognition that clean water improves economic opportunities for Virginians, and a healthy economic base provides the resources and funding necessary to pursue restoration and enhancement activities.

The agricultural and residential practices recommended in this document are expected to provide economic and environmental benefits to the landowner. Specifically, alternative (clean) water sources, exclusion of livestock from streams, intensive pasture management, and private sewage system maintenance will each provide economic benefits.

Targeting

The impaired watershed was divided into sub-watersheds for TMDL modeling purposes and this also helps with the targeting of BMP practices (Figure 11). Targeting of critical areas for livestock fencing was accomplished through analysis of livestock population and the fencing requirements for each sub-watershed. The sub-watersheds were ranked in descending order based on the ratio of animals per fence length along perennial streams (Table 17). If feasible, an effort should be made to prioritize financial and technical resources in the order of sub-watersheds shown in Table 17.

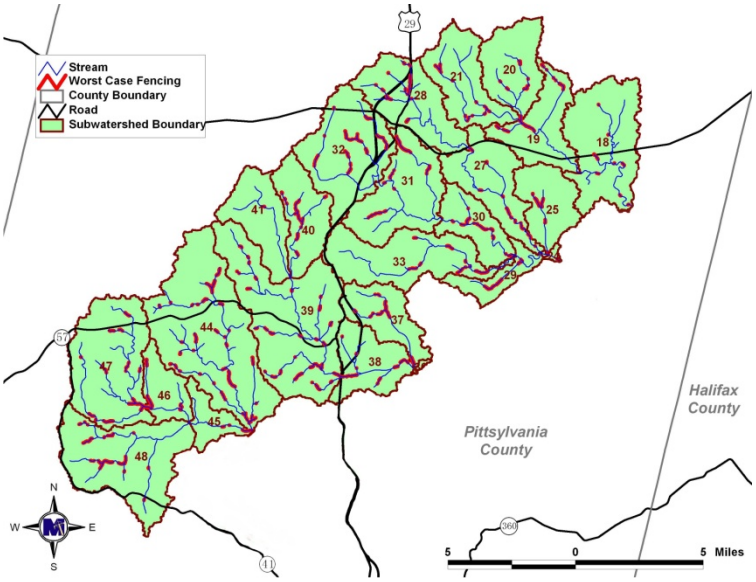

Figure 11 Area available for streamside fencing the Upper Banister River and Tributaries watershed.

Table 17 Sub-watershed targeting order for streamside fencing in Upper Banister River and Tributaries watershed.

Priority	Sub-watershed
1	24
2	18
3	27
4	21
5	33
6	31
7	20
8	45
9	44
10	19
11	30
12	25
13	28
14	48
15	47
16	32
17	46
18	29

There was some discussion within the working groups about how to target implementation among the impairments themselves, in regards to which impairment to focus on initially. It was suggested to target implementation along the Whitethorn impairment at the mouth of the watershed, due to its relatively small impaired stream length. The idea is that since the impaired length is relatively short,

and has been significantly reduced from previous listing cycles, that targeting BMPs in this area should result in a relatively simple delisting of the impairment. Also, it would more effectively utilize targeted TMDL implementation funds as opposed to allocate cost-share to land owners throughout the entire Whitethorn Creek watershed. Working group members agreed with this recommendation.

Monitoring

Improvements in water quality will be determined in the Upper Banister watershed through monitoring conducted by the Virginia Department of Environmental Quality's (VADEQ) monitoring program. Figure 12 shows the monitoring stations on impaired streams within the TMDL watershed. Table 18 lists the proposed VADEQ monitoring stations on the impaired streams of this implementation plan. These are subject to change based upon the development of the VADEQ Monitoring Strategy. Typically, monitoring in an implementation area begins two years after implementation is initially funded, and monitoring continues bimonthly in two-year cycles. The VADEQ uses the data to determine overall water quality status, and gauge the success of implementation aimed at reducing the amount of pollutants in the streams of the Upper Banister watershed.

The VADEQ monitoring stations in the Upper Banister River and Tributaries watershed are described in Table 18 and shown in Figure 12. Stations are monitored every other month within the monitoring period listed in Table 18. Currently, no volunteer monitoring is occurring in the Upper Banister River and Tributaries Watershed.

Up-to-date monitoring results are available to residents by requesting the information from the VADEQ.

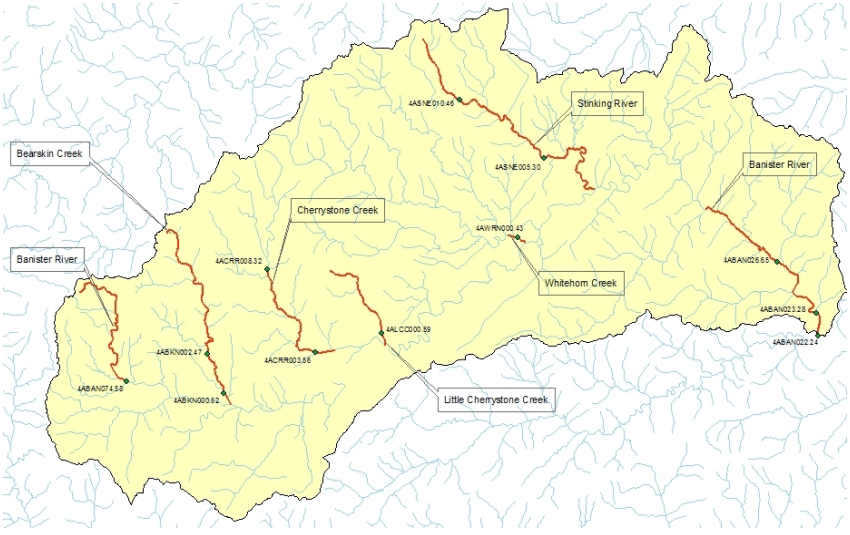

Figure 12 Upper Banister Watershed Monitoring Stations.

Table 18 Upper Banister watershed VADEQ monitoring stations.

Stream Name	Station ID	Station Description	Listing Station
Banister River	4ABAN074.58	@ Strawberry Rd (Route 750)	No
Bearskin Creek	4ABKN000.52	@ Route 703 Tight Squeeze Road	Yes
Bearskin Creek	4ABKN002.47	@ Mitchell Road (Route 612)	No
Cherrystone Creek	4ACRR003.56	Business Route 29	Yes
Cherrystone Creek	4ACRR008.32	Station #1 at Dam-Pittsylvania County	No
Little Cherrystone Creek	4ALCC000.59	@ Route 57-Halifax Road	No
Whitethorn Creek	4AWRN000.43	Route 683, Cedar Hill Road	Yes
Stinking River	4ASNE005.30	Route 927 Bridge	Yes
Stinking River	4ASNE010.46	@ Midway Road (Route 671)	No

Education

Personnel from the Pittsylvania SWCD and NRCS will initiate contact with farmers in this watershed to encourage the installation of agricultural BMPs. This one-on-one contact will facilitate communication of the water quality problems and the corrective actions needed. The technical support staff for the implementation will conduct a number of outreach activities in the watershed to raise local awareness, encourage community support and participation in reaching the Implementation Plan milestones. Such activities will include information exchange through newsletters, postcard mailings, field days and, presentations at local Ruritan and Rotary Clubs. The technical staff should work with Virginia Cooperative Extension and organizations such as the Cattlemen's Association, Dairymen's Association, And Farm Bureau to sponsor farm tours and field days.

Stakeholders' Roles and Responsibilities

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

Environmental Protection Agency

The EPA has the responsibility for overseeing the various programs necessary for the success of the Clean Water Act. However, administration and enforcement of such programs falls largely to the states. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. Currently, there are six state agencies responsible for regulating activities that impact water quality with regard to this Implementation Plan. These agencies include: VADEQ, DCR, VDH, VCE, DOF, and Virginia Department of Agriculture and Consumer Services (VDACS).

Department of Environmental Quality

VADEQ has responsibility for monitoring the waters to determine compliance with state standards and for requiring permitted point dischargers to maintain loads within permit limits. They have the regulatory authority to levy fines and take legal action against those in violation of permits. Beginning in 1994, animal waste from confined animal facilities in excess of 300 animal units (cattle and hogs) has been managed through a Virginia general pollution abatement permit. These operations are required to implement a number of practices to prevent groundwater contamination. In response to increasing demand from the public to develop new regulations dealing with animal

waste, in 1999 the Virginia General Assembly passed legislation requiring VADEQ to develop regulations for the management of poultry waste in operations having more than 200 animal units of poultry (about 20,000 chickens) (ELI, 1999). On January 1, 2008 the Virginia Department of Environmental Quality (VADEQ) assumed regulatory oversight of all land application of treated sewage sludge, commonly referred to as biosolids. VADEQ's Office of Land Application Programs within the Water Quality Division to manages the biosolids program. The biosolids program includes having and following nutrient management plans for all fields receiving biosolids, unannounced inspections of the land application sites, certification of persons land applying biosolids, and payment of a $7.50 fee per dry ton of biosolids land applied.

Department of Conservation and Recreation

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

Pittsylvania Soil and Water Conservation District

The Pittsylvania SWCD will provide outreach, technical and financial assistance to farmers and property owners in the Upper Banister River and Tributaries watershed through the Virginia Agricultural BMP Cost-Share and Tax Credit programs. Their responsibilities will include promoting implementation goals, available funding and the benefits of BMPs and providing assistance in the survey, design, layout, and approval of agricultural BMPs. Education and outreach activities are a significant portion of their responsibilities.

It is recommended that stakeholders and participants consult the experienced personnel at the Pittsylvania Soil and Water Conservation District in order to choose the most applicable BMPs, the programs that best fit their needs, and the funding sources to match.

Natural Resources Conservation Service

NRCS offers a number of conservation programs to help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty. USDA programs that could fund agricultural BMPs in the watershed area include: Conservation Reserve Enhancement Program (CREP), Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), Wetland Reserve Program, and Grassland Reserve Program.

Virginia Department of Agriculture and Consumer Services

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

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

Virginia Department of Health

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

Local Government

Pittsylvania County, Town of Chatham, and the Town of Gretna can develop programs and ordinances involving pollution prevention measures and play a very active role in the TMDL implementation process. Actions include, in order of priority:

- Exploring options for providing sewer service to more residents, including conventional and alternative systems
- Making landowners in the watershed aware of implementation goals, cost-share assistance, and voluntary options that are beneficial.
- Providing information for pet owners related to the benefits of picking up after their pets
- Mailing educational materials explaining specific practices that individuals and small groups can use to reduce pollution (particularly bacteria) from reaching streams.
- Promoting the use of sustainable growth practices that minimize or eliminate storm water runoff from future development.
- Assist in tracking BMP installation.

Citizens and Businesses

The primary role of citizens and businesses is to be aware of the implementation plan and be knowledgeable about bacteria sources in the local watersheds. Taking responsibility of minimizing potential sources on property that they own or manage can be done through implementing this plan.

Successful implementation depends on stakeholders taking responsibility for their role in the process. This could include using pet waste composters if they have dogs, getting septic tanks pumped on a regular basis and talking with friends and neighbors about things they can do to protect water quality. While the primary role falls on the landowner, local, state and federal agencies also have a stake in seeing that Virginia's waters are clean and provide a healthy environment for its citizens. While it is unreasonable to expect that the natural environment (e.g., streams and rivers) can be made 100% free of risk to human health, it is possible and desirable to minimize anthropogenic problems. Virginia's approach to correcting NPS pollution problems has been, and continues to be, encouragement of participation through education and financial incentives.

However, if progress is not made toward restoring water quality using this voluntary approach, more regulatory controls may be established and enforced.

Integration with Other Water Quality Programs and Activities

The remaining three impaired segments from the original TMDL study will be accounted for in a separate Implementation Plan, The Lower Banister River, Sandy Creek and Polecat Creek Implementation Plan in Halifax County, to be completed by June 2012. Clearly the development of the downstream IP will be highly linked to this one, as its success is directly related to successfully attaining the water quality standards in these upstream impairments.

This watershed, like all watersheds in the state, is under the jurisdiction of a multitude of individual, yet related, water quality programs and activities which have specific geographic boundaries and goals. In the Banister River watershed these include, but are not limited to the Dan River Basin Association activities in the Dan River watershed. Other programs may include: water quality management plans, erosion and sediment control regulations, and stormwater management plans. Coordination of local implementation with these existing programs could result in additional resources and increased participation.

Funding for Implementation

Potential funding sources available to assist with implementation were identified during Implementation Plan development. Detailed descriptions can be obtained from the Pittsylvania SWCD, DCR, and NRCS. Sources include:

Federal
Federal Clean Water Act 319 Incremental Funds
Community Development Block Grant Program
Conservation Reserve Program (CRP)
Conservation Reserve Enhancement Program (CREP)
Environmental Quality Incentives Program (EQIP)
Grassland Reserve Program (GRP)
Wildlife Habitat Incentive Program (WHIP)
Wetland Reserve Program (WRP)

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

Local
Indoor Plumbing Rehabilitation Program

Private
Small Watershed Grants Program
Southeast Rural Community Assistance Project (SE/R-CAP)

National Fish and Wildlife Foundation

List of Acronyms

BMP	Best Management Practice
BST	Bacteria Source Tracking
CREP	Conservation Reserve and Enhancement Program
CWA	Clean Water Act
DCR	Virginia Department of Conservation and Recreation
VADEQ	Virginia Department of Environmental Quality
DOF	Virginia Department of Forestry
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
LID	Low Impact Development
NPS	Non-point Source (pollution)
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
GWG	Government Working Group
TMDL-IP	Implementation Plan
NPS	Nonpoint Source Pollution
NRCS	Natural Resources Conservation Service
RWG	Residential Working Group
SL-6	Grazing Land Protection System
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load

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