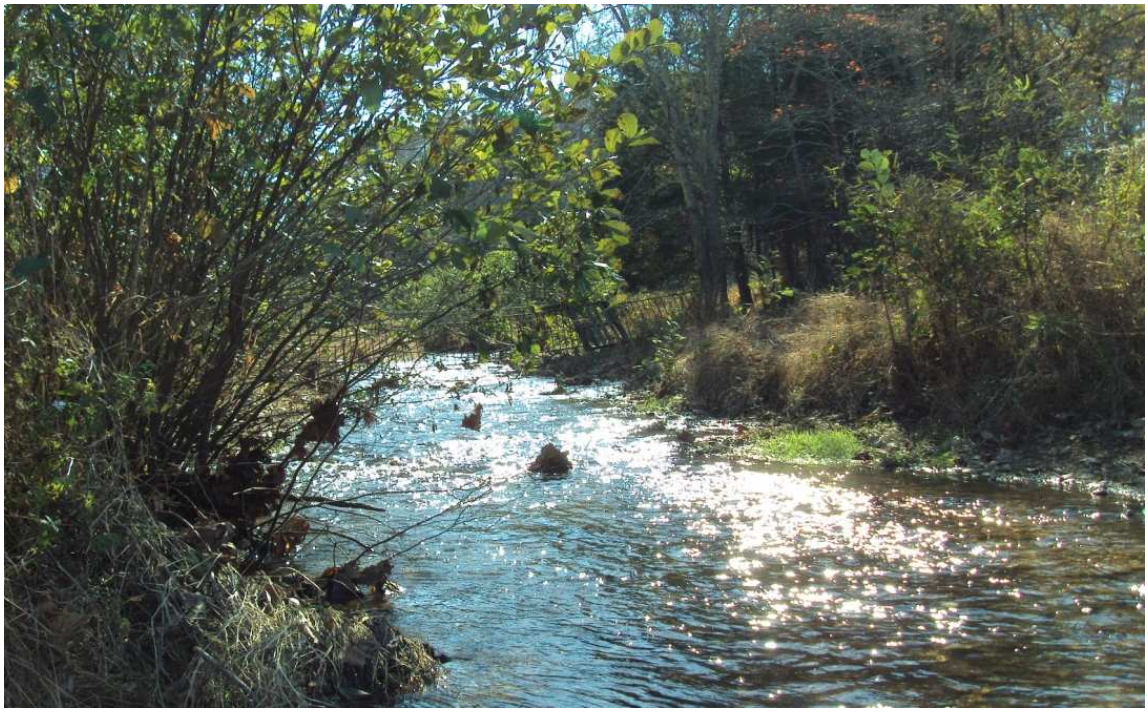

ROCKFISH VALLEY WATERSHED IMPROVEMENT PLAN

A plan to reduce bacteria and sediment in the Rockfish River and its tributaries

Prepared by:
The Virginia Department of Environmental Quality
The Virginia Department of Conservation and Recreation
In Cooperation with:
Virginia Tech's Department of Biological Systems Engineering
Local Stakeholders

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Thomas Jefferson Planning District Commission
Rockfish Valley Foundation
Shannon Farm
Wintergreen Resort
Virginia Cooperative Extension
James River Association
Rockfish Valley Community Center
Local Landowners

1. INTRODUCTION

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

The CWA became federal law in 1972 and gives responsibility to states to monitor waterways in order to identify polluted sections. Through this program, the Commonwealth of Virginia has found many streams which do not meet state water quality standards for protection of the five beneficial uses: recreation, the production of edible and marketable natural resources, aquatic life, wildlife, and drinking. When streams do not meet standards, they are placed on the state's "dirty waters" or impaired waters list which is reported to the US Environmental Protection Agency every even-numbered year for each waterbody. Virginia must then develop a Total Maximum Daily Load, or TMDL, for each pollutant contributing to the impairment. A TMDL is a pollution budget for a stream. In other words, it sets limits on the amount of pollution that a stream can tolerate and still maintain water quality standards. In order to develop a TMDL, background concentrations, point source loadings, and non-point source loadings are considered. Non-point source pollution occurs when pollutants are transported across the land to a body of water when 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.

WHAT IS A WATERSHED? It's an area of land that drains to a common point or body of water.

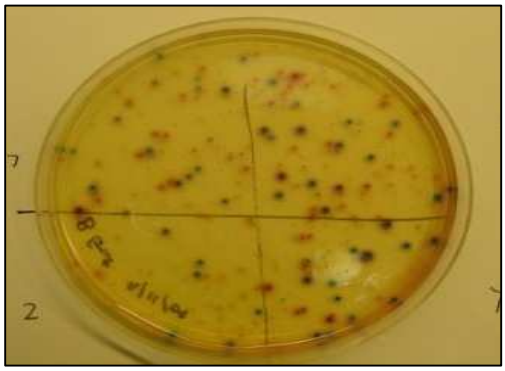
TOTAL MAXIMUM DAILY LOAD

A <u>TMDL</u> is a pollution budget for a stream, which sets a maximum amount of a pollutant that can be released into a stream but still allows the stream to maintain water quality standards. It is also the process of improvement that Virginia uses to make streams healthier and cleaner.

WATER QUALITY PROBLEMS

TMDLs were developed for the North Fork Rockfish River, South Fork Rockfish River and mainstem Rockfish River in 2011 after water quality monitoring showed:

1) The North Fork Rockfish, South Fork Rockfish and portions of the mainstem Rockfish River were violating the water quality standard for bacteria, which is based on the concentration of *E. coli* in the water. *E. coli* comes from the intestines of warm-blooded animals and can pose risks to human health including gastrointestinal illness or infection. This risk to human health is the basis of the state's water quality standard and assessment criterion, where *E. coli* should not exceed 235 colonies per 100 mL of stream water at any time.



These small, dark dots are *E. coli* growing among other fecal bacteria colonies (colored red) growing on media after being collected in a water sample from a river in Augusta County, VA.
(Photo credit: Sandy Greene)

2) In addition, Taylor Creek, a tributary which flows into the North Fork Rockfish, did not meet the aquatic life use. This standard states that all state waters should support "the propagation and growth of a balanced indigenous population of aquatic life…" Based on biological monitoring conducted by the Virginia Department of Environmental Quality (DEQ), it was concluded that Taylor Creek was not meeting this designation. Through the TMDL process, the primary stressor on the aquatic community was identified as sediment. Here are a few examples of benthic macroinvertebrates which are sampled as part of VADEQ's biological monitoring (L – R): Stonefly larva, fly larva, mayfly larva, and caddisfly larva (all images from www.usask.ca/biology/skabug).

The North Fork Rockfish, South Fork Rockfish, mainstem Rockfish River and Taylor Creek TMDLs specified the maximum bacteria and sediment loads that a stream can handle and still meet the water quality standard for bacteria while also supporting a healthy and diverse aquatic population.

ROCKFISH WATERSHED TMDL IMPLEMENTATION PLAN

Once a TMDL is developed, measures must be taken to reduce pollutant levels in the relevant streams. An Implementation Plan describes those measures, which can include the use of better treatment technology and the installation of best management practices (BMPs) to be implemented in order to meet the water quality goal established by the TMDL. In the Rockfish Watershed, this was also referred to as an Improvement Plan, and the two terms are used interchangeably in this document. There are nine components that need to be included in the implementation plan:

1) A listing of the causes and sources of bacteria and sediment that will need to be controlled to meet the water quality standards.
2) Reductions in bacteria and sediment 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/or the sources and authorities that will be relied upon to implement the watershed-based plan.
5) An information/education component that will be used to enhance public understand 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 and sediment reductions are being achieved and if progress is being made towards attaining water quality standards.
9) A monitoring program to evaluate the effectiveness of the implementation effort.

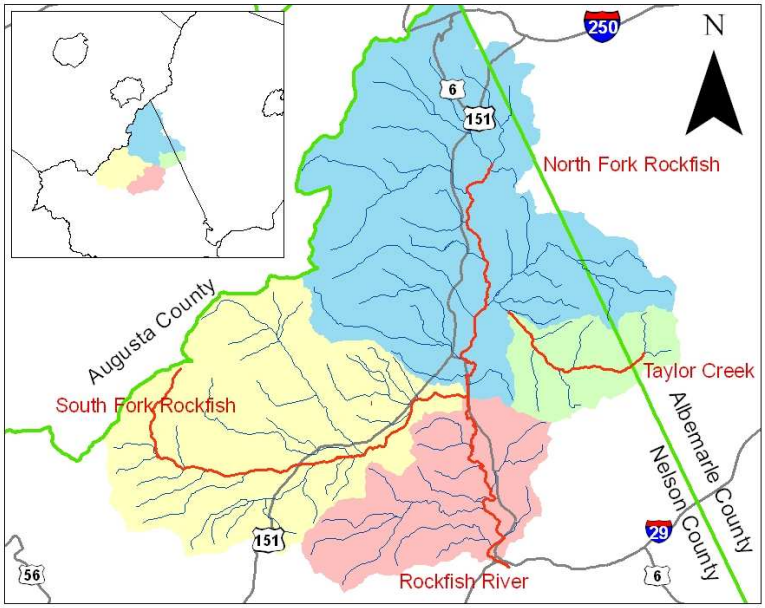
2. REVIEW OF WATER QUALITY STUDIES

Several studies have been completed on the Rockfish River and its tributaries to determine if they are safe and healthy.

WATERSHED CHARACTERISTICS

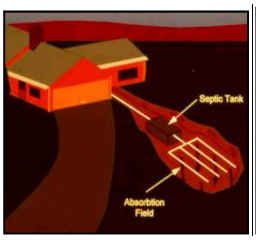
The Rockfish River watershed is located in Nelson County and a small portion of Albemarle County. The watershed is approximately 67,500 acres in size and eventually drains to the James River. The predominant land use in the Rockfish River watershed is forest, which comprises 84% of the watershed area.

The bacteria impairment on the North Fork Rockfish begins in the headwaters and extends 7.2 miles to its confluence with the Rockfish River. The South Fork Rockfish bacterial impairment extends 11.6 miles from its headwaters to its confluence with the mainstem Rockfish River. The bacteria impairment on the Rockfish River extends from the confluence of its North and South Forks to its confluence with Davis Creek, which is a total of 6.5 miles. The benthic impairment on Taylor's Creek extends 5 miles from its headwaters to the confluence with North Fork Perry Creek.



SOURCES OF BACTERIA IN THE ROCKFISH RIVER

Direct deposit into streams of manure from livestock, wildlife, and illegal straight pipes (pipes directly discharging untreated sewage into the stream) were determined to be the primary sources of bacteria in these watersheds. Non-point sources of bacteria include failing septic systems, livestock, wildlife and domestic pets. Point sources, such as wastewater treatment plants, can also contribute bacteria loads to waterways through effluent discharges. There are currently 2 point source permits in the Rockfish River watersheds.



SOURCES OF SEDIMENT IN TAYLOR CREEK

The sources of sediment in Taylor Creek can be attributed to surface runoff and in-stream/streambank contributions. When sediment, otherwise known as soil or dirt, washes off the land it is transported by surface runoff. In Taylor Creek, soil is washing off residential area, forest harvesting areas, pastureland, and non-vegetated areas along the stream. In-stream and streambank erosion can be caused by livestock trampling the bank to get into or out of the stream.

GOALS FOR REDUCING BACTERIA

The TMDL water quality study identified goals for reducing bacteria from different sources in the watershed. There are two sets of goals: the first set is to enable the impaired sections of the Rockfish River and its tributaries to again meet the water quality assessment criterion and allow for the evaluation of the effectiveness of practices. Meeting this first set of goals will allow the streams to be "de-listed" and will remove them from the "dirty waters" list. This set of goals can be found in the following table.

Goals for bacteria reductions in the Rockfish River to meet "de-listing" criteria
(DD = direct deposit)

Stream Name	Bacteria Reduction Goals based on Land Use				
	Livestock DD	Pasture	Cropland	Straight Pipes	Residential Areas
North Fork Rockfish River	**55%**	**25%**	**0%**	**100%**	**73%**
South Fork Rockfish River	**55%**	**25%**	**0%**	**100%**	**38%**
Rockfish River	**30%**	**10%**	**0%**	**100%**	**71%**

The second set of goals is to reduce bacteria so that the Rockfish River never violates the water quality standard. This challenging set of goals is required by EPA to be included in Implementation Plans. These reduction goals can be found in the next table.

Goals for bacteria reductions in the Rockfish River to never exceed Water Quality Standard (DD = direct deposit)

Stream Name	Bacteria Reduction Goals based on Land Use				
	Livestock DD	Pasture	Cropland	Straight Pipes	Residential Areas
North Fork Rockfish River	**100%**	**25%**	**0%**	**100%**	**73%**
South Fork Rockfish River	**100%**	**25%**	**0%**	**100%**	**38%**
Rockfish River	**100%**	**10%**	**0%**	**100%**	**71%**

GOALS FOR REDUCING SEDIMENT

Sediment was identified as the primary pollutant stressing the benthic community. Excess sediment can be a problem because it can fill in the small spaces and niches between rocks on the bottom of the stream, making it difficult for aquatic organisms to reproduce, move around, make their homes, and find food. The TMDL study identified that Taylor Creek only required a small percentage of sediment reduction, 9% overall, to bring the aquatic community back to healthy levels.

3. PUBLIC PARTICIPATION

Local stakeholders' input on conservation and outreach strategies is essential to creating an improvement plan that will make meaningful change in the local community.

PUBLIC MEETINGS

On September 7, 2011, a public meeting reviewing the TMDL water quality study and introducing the implementation plan process was held at the Rockfish River Elementary School. A community meeting wrapping up the process, unveiling the implementation plan, and celebrating all the work that has already been done on the Rockfish, was held on May 16, 2012 at the Rockfish Valley Community Center. Members of the Nelson County Board of Supervisors welcomed folks to the meeting and copies of the *Rockfish Valley Watershed Improvement Plan* were distributed. Tara Sieber from DEQ reviewed the background of the water quality study and its contents. Speakers from the Virginia

Department of Health and local community leaders spoke on the assistance available for landowners who were interested in putting into place practices to reduce bacteria from their properties, such as fixing their straight pipes, providing alternative water supplies for their cattle, and other residential and agricultural practices.

WORKING GROUPS

Two Working Groups met over the course of the development of the Implementation Plan. One focused on residential practices that can reduce bacteria from homeowners, and the other focused on agricultural land uses and what practices would be utilized by local producers to reduce bacteria. The Working Groups met on September 21, 2011 and November 29, 2011 and the Agricultural Working Group met an additional time on January 31, 2012. Due to serious stakeholder concerns regarding erosion within the stream channels in the watershed, a Streambank Erosion Workshop was held on October 25, 2011 at the Rockfish Valley Community Center. At this meeting, representatives from the US Army Corps of Engineers (the Corps), DEQ's Virginia Water Protection Program (DEQ-VWP), and the Virginia Department of Game and Inland Fisheries (DGIF) Stream Rehabilitation program summarized their programs and available assistance to local landowners. The Army Corps of Engineers stated that some of the regulations can be waived for small, landowner-controlled projects that the Corps has been informed about and inspected. The DEQ-VWP representative told the group that the DEQ program and Corps programs work hand-in-hand to make it as easy for landowners as possible. There were many questions about specific activities and locations in the Rockfish River watershed. The DGIF Stream Rehabilitation specialist showed the group many photos of before a restoration project and then after her program came in. The comparison was startling and it was helpful for the group as a whole to have a question and answer session with the presenters to bring up individualized concerns.

STEERING COMMITTEE

The Steering Committee was comprised of representatives from each of the Working Groups as well as interested organizations and government agencies. The Steering Committee met twice, once on January 31, 2012 and once on February 28, 2012. The January meeting discussion began with an introduction by Tara Sieber from DEQ to the Steering Committee as a group and the purpose of the group as a whole. The group then began constructing a rough timeline for implementation. It was decided that 5 year increments should be used; five years to meet the water quality assessment criterion and then an additional five years to achieve the challenging TMDL goal of never

exceeding water quality standards. The Steering Committee also discussed the possibility of adding additional monitoring stations through the DEQ Citizen Nomination process. The second meeting in February was primarily concerned with setting a timeline for implementation and sharing BMP cost-share data amongst the various partners working on projects. The Nelson County Department of Planning and Zoning offered to provide assistance towards organizing and managing information relating to watershed health and restoration efforts. However, the Virginia Department of Forestry will continue to track the forest harvesting operations, and the TJSWCD, DCR and NRCS will continue to track agricultural cost-share projects. The attendees of this meeting decided that May would be a good time for the final public meeting which would introduce the improvement plan to the community as a whole.

4. IMPLEMENTATION ACTIONS

An important part of the development of the implementation plan is to identify and prioritize actions and practices that landowners can put into place to improve water quality.

STAKEHOLDER REVIEW

This plan relied heavily on stakeholder input and review. Although the TMDL study directly recommended certain actions should be taken to reduce bacteria contributions, such as the removal of livestock direct deposition and straight pipes, a combination of practices were needed to achieve the necessary reductions. This plan was tailored to the specific needs and requirements of the Rockfish Watershed by the involvement of local stakeholders. The citizens involved represented local organizations, neighborhoods and interests throughout the process.

Photo: SVSWCD

AGRICULTURAL PRACTICES

To estimate fencing needs, information on the stream network was compared with land use data. Stream segments that flowed through or were adjacent to pasture were identified. If the stream segment flowed through a pasture, it was assumed that fencing was needed on both sides of the stream. If a stream segment flowed adjacent to a pasture, it was assumed that fencing was required on only one side of the

stream. 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. The VADCR Agricultural BMP Database was utilized in conjunction with input from SWCD and NRCS staff to determine typical characteristics (e.g., average length of fencing installed per fencing project) 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. In addition, data on stream fencing already in place was collected for each watershed and subtracted from the total fencing needed.

Farmers who wish to exclude their livestock from the stream have several options through state and federal cost share programs. 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 farmers and agricultural conservation professionals.

Farmers who cannot afford to give up a significant amount of land for a streamside buffer can receive 50% cost share for the installation of exclusion fencing with a ten foot setback, cross fencing, and to provide an alternative water source for their livestock (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 (code LE-1T). Voluntary fencing is fencing that a landowner places wherever is suitable for the parcel of land and accommodating for the landowner.

One pasture practice that will help water quality is prescribed grazing through rotational grazing systems. Vegetated buffers were also included in the implementation plan to treat runoff from pasture. These buffers will act as filters, trapping bacteria, sediment and phosphorous before it runs into the stream (VADCR, 2010).

Photo: USDA-NRCS

Fencing Estimates and Stream Lengths included in Stream Exclusion

Watershed	Stream Length (miles)	Stream Adjoining Pasture (miles)	Estimated Livestock Exclusion Fencing Needed (miles)	Existing BMP Stream-side Fencing (miles)
North Fork Rockfish River	39	9	13	0.1
South Fork Rockfish River	28	3	6	0.5
Rockfish River	21	2	3	1.4
Total	88	14	22	2.0

Agricultural Practices needed to never exceed the water quality standards

Watershed	LE-1T Systems (linear feet) *(miles)*	LE-2T Systems (linear feet) *(miles)*	Voluntary Fencing (linear feet) *(miles)*	Pasture Needing Improved Pasture Management (%)	Improved Pasture Management (acres)
North Fork Rockfish River	17,424 *3.3*	45,301 *8.6*	6,969 *1.3*	82	2,530
South Fork Rockfish River	7,350 *1.4*	19,110 *3.6*	2,940 *0.6*	82	1,147
Rockfish River	2,577 *0.5*	6,701 *1.3*	1,031 *0.2*	33	145
Total	27,351 *5.2*	71,112 *13.5*	10,940 *2.1*	78	3,822

RESIDENTIAL PRACTICES

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 percentages of households served by failing septic systems and straight pipes in the watersheds are shown in the below table. 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 Virginia Department of Health and observations from septic system maintenance projects in the area (VADCR, 2010).

Residential Measures needed in the Rockfish River watersheds

Watershed	Septic Tank Pump-outs	Septic System Repair	Installation of Conventional Septic System	Installation of Alternative Waste Treatment System
North Fork Rockfish River	865	94	213	71
South Fork Rockfish River	495	43	99	35
Rockfish River	175	17	39	13
Total	**1,535**	**154**	**351**	**119**

5. EDUCATION AND OUTREACH

The stakeholders brainstormed many innovative and creative ideas to educate the community about water quality improvement practices.

AGRICULTURAL LAND USES

- Promote local businesses and foods through Nelson County Farmer's Market
- Consider flood insurance to allow landowners to insure their stream exclusion fencing against flooding
- Fund flexible fencing practices which allow landowners to place the fence where appropriate for the individual property – whether it be at the top of the bank, a ten foot setback, or greater
- Educate landowners regarding natural stream channel movements, and the importance of riparian areas
- Attempt to better account for voluntary measures undertaken by landowners without cost-share
- Proper manure storage could be a measure that could improve water quality in instances where the landowner is feeding next to the stream or in wintertime

- Facilitate neighbor-to-neighbor communication and interaction through field days, Ruritan and Rotary presentations, and other methods

RESIDENTIAL LAND USES

- Outreach to Nelson County food pantry and food bank clients to educate them regarding assistance for straight pipes and malfunctioning septic systems
- Reach homeowners and renters through Nelson County public schools Parent-Teacher Associations and science classes
- In order to reach economically distressed renters and homeowners, outreach could be targeted through Habitat for Humanity, in-home care companies, and other service-related companies and agencies
- It may be very helpful to prioritize by neighborhood and clump system maintenance together to achieve maximum efficiency and perhaps discounts from pump-out companies
- Kennels would be a point of outreach in order to educate pet owners about how pet waste contributes to bacteria in streams
- A number of various local groups would be the focus of presentations and focus groups to better understand the current conditions of septic systems, including the Senior Center, the RVCC, BINGO nights, Ruritan Clubs, and other civic organizations

6. COSTS OF IMPLEMENTATION

Implementation costs were gathered through stakeholder input and research.

Costs for Agricultural Measures needed

Practice	Estimated units needed	Average cost ($)/unit	Total cost ($)
Livestock Exclusion – Riparian Buffers (LE-1T) (2800 ft per system)	10	24,000	240,000
Livestock Exclusion – Reduced Setback (LE-2T) (2000 ft per system)	37	8,000	296,000
Voluntary Fencing (linear feet)	10,940	3.50	38,290
Improved Pasture Management (acres)	3,822	150	573,300
Critical Area Stabilization (acres)	0.85	1,355	1,153
Prescribed Grazing (acres)	11.7	31	362
Barnyard Runoff Controls	3	2,738	8,214
Forest Harvesting BMPs (acres)	54.5	75	4,090
Staff years	10 (1 for 10 years)	50,000	500,000
Total		–	1,661,409

Costs for Residential Measures needed

Practice	Estimated systems needed	Average cost ($) /system	Total cost ($)
Septic tank pump-out	1,535	300	460,000
Septic systems repaired	154	3,000	462,000
Septic systems replaced			
Conventional system w/o pump	309	6,000	1,854,000
Conventional system w/ pump	35	8,000	280,000
Alternative waste treatment	117	25,000	2,925,000
Straight pipes replaced			
Conventional system w/ pump	5	8,000	40,000
Alternative waste treatment	2	25,000	50,000
Staff years	5 (1 for 5 years)	50,000	250,000
Total			6,321,500

The number of staff years was calculated based on the personnel required for installation of the best management practices and measures. For planning purposes, one full-time employee was budgeted as $50,000/yr, including benefits. The agricultural employee would work through both Stage 1 and Stage 2 of implementation, for a total of 10 years. In comparison, the residential measure employee would work through just Stage 1 of implementation.

7. BENEFITS OF IMPLEMENTATION

The primary benefit of implementation is cleaner water in the Rockfish River and its tributaries.

In particular, *E. coli* contamination in the streams will be reduced to meet water quality standards and the aquatic communities in Taylor Creek will be restored. It is difficult to measure the impact this improvement will have on public health as many 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 should be greatly reduced following the implementation of the measures outlined in this plan.

It is important to note the exceptionality of Nelson County and its natural resources. Nelson County is located in the heart of Virginia and characterized by beautiful scenery, exceptional recreational opportunities and rural living. Although devastated by Hurricane Camille in 1969, the County's economic prosperity has grown through the development of Wintergreen Resort, the increasing popularity of local vineyards and wine culture in Virginia, and the close proximity to tourism for the George Washington National Forest, Shenandoah National Park and the Blue Ridge Parkway. Improving the Rockfish River in the northern portion of the county will only aid the recreational opportunities and economic development momentum.

Agricultural operations will benefit from improving local water quality. Restricting livestock access to streams and providing them with clean water sources has been shown to improve weight gain and milk production in cattle (Zeckoski et al., 2007). Please see the below table for an illustration of the potential benefits from a study by Virginia Tech and DCR. Studies have shown that increasing livestock intake of clean water can lead to increased milk and butterfat production and increased weight gain (Landefeld and Bettinger, 2002). 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 loading areas will reduce the amount of time that cattle have access to those areas (VADCR, 2010).

Typical Calf sale weight	Additional weight gain due to off-stream waterer	Price	Increased revenue due to off stream waterer
500 lb/calf	5% (25 lb)	$.60 per lb	$15 per calf

(source: Zeckoski et al., 2007)

Residential programs to reduce the contribution of bacteria from homes will play an important role in improving water quality. Human waste can carry pathogens and viruses and contribute to the spread of disease. The economic benefit of proper septic system connection and maintenance can reach past prolonging the life of septic systems for homeowners and extend in the local community. Local businesses that deal with septic pumping and repair will see an increased business from education on proper maintenance to septic system owners. **It is important to note that the cost of proper maintenance is relatively inexpensive in comparison to repairing or replacing an entire system.**

Proper Septic System Maintenance includes:

- Knowing the location of the system
- Avoiding planting trees in locations where they could damage the system
- Keeping hazardous chemicals out of the system
- Pumping out the system every 3-5 yrs

8. GOALS AND MEASURABLE MILESTONES

There are two goals that will be used to measure success: the first is for the Rockfish River to be removed from the state's list of impaired waters, and the second is for the Rockfish River to never exceed the water quality standard.

The first goal will be achieved when less than 10.5% of the water monitoring samples taken from the Rockfish River and its tributaries are below the *E. coli* assessment criterion of 235 bacteria colonies per 100 mL of water. This means that the Rockfish River can be taken off Virginia's List of Impaired Waters, which is reported to EPA every other year. The Steering Committee believed this would take about 5 years. The second goal will be reached when the samples from the Rockfish never exceed the water quality standard, and it is believed this will take an additional 5 years. This is a

challenging goal that EPA has required that all TMDL water quality studies be written to achieve.

This staged approach will allow for the prioritization of practices along stretches of ever-flowing streams and off of very steep slopes, which account for much of the headwaters area of the North Fork and South Fork watersheds. Also, consideration was taken to address the pollutant sources with the largest impact on water quality first, such as straight pipes and livestock direct deposits.

STAGE 1 – Agricultural Measures needed to remove the Rockfish River from VA's Impaired List

Watershed	Streams needing fencing (%)	Stream Exclusion w/ 35 ft (systems)	Stream Exclusion w/ 10 ft (systems)	Voluntary Fencing (Linear ft)	Improved Pasture Mgmt. (acres)
North Fork Rockfish	55%	4	13	3,833	2,530
South Fork Rockfish	55%	2	6	1,617	1,147
Rockfish River	30%	1	2	310	145
Total		**7**	**21**	**5,760**	**3,822**

STAGE 1 – Residential Measures needed to remove the Rockfish River from VA's Impaired List

Watershed	Septic Tank Pump-outs	Replace Straight Pipes	Repair Failing Septic Systems	Replace Failing Septic Systems
North Fork Rockfish	865	2	188	188
South Fork Rockfish	495	5	86	86
Rockfish River	175	--	35	34
Total	**1,535**	**7**	**209**	**208**

STAGE 2 – Additional Agricultural Measures needed to never exceed water quality standards

Watershed	Streams Needing fencing (%)	Stream Exclusion w/ 35 ft (Systems)	Stream Exclusion w/ 10 ft (Systems)	Voluntary Fencing (Lin. Ft)	Critical area stabilization (acres)	Prescribed grazing (acres)	Barnyard Runoff Controls (systems)	Forest Harvesting BMPs (Acres)
North Fork Rockfish	45%	2	10	3,136	0.85	11.7	3	54.5
South Fork Rockfish	45%	1	4	1,323	--	--	--	--
Rockfish River	70%	0	2	721	--	--	--	--
Total		**3**	**16**	**5,180**	**0.85**	**11.7**	**3**	**54.5**

These measures will be tracked in various ways. The Thomas Jefferson SWCD and DCR track control measures funded with state cost-share dollars. NRCS also tracks the practices that federal money pays for and shares that data with the Virginia Agricultural Cost-Share Program. Residential measures will be noted by the Virginia Department of Health. Forest harvesting best management practices will be tracked by the Department of Forestry. All of these organizations will alert the Nelson County Department of Planning and Zoning who will keep a database of where measures are installed, the money spent, and the assistance received.

The following table includes the costs for the various measures discussed above. Please keep in mind that an LE-1T practice includes 35 ft. setback and the LE-2T practices includes a 10 ft setback from the stream.

Costs of Staged Implementation of the Rockfish River Improvement Plan

Type of Control Measure		Implementation Costs		
		Stage 1	Stage 2	Total
Livestock Exclusion Measures				
	LE-1T systems	$168,000	$72,000	$240,000
	LE-2T systems	$168,000	$128,000	$296,000
	voluntary fencing	$20,160	$18,130	$38,290
Pasture Control Measures				
	improved pasture management	$573,300	-	$573,300
	critical area stabilization		$1,153	$1,153
	prescribed grazing		$362	$362
	barnyard runoff controls		$8,214	$8,214
Forestry Control Measure				
	forest harvesting BMPs		$4,090	$4,090
Residential Wastewater Control Measures				
	septic tank pump-out	$460,500	-	$460,500
	conventional septic systems	$2,174,000	-	$2,174,000
	alternative waste treatment systems	$2,975,000	-	$2,975,000
	septic system repairs	$462,000	-	$462,000
Technical Assistance				
	agricultural BMPs	$250,000	$250,000	$500,000
	residential BMPs	$250,000	-	$250,000
Total		**$7,040,460**	**$481,949**	**$7,982,909**

9. POTENTIAL FUNDING SOURCES

A list of potential funding sources available for implementation has been developed. Detailed descriptions can be obtained from the Thomas Jefferson SWCD, VADCR, Natural Resources Conservation Service (NRCS), and Virginia Cooperative Extension (VCE). While some assistance is available for agricultural BMPs and technical assistance for farmers through pre-existing programs, an additional funding commitment is needed to implement the residential and urban practices included in the plan.

Virginia Agricultural Best Management Practices Cost-Share Program

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

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, is 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 the credit cannot 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 independently or in conjunction with other cost-share programs on the stakeholder's portion of BMP costs. It is also approved for use in supplementing the cost of repairs to streamside fencing.

Virginia Agricultural Best Management Practices Loan Program

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

Virginia Small Business Environmental Assistance Fund Loan Program

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

Virginia Water Quality Improvement Fund

This is a permanent, non-reverting fund established by the Commonwealth of Virginia in order to assist local stakeholders in reducing point and nonpoint nutrient loads to surface waters. Eligible recipients include local governments, SWCDs, and individuals. Grants for point sources are administered through VADEQ and grants for nonpoint sources are administered through VADCR.

Conservation Reserve Program (CRP)

Through this program, cost-share assistance is available to establish cover of trees or herbaceous vegetation on cropland. 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. The payment to the participant is up to 50% of the cost for establishing ground cover.

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 and rental rates, and offering a flat rate incentive payment to place a permanent "riparian easement" on the enrolled area. Additional federal incentives can bring the effective cost share rate up to 115% of eligible expenses. Pasture and cropland adjacent to streams, seeps, springs, ponds and sinkholes are eligible to be enrolled. Buffers consisting of native, warm-season grasses on cropland, and 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. The State of Virginia will make an additional payment to place a perpetual easement on the enrolled area.

Environmental Quality Incentives Program (EQIP)

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. 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.

Chesapeake Bay Watershed Initiative

This initiative was authorized in the 2008 Farm Bill for 2009-2012. It provides technical and financial assistance to producers to implement practices that reduce sediment and nutrients to help protect and restore the Chesapeake Bay. Priority has been given to the Shenandoah and Potomac River Basins and selected watersheds that have impaired streams due to high levels of nutrients and sediment. Producers who live in an NRCS

high priority Chesapeake Bay watershed receive additional consideration in the funding ranking process.

Wildlife Habitat Incentive Program (WHIP)

WHIP is a voluntary program for landowners who want to develop or improve wildlife habitat on private agricultural 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. 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. 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.

Wetland Reserve Program (WRP)

This program is a voluntary program to restore and protect wetlands on private property. Landowners who choose to participate in WRP may receive payments for a conservation easement or cost-share assistance for a wetland restoration agreement. The landowner will retain ownership but voluntarily limits future use of the land. To be eligible for WRP, land must be suitable for restoration (formerly wetland and drained) or connect to adjacent wetlands. A landowner continues to control access to the land and may lease the land for hunting, fishing, or other undeveloped recreational activities.

Nelson County Community Development Foundation

Operated through the Thomas Jefferson Planning District Commission, this foundation assists local income and distressed homeowners with "funds, personnel and other assistance for the development of housing, health, water and wastewater facilities, education, recreation and economic development" (www.tjpdc.org). The Foundation has worked with a number of homeowners to rehabilitate straight pipes and failing septic systems.

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 staff across the region. They can provide (at no cost): 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.

National Fish and Wildlife Foundation

Grant proposals for this funding are accepted throughout the year and processed during fixed sign up periods. 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. Grants generally range between $10,000 and $150,000. 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, a 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.

Virginia Natural Resources Commitment Fund

This fund was established in the Virginia Code as a subfund of the Water Quality Improvement Fund in 2008. Monies placed in the fund are to be used solely for the Virginia Agricultural BMP Cost Share Program as well as agricultural needs for targeted TMDL implementation areas. Watersheds addressed in this water quality improvement plan are eligible for these funds, which are appropriated by DCR to Thomas Jefferson SWCD.

Clean Water State Revolving Fund

EPA 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.

Wetland and Stream Mitigation Banking

Mitigation banks are sites where aquatic resources such as wetlands, streams, and streamside buffers are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources. Mitigation banking is a commercial venture which provides compensation for aquatic resources in financially and environmentally preferable ways. Not every site or property is suitable for mitigation banking. Wetlands and streams are complex systems, and their restoration, creation, enhancement, or preservation often requires specialized ecological and engineering knowledge. Likewise, the mitigation banking process requires experience to efficiently navigate. Mitigation banks are required to be protected in perpetuity, to provide financial assurances, and long term stewardship. The mitigation banking processes is overseen by the Inter-Agency Review Team (IRT) consisting of several state and federal agencies and chaired by DEQ and Army Corps of Engineers. For more information, contact the Army Corps of Engineers or VADEQ's Virginia Water Protection Program.

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