

Upper York River Basin Bacteria Total Maximum Daily Load Implementation Plan

Technical Report



Submitted To: Virginia Department of Conservation and
Recreation

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Submitted: September 2011

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ACKNOWLEDGEMENTS

Jenny Biche', Rappahannock-Rapidan Regional Commission

Deirdre Clarke, Rappahannock-Rapidan Regional Commission

May Sligh, Virginia Department of Conservation and Recreation

Bob Slusser, Virginia Department of Conservation and Recreation

Charles Lunsford, Virginia Department of Conservation and Recreation

Katie Conaway, Virginia Department of Environmental Quality

Jennifer Carlson, Virginia Department of Environmental Quality

Bryant Thomas, Virginia Department of Environmental Quality

Greg Wichelns, Culpeper Soil and Water Conservation District

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Agricultural Working Group Members

Residential Working Group Members

Governmental Working Group Members

EXECUTIVE SUMMARY

Introduction

The Virginia Total Maximum Daily Load (TMDL) program is a process to improve water quality and restore impaired waters in Virginia. Specifically, TMDL is the maximum amount of pollutant that a waterbody can assimilate without surpassing the state water quality standards for protection of the six beneficial uses: drinking water, recreational (i.e., primary contact/swimming), fishing, shellfishing, aquatic life, and wildlife. If the water body surpasses the water quality standard during an assessment period, Section 303(d) of the Clean Water Act and the United States Environmental Protection Agency's Water Quality Management and Planning Regulation (40 CFR Part 130) both require states to develop a TMDL for each pollutant.

Beaver Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run were initially placed on the Commonwealth of Virginia's Section 303(d) List of Impaired Waters in 1998 for exceedances of the bacteria standard. Goldmine Creek was initially placed on the list in 2004 for exceedances of the bacteria standard. After these listings, a TMDL study was conducted to identify bacteria sources in the watersheds. The TMDL set limits on the amount of bacteria these streams can tolerate and still maintain support of the Recreational Use. After a TMDL study is complete and approved by the United States Environmental Protection Agency, Virginia's 1997 Water Quality Monitoring, Information and Restoration Act states in section 62.1-44.19:7 that the "Board shall develop and implement a plan to achieve fully supporting status for impaired waters". To comply with this state requirement, a TMDL implementation plan was developed to reduce bacteria levels to attain water quality standards allowing de-listing of streams from the Section 303(d) List of Impaired Waters. The TMDL implementation plan describes control measures, which can include the use of better treatment technology and the installation of best management practices, to be implemented in a staged process. Local support and successful completion of the implementation plan will enable restoration of the impaired water while enhancing the value of this important resource for the Commonwealth. Opportunities for Louisa, Orange, and Spotsylvania Counties; local agencies; and watershed residents to obtain funding will improve with an approved IP.

Key components of the implementation plan are discussed in the following sections:

- [Review of TMDL Development Study](#)
- [Public Participation](#)
- [Implementation Actions](#)
- [Measurable Goals and Milestones for Attaining Water Quality Standards](#)
- [Stakeholder's Roles and Responsibilities](#)
- [Integration with Other Watershed Plans](#)
- [Potential Funding Sources](#)

Review of TMDL Study

Impairment description, water quality monitoring, watershed description, source assessment, water quality modeling, and allocated reductions were reviewed to determine implications of TMDL and modeling procedures on implementation plan development. Conditions outlined in the TMDL development study to address the bacteria impairments in these watersheds include:

- Exclusion of most/all livestock including horses from streams is necessary;
- Substantial land-based NPS load reductions are called for on pasture and cropland;
- All straight pipes and failing septic systems need to be identified and corrected;
- Implicit in the requirement to correct straight pipes and failing septic systems is the requirement to maintain all properly functioning septic systems;
- Reductions to pet bacteria loads on residential land use are necessary; and
- Implicit in the requirement for no point source bacteria load adjustment is the requirement for point sources to maintain permit compliance.

Public Participation

The actions and commitments compiled in this document are formulated through input from citizens of the watershed; Louisa, Orange, and Spotsylvania Counties government; Town of Orange government ; Culpeper Soil and Water Conservation District; Thomas Jefferson Soil and Water Conservation District; Tri-County/City Soil and Water Conservation District; Virginia Department of Conservation and Recreation; Virginia Department of Environmental Quality; Virginia Department of Health; Virginia Cooperative Extension; Natural Resources Conservation Service; Farm Bureau; Piedmont Environmental Council; Southeast Regional Community Assistance Project; Rappahannock-Rapidan Regional Commission; Thomas Jefferson Planning District Commission, and Blue Ridge Environmental Solutions, Inc.

Public participation took place during implementation plan development on three levels. First, public meetings were held to provide an opportunity for informing the public as to the end goals and status of the project, as well as, a forum for soliciting participation in the smaller, more-targeted meetings (*i.e.*, working groups and Steering Committee). Second, three working groups were formed: Agricultural, Residential, and Governmental. Third, a Steering Committee was formed with representation from the Agricultural, Residential, and Governmental Working Groups; Louisa, Orange, and Spotsylvania Counties government; Town of Orange government ; Culpeper Soil and Water Conservation District; Thomas Jefferson Soil and Water Conservation District; Tri-County/City Soil and Water Conservation District; Virginia Department of Conservation and Recreation; Virginia Department of Environmental Quality; Virginia Department of Health; Virginia Cooperative Extension; Natural Resources Conservation Service; Rappahannock-Rapidan Regional Commission; Thomas Jefferson Planning District Commission; and Blue Ridge Environmental Solutions, Inc. to guide the development of the implementation plan. Over 500 man-hours were devoted to attending these meetings by individuals representing agricultural, residential, commercial, environmental, and government interests on a local, state, and federal level. Throughout the public participation process, major emphasis was placed on discussing best management practices (BMPs), locations of control measures, education, technical assistance, monitoring, and funding.

Implementation Actions

The actions and cost needed in both implementation stages were identified and quantified. The overall numbers presented represent the Stage II goal of TMDL source allocation attainment (*i.e.*, no water quality standard exceedance). An assessment was also conducted to quantify actions and cost to meet source allocations that translate to an instantaneous standard violation rate of 10.5% or less resulting in removal of

these streams from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters. This is referred to as the Stage I implementation goal.

The quantity of control measures, or BMPs, required during implementation was determined through spatial analyses of land use, stream-network, and the Commonwealth of Virginia aerial maps along with regionally appropriate data archived in the Virginia Department of Conservation and Recreation Agricultural BMP Database and TMDL document. Bacteria load reductions on land uses were determined through modeling alternative implementation scenarios, defining percentage of land use area or unit amount treated by control measure, then applying related reduction efficiency to the associated load. Additionally, input from local agency representatives, citizens, and contractors were used to verify the analyses. Estimates of control practices needed for full implementation in these watersheds are:

- * 42 Livestock Exclusion Systems (CREP)
- * 87 Livestock Exclusion Systems (EQIP/CBWI)
- * 87 Livestock Exclusion Systems (LE-1T)
- * Five Small Acreage Grazing Systems (SL-6AT)
- * 85 Livestock Exclusion Systems (LE-2T)
- * 14 Stream Protection Systems (WP-2T)
- * 26,966 acres of Improved Pasture Management
- * 15,141 acres of pasture treated by Retention Ponds
- * 346 acres of Permanent Vegetative Cover on Cropland (SL-1)
- * 336 acres of Reforestation of Erodible Crop and Pastureland (FR-1)
- * 2,320 acres of cropland with Manure/Litter/Biosolids Incorporation into Soil
- * 514 Septic Tank Pump-outs
- * 10 Connections to Public Sewer
- * 302 Septic System Repairs
- * 201 New Conventional Septic Systems
- * 55 Alternative On-site Sewage Disposal Systems
- * Three Pet Waste Education Programs
- * 120 Pet Waste Enzyme Digesting Composters
- * Seven Confined Canine Unit Waste Treatment Systems
- * 60 acres of residential landuse treated with Vegetated Buffers
- * 147 acres of residential landuse treated with Bioretention
- * 35 acres of residential landuse treated with Infiltration Trenches
- * Two Agricultural Technical Assistance Full Time Equivalent per year
- * Two Residential Technical Assistance Full Time Equivalent per year

Associated cost estimations for each implementation action were calculated by multiplying the average unit cost per the number of units. Focusing on Stage I (*i.e.*, removal of impairments from impaired waters list) costs, the total average installation cost for livestock exclusion systems and improved pasture management is \$9.16 million. The total installation cost for converting cropland to permanent vegetative cover and forest is estimated at \$0.22 million. Accordingly, total agricultural corrective action costs equal \$9.38 million. Estimated corrective action costs needed to replace straight pipes and fix failing septic systems during Stage I totals \$4.22 million. The cost to implement the pet waste reduction process totals an estimated \$0.16

million. Cost to install vegetated buffers, rain gardens, and infiltration trenches during Stage I equal \$0.54 million. The total costs to provide assistance in the agricultural and residential programs during Stage I implementation are expected to both equal \$1.04 million. The total Stage I implementation cost including technical assistance is \$16.38 million with the agricultural cost being \$10.42 million and residential cost \$5.96 million.

The primary benefit of implementation is cleaner waters in Virginia, where bacteria levels in the Beaver Creek, Goldmine Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run impairments will be reduced to meet water quality standards, benefiting human and livestock herd health, local economies, and aquatic ecosystems. It is hard 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, the incidence of infection from fecal sources, through contact with surface waters, should be reduced considerably. An important objective of the implementation plan is to foster continued economic vitality and strength. Healthy waters can improve economic opportunities for Virginians, and a healthy economic base can provide the resources and funding necessary to pursue restoration and enhancement activities. The control measures recommended in this document will provide economic benefits to the landowner, along with the expected environmental benefits on-site and downstream. Improved aesthetics in public areas (*e.g.*, parks) and surrounding businesses provided by control measures (*e.g.*, pet waste kiosks and bioretention) has the potential to draw local citizens and visitors to these areas. In addition, a healthy waterway has the potential to attract local citizens and visitors for recreation. With a major recreation area just downstream, Lake Anna, this is a vital enhancement to the public's enjoyment of the area. Additionally, money spent on materials and technical assistance resources by landowners, government agencies, and non-profit organizations in the process of implementing the implementation plan will stimulate the local economy.

Measurable Goals and Milestones for Attaining Water Quality Standards

The end goals of implementation are restored water quality in the impaired waters and subsequent de-listing of streams from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters. Progress toward end goals will be assessed during implementation through tracking of control measure installations. The Virginia Department of Environmental Quality will continue to assess water quality through its monitoring program. Implementation will be assessed based on reducing exceedances of the bacteria water quality standard, thereby improving water quality. Implementation of control measures is scheduled for 10 years and will be assessed in two stages. Stage I is based on meeting source allocations that translate to an instantaneous standard exceedance rate of 10.5% or less resulting in removal of streams from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters. The Stage II goal is based on implementing source allocations to meet the specified TMDL goal, 0% exceedance of water quality standards. Implementation of control measures is scheduled to begin in January 2012 lasting to December 2021. After implementation inception, five milestones will be met in two-year increments until streams are removed from the List of Impaired Waters.

Implementation in years one through eight for agricultural source reductions focuses on installing livestock stream exclusion systems, improving pasture management, and cropland conversion. BMPs installed in years nine and ten are based on additional treatment of bacteria load not treated during Stage I from pasture and cropland using improved pasture management, manure / biosolids incorporation into soil, and retention ponds. Implementation in years one through eight for residential bacteria loads focuses on performing septic tank pump-outs, identification and removal of straight pipes, repairing or replacing failed septic systems, instituting pet waste control education programs, installation of pet waste enzyme digesting composters, installation of confined canine unit waste treatment systems, and vegetated buffer installation. Rain garden and infiltration trench installations will be concentrated in years nine and ten if needed.

Water quality improvement is expected to increase each year, 12% overall bacteria load reduction is expected at the second year, 24% in the fourth year, 36% in the sixth year, and 49% in the eighth year. Based on water quality modeling projections, the impairments would be in a probable position to be delisted from the List of Impaired Waters at the fourth milestone. Considering the dynamics of a stream ecosystem and the inherent difficulties that may arise preventing implementation, the final milestone of TMDL allocation attainment was set at 10 years following implementation commencement.

The process of a staged implementation implies targeting of control measures, ensuring optimum utilization of resources. In quantifying agricultural BMPs through the use of aerial photography, land use, and stream network GIS layers, maps were formulated showing potential livestock stream access, pastures, and crop fields. These maps identify farm tracts that CSWCD, TCCSWCD, and TJSWCD should concentrate their efforts in. The district will coordinate with landowners and track BMP installation progress. Known problem areas, clusters of older homes, or houses in close proximity to streams known by the VDH will be targeted for on-site sewage disposal system control measures. Steps outlined in pet waste management stages results in targeting of source type and resources. Significant exposure to a rain garden and/or infiltration trench project would be attained if installed at schools, county administration buildings, or shopping centers in watershed.

Stakeholder's Roles and Responsibilities

Stakeholders are individuals who live or have land management responsibilities in the watershed, including government agencies, businesses, private individuals, and special interest groups. Successful implementation depends on stakeholders taking responsibility for their role in the process, and the primary role falls on the local groups that are most affected; that is, businesses, community watershed groups, and citizens. However, 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. Stakeholder participation and support is essential for achieving the goals of this TMDL effort (*i.e.*, improving water quality and removing streams from the impaired waters list). It must first be acknowledged that there is a water quality problem, and changes must be made as needed in operations, programs, and legislation to address these pollutants. In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions.

The Culpeper, Thomas Jefferson, and Tri-County/City Soil and Water Conservation Districts will provide cost-share funds, lead education and technical assistance efforts, and track best management practice

implementation for the agricultural and residential programs. State agencies conducting regulatory, education, or funding procedures related to water quality in Virginia include: Virginia Department of Environmental Quality; Virginia Department of Conservation and Recreation; Virginia Department of Health; Virginia Department of Agriculture and Consumer Services; Virginia Department of Game and Inland Fisheries; Virginia Department of Forestry; Virginia Cooperative Extension; and Virginia Outdoors Foundation. The Natural Resources Conservation Service will provide cost-share funds and technical assistance.

Integration with Other Watershed Plans

Each watershed within the state is under the jurisdiction of a multitude of individual yet related water quality programs and activities, many of which have specific geographical boundaries and goals. These include but are not limited to the Chesapeake Bay Watershed Implementation Plan, TMDLs, Roundtables, Water Quality Management Plans, Erosion and Sediment Control Regulations, Stormwater Management Program, Source Water Assessment Program, and local comprehensive plans. The progress of these planning efforts needs continuous evaluation to determine possible effects on implementation goals. Financial and technical resources may be maximized for implementation by coordinating and expanding the planning and implementation activities of these on-going watershed activities. Current initiatives within Louisa, Orange, and Spotsylvania Counties to be integrated with the Upper York River Basin TMDL IP include:

- Louisa, Orange, and Spotsylvania Counties Comprehensive Plans
- Town of Orange Comprehensive Plan
- Chesapeake Bay Watershed Implementation Plan
- Lake Anna Watershed Management Plan / Special Area Management Plan
- Louisa Shoreline Protection Plan
- Piedmont Environmental Council Strategic Plan
- Lake Anna Civic Association Strategic Plan
- Lake Anna Ecosystem Restoration Project
- York River and Small Coastal Basin Roundtable

Potential Funding Sources

Potential funding sources available during implementation were identified in the course of plan development. Detailed description of each source (*i.e.*, eligibility requirements, specifications, incentive payments) can be obtained from the Culpeper Soil and Water Conservation District; Thomas Jefferson Soil and Water Conservation District; Tri-County/City Soil and Water Conservation District; Virginia Department of Conservation and Recreation; Virginia Department of Health; Virginia Department of Environmental Quality; Virginia Department of Game and Inland Fisheries; Virginia Cooperative Extension; Virginia Outdoors Foundation; Natural Resources Conservation Service; Rapidan Better Housing; and Fluvanna-Louisa Better Housing Foundation. Potential funding sources include:

- Federal Clean Water Act Section 319 Incremental Funds
- U.S. Department of Agriculture (USDA) Conservation Reserve Enhancement Program (CREP)
- USDA Conservation Reserve Program (CRP)
- USDA Environmental Quality Incentives Program (EQIP)

- USDA Chesapeake Bay Watershed Initiative (CBWI)
- USDA Wetland Reserve Program (WRP)
- USDA Wildlife Habitat Incentive Program (WHIP)
- U.S. Fish and Wildlife Service Conservation Grants
- U.S. Fish and Wildlife Service Private Stewardship Program
- Virginia Agricultural Best Management Practices Cost-Share Program
- Virginia Agricultural Best Management Practices Tax Credit Program
- Virginia Water Quality Improvement Fund
- Virginia Forest Stewardship Program
- Virginia Small Business Environmental Compliance Assistance Fund
- Virginia Clean Water Revolving Loan Fund (VCWRLF)
- Virginia Outdoors Foundation
- York River and Small Coastal Basin Roundtable
- Community Development Block Grant Program
- Southeast Rural Community Assistance Project (Southeast RCAP)
- National Fish and Wildlife Foundation
- Chesapeake Bay Foundation
- Rapidan Better Housing
- Fluvanna-Louisa Housing Foundation

INTRODUCTION

Background

The Virginia Total Maximum Daily Load (TMDL) program is a process to improve water quality and restore impaired waters in Virginia. Specifically, TMDL is the maximum amount of pollutant that a water body can assimilate without surpassing the state water quality standards for protection of the six beneficial uses: drinking water, recreational (i.e., primary contact/swimming), fishing, shellfishing, aquatic life, and wildlife. If the water body surpasses the water quality criteria during an assessment period, Section 303(d) of the Clean Water Act (CWA) and the United States Environmental Protection Agency's (USEPA) Water Quality Management and Planning Regulation (40 CFR Part 130) both require states to develop a TMDL for each pollutant.

Beaver Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run were initially placed on the Commonwealth of Virginia's Section 303(d) List of Impaired Waters in 1998 for exceedances of the bacteria standard. Goldmine Creek was initially placed on the list in 2004 for exceedances of the bacteria standard. After these listings, a TMDL study was conducted in 2005 to identify bacteria sources in the watersheds and set limits on the amount of bacteria these rivers can tolerate and still maintain support of the Recreational Use. After the TMDL study is complete and approved by USEPA, Virginia's 1997 Water Quality Monitoring, Information and Restoration Act (WQMIRA) states in section 62.1-44.19:7 that the "Board shall develop and implement a plan to achieve fully supporting status for impaired waters". To comply with this state requirement, a TMDL IP was developed to reduce bacteria levels to attain water quality standards allowing delisting of impaired waters from the Section 303(d) List of Impaired Waters. The TMDL IP describes control measures, which can include the use of better treatment technology and the installation of best management practices (BMPs), to be implemented in a staged process. Local support and successful completion of the implementation plan will enable restoration of the impaired water while enhancing the value of this important resource for the Commonwealth. Opportunities for Louisa, Orange, and Spotsylvania Counties, local agencies, and watershed residents to obtain funding will improve with an approved IP.

Project Methodology

The overall goal of this project was to begin the process of restoring water quality in the Beaver Creek, Goldmine Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run watersheds. Specific objectives in meeting this goal were:

1. Development of a staged IP for the watersheds;
2. Coordination of public participation; and
3. Implementation of control measures.

Key components of the implementation plan are discussed in the following sections:

- [Review of TMDL Development Study](#)
- [Public Participation](#)
- [Implementation Actions](#)
- [Measurable Goals and Milestones for Attaining Water Quality Standards](#)
- [Stakeholder's Roles and Responsibilities](#)

- **Integration with Other Watershed Plans**
- **Potential Funding Sources**

Public participation was an integral part in developing the IP and is critical to promote reasonable assurance that the implementation actions will occur. Public participation took place during IP development on three levels. First, public meetings were held to inform the public of project end goals and status of the project, as well as, a forum for soliciting participation in the smaller, more-targeted meetings (i.e., working groups and Steering Committee). Second, working groups were assembled from communities of people with common interests and concerns regarding implementation process and were the primary arena for seeking public input. Agricultural, Residential, and Governmental working groups were formed. A representative from Virginia Department of Conservation and Recreation (VADCR), Rappahannock-Rapidan Regional Commission (RRRC), or Blue Ridge Environmental Solutions, Inc. (BRES) coordinated each working group in order to facilitate the process and integrate information collected from the various communities. Third, a Steering Committee was formed with representation from the Agricultural, Residential, and Governmental Working Groups; Louisa, Orange, and Spotsylvania Counties government; Town of Orange government; Culpeper Soil and Water Conservation District (CSWCD); Tri-County/City Soil and Water Conservation District (TCCSWCD); Thomas Jefferson Soil and Water Conservation District (TJSWCD); VADCR; Virginia Department of Environmental Quality (VADEQ); Virginia Department of Health (VDH); Virginia Cooperative Extension (VCE); Natural Resources Conservation Service (NRCS); RRRC; and BRES to guide the development of the IP. Potential control measures, their associated costs and efficiencies, and potential funding sources were identified through review of the TMDL, input from working groups and Steering Committee, literature review, and discussion with CSWCD, TCCSWCD, TJSWDC, NRCS, and VDH. Implementation actions that can be promoted through existing programs were identified, as well as actions not currently supported by existing programs and their potential funding sources. Control measures were assessed based on cost, availability of existing funds, reasonable assurance of implementation, and water quality impacts.

The quantity of control measures, or BMPs, recommended during implementation was determined through spatial analyses and modeling alternative implementation scenarios. Spatial analyses of land use, stream-network, farm tracts, and the Commonwealth of Virginia aerial maps along with regionally appropriate data archived in the VADCR Agricultural BMP Database and TMDL document were combined to establish average estimates of control measures required. Bacteria load reductions on land uses was determined through modeling alternative implementation scenarios, defining percentage of land use area or unit amount treated by control measure, then applying related reduction efficiency to the associated load. Additionally, input from local agency representatives, citizens, and contractors were used to verify the analyses.

The assessment of water quality impacts consisted of the development and evaluation of implementation scenarios. Implemental strategies were presented to and evaluated by the Steering Committee. Based on the evaluated strategies, a staged implementation timeline was developed. Implicit in the process of a staged implementation is targeting of control measures. Targeting was proposed to ensure optimum utilization of resources. Modeling was used to evaluate measurable goals and milestones by linking water quality with specific levels of implementation. Through this process, a staged implementation plan was developed that will establish full implementation within 10 years.

STATE AND FEDERAL REQUIREMENTS FOR IMPLEMENTATION PLANS

In developing this implementation plan, both state and federal requirements and recommendations were followed. Virginia's 1997 WQMIRA directs the State Water Control Board (SWCB) to "develop and implement a plan to achieve fully supporting status for impaired waters" (§62.1-44.19:4 through 19:8 of the Code of Virginia). WQMIRA establishes that the implementation plan shall include the date of expected achievement of water quality objectives, measurable goals, corrective actions necessary and the associated costs, benefits, and environmental impacts of addressing the impairments.

Section 303(d) of the CWA and current USEPA regulations do not require the development of implementation strategies. USEPA does, however, outline the minimum elements of an approvable IP in its 1999 "Guidance for Water Quality-Based Decisions: The TMDL Process". The listed elements include description of the implementation actions and management measures, timeline for implementing these measures, legal or regulatory controls, time required to attain water quality standards, monitoring plan, and milestones for attaining water quality standards.

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

1. Identify the causes and sources of groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan;
2. Estimate the load reductions expected to achieve water quality standards;
3. Describe the NPS management measures that will need to be implemented to achieve the identified load reductions;
4. Estimate the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement the watershed-based plan;
5. Provide an information/education component that will be used to enhance public understanding of the project and encourage the public's participation in selecting, designing, and implementing NPS management measures;
6. Provide a schedule for implementing the NPS management measures identified in the watershed-based plan;
7. Describe interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented;

8. Identify a set of criteria for determining if loading reductions are being achieved and progress is being made towards attaining water quality standards, and if not, the criteria for determining if the watershed-based plan needs to be revised; and
9. Establish a monitoring component to evaluate the effectiveness of the implementation efforts.

Once developed, Virginia Department of Environmental Quality (VADEQ) will present the IP to the SWCB for approval as the plan for implementing pollutant allocations and reductions contained in the TMDL. In addition, VADEQ will request the plan be included in the appropriate Water Quality Management Plan (WQMP), in accordance with the CWA's Section 303(e) and Virginia's Public Participation Guidelines for Water Quality Management Planning.

Designated Uses

The "Designation of Uses" of all waters in Virginia is defined in the Code of Virginia (9 VAC 25-260-10) as follows:

"A. All state waters are designated for the following uses: recreational uses (e.g., swimming and boating); the propagation and growth of a balanced indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish)." (SWCB, 2003)

The goal of the CWA is that all streams should be suitable for recreational uses, including swimming and fishing. **Fecal coliform and *E. coli* bacteria** are used to indicate the presence of pathogens in streams supporting the **swimmable use goal**. Bacteria in Little Dark Run and Robinson River exceed the *E. coli* criterion.

REVIEW OF TMDL DEVELOPMENT STUDY

Rappahannock-Rapidan Regional Commission and Engineering Concepts, Inc. were contracted by VADEQ to develop bacteria TMDLs for Beaver Creek, Goldmine Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run. The final TMDL was completed in August 2005 with subsequent approval by USEPA in November 2005. The TMDL development document can be obtained at the VADEQ office in Woodbridge, VA or via the Internet at www.deq.virginia.gov. Impairment description, water quality monitoring, watershed description, source assessment, water quality modeling, and allocated reductions were reviewed to determine implications of TMDL and modeling procedures on IP development.

Watershed Description

Mountain Run, Beaver Creek, Pamunkey Creek, and Terrys Run impairment watersheds are located in Orange County, Virginia (Figure 1). Goldmine Creek and Plentiful Creek impairment watersheds are located in Louisa County, Virginia and Spotsylvania County, Virginia, respectively (Figure 1). Mountain Run watershed area is 9,464 acres consisting of forest (50%), pasture/hayland (43%), residential (3%), water/wetland (2%), and cropland (2%) landuses. Beaver Creek watershed is 6,315 acres in size. Beaver Creek is mainly a forested watershed (about 88%) with pasture/hayland and water/wetland comprising 9% and 3% of the area, respectively. Mountain Run and Beaver Creek flow south and drain into the North Anna River. Pamunkey Creek watershed area of 34,382 acres is comprised of forest (54%), pasture/hayland (36%), cropland (7%), residential (2%), and water/wetland (1%). The 18,614 acres in the Terrys Run watershed consists of approximately 58% forest, 29%, pasture/hayland, 12% cropland, and the remaining 1% split between residential and water/wetland land uses. Goldmine Creek watershed is 15,151 acres in size, mainly forested (about 69%), approximately 31% in agriculture production (i.e., pasture/hayland and cropland equal 24% and 4%, respectively) with residential (2%) and water/wetland (1%) landuses contributing the difference. The 7,620 acres of Plentiful Creek watershed are mostly forested (about 70%) with 19%, 10%, 1% of the remaining acreage consisting of pasture/hayland, cropland, and water/wetland land uses, respectively. Pamunkey Creek, Terrys Run, Goldmine Run, and Plentiful Creek watersheds drain directly into Lake Anna.

The watersheds are all located within the Northern Piedmont Ecoregion. The Northern Piedmont Ecoregion consists primarily of low rounded hills, irregular plains, and open valleys and is underlain by metamorphic, igneous, and sedimentary rocks. The natural vegetation was mostly Appalachian Oak Forest (dominated by white and red oaks). This ecoregion is a transitional area between the mostly mountainous ecoregions of the Appalachians to the west and the lower and more level ecoregions of the coastal plain to the east. It is a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks, with moderately dissected irregular plains and some hills.

The main soil map units found in the watersheds are the Comus-Hiawasee-Elsinboro, Masada-Turbeville, Chewacla-mixed alluvial land, Nason-Tatum-Manteo, Tatum-Nason, Lloyd-Wilkee-Orange-Iredell, Orange concretionary-variant Fluvanna-Elbert, Appling-Cecil Colfax, and Grover-Madison-Louisburg soil associations. Comus-Hiawasee-Elsinboro association is highly suited for agricultural and severely suited for building foundation and septic drain fields. The Masada-Turbeville association is fairly, moderately, and severely suited for agricultural, building foundation and septic drain fields, respectively. The Chewacla-mixed alluvial

land association is has limited natural fertility for agricultural productivity and is severely suited for building foundation and septic drain fields, respectively. The Nason-Tatum-Manteo and Tatum-Nason associations have limited natural fertility for agricultural and are moderately suited for building foundation and septic drain fields. Lloyd-Wilkee-Orange-Iredell association is good for agricultural with drainage and severely suited for building foundation and septic drain fields. The Orange concretionary-variant Fluvanna-Elbert association is characterized by poor drainage for agricultural suitability and is severely suited for building foundation and septic drain fields. The Appling-Cecil Colfax association is characterized as good suitability for agricultural and is moderately suited for building foundation and septic drain fields. Grover-Madison-Louisburg association is good for agricultural, and severely suited for building foundation and septic drain fields.

The climate of the Beaver Creek, Mountain Run, Pamunkey Creek, and Terrys Run watersheds is characterized based on the meteorological observations from 08/02/1948 to 12/31/2003 assembled by the Southeast Regional Climate Center for the Piedmont Research Station, Virginia (446712) station. The weather station is located in Gordonsville, VA within the Pamunkey Creek watershed. Average annual precipitation is 42.27 inches with 55% of the precipitation occurring during the crop-growing season (May-October). Average annual snowfall is 20.7 inches with the highest snowfall occurring during February. Average annual daily temperature is 55.5°F. The highest average daily temperature of 86.8°F occurs in July while the lowest average daily temperature of 24.1°F occurs in January.

The climate of the Goldmine Run and Plentiful Creek watersheds is characterized based on the meteorological observations from 08/01/1948 to 12/31/2003 assembled by the Southeast Regional Climate Center for the Louisa, Virginia (445050) station. The weather station is located about seven miles west of the Goldmine Creek watershed. Average annual precipitation is 43.08 inches with 53% of the precipitation occurring during the crop-growing season (May-October). Average annual snowfall is 18.5 inches with the highest snowfall occurring during January. Average annual daily temperature is 56.0°F. The highest average daily temperature of 87.4°F occurs in July while the lowest average daily temperature of 24.8°F occurs in January.

Water Quality Assessment

The impaired portion of Beaver Creek (VAN-F06R_BRC01A02) located in National Watershed Boundary Dataset (NWBD) YO12, beginning at the confluence of Cooks Creek and continuing downstream approximately 2.51 miles to the confluence with North Anna River, is listed as impaired due to water quality exceedances of the bacteria standard at station 8-BRC001.88. Beaver Creek (VAN-F06R_BRC01A02) was initially placed on the 303(d) list in 1998.

Mountain Run (VAN-F06R_MTN01A00) located in NWBD YO12, is listed as impaired due to water quality exceedances of the bacteria standard at station 8-MTN000.96. The VADEQ has delineated the Mountain Run (VAN-F06R_MTN01A00) impairment on a stream length of 2.52 miles, beginning at the confluence of Madison Run and continuing downstream to the confluence with North Anna. Mountain Run (VAN-F06R_MTN01A00) was initially placed on the 303(d) list in 1998.

The Pamunkey Creek (VAN-F07R_PMC01A00 and VAN-F07R_PMC02A02) impaired segment located in NWBD YO16 begins at the confluence of Tomahawk and Church Creek (where Pamunkey Creek begins) and extends to the confluence with Lake Anna, at an approximate length of 12.14 miles. Pamunkey Creek (VAN-F07R_PMC01A00 and VAN-F07R_PMC02A02) is listed as impaired due to water quality exceedances of the bacteria standard at stations 8-PMC009.85 and 8-PMC014.75. Pamunkey Creek (VAN-F07R_PMC01A00 and VAN-F07R_PMC02A02) was first listed on the 303(d) list in 1998.

The impaired portion of Terrys Run (VAN-F07R_TRY01A00) located in NWBD YO17, beginning at the confluence with Horsepen Branch and continuing downstream approximately 5.45 miles to the confluence with Lake Anna, is listed as impaired due to water quality exceedances of the bacteria standard at station 8-TRY004.98. Terrys Run (VAN-F07R_TRY01A00) was first listed on the 303(d) list in 1998.

The impaired portion of Plentiful Creek (VAN-F07R_PLT01A00) located in NWBD YO18, beginning at the confluence of an unnamed tributary to Plentiful Creek (VAN-F07R_PLT01A00) upstream from the Route 601 bridge and continuing downstream approximately 3.15 miles to the confluence with Lake Anna, is listed as impaired due to water quality exceedances of the bacteria standard at station 8-PLT002.82. Plentiful Creek (VAN-F07R_PLT01A00) was initially placed on the 303(d) list in 1998.

Goldmine Creek (VAN-F06R_GMC01A00) located in NWBD YO14, is listed as impaired due to water quality exceedances of the bacteria standard at station 8-GMC002.19. The VADEQ has delineated the Goldmine Creek (VAN-F06R_GMC01A00) impairment on a stream length of 7.16 miles, beginning at the headwaters of Goldmine Creek (VAN-F06R_GMC01A00) and continuing downstream to the confluence with Lake Anna. Goldmine Creek (VAN-F06R_GMC01A00) was initially placed on the 303(d) list in 2002.

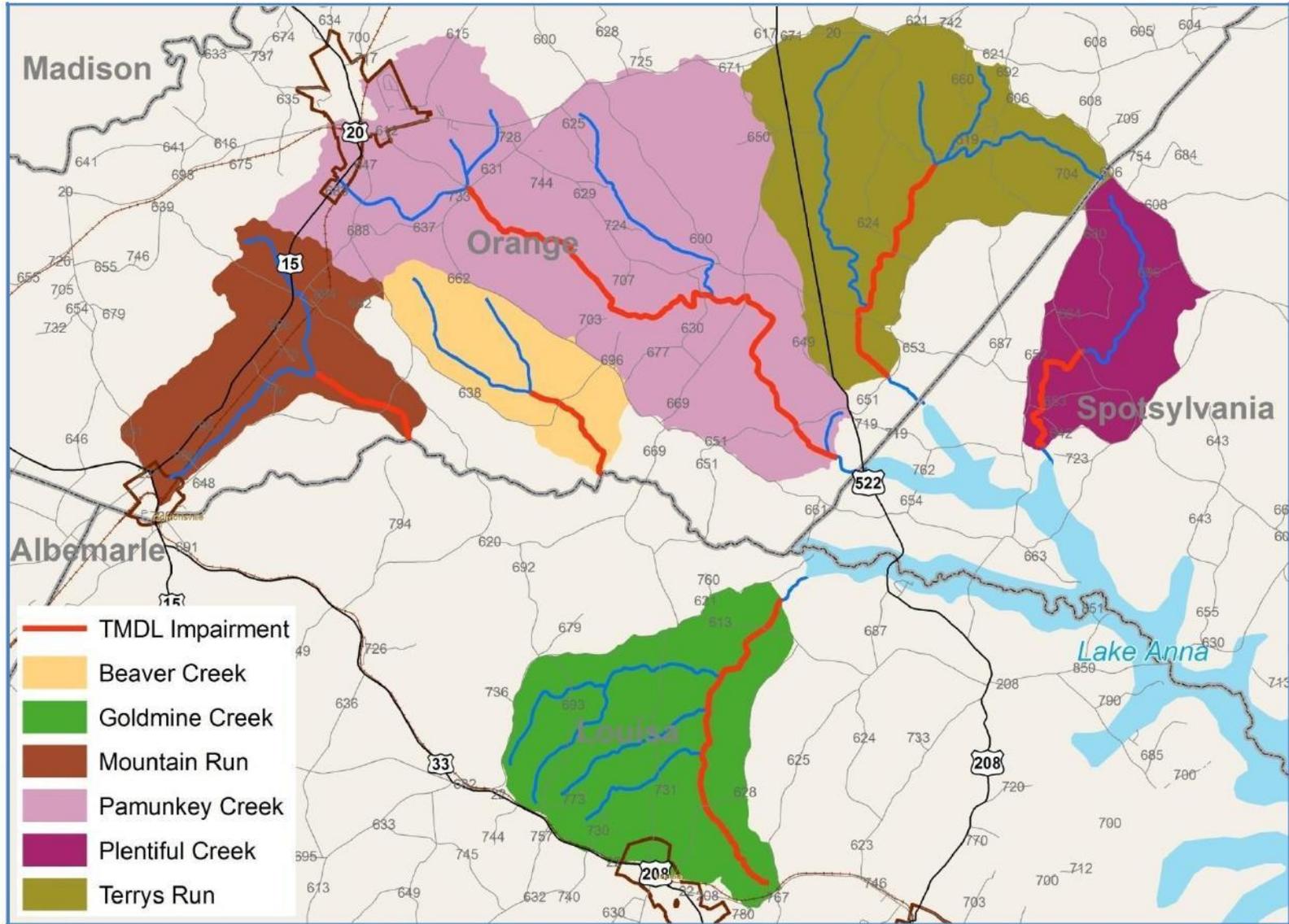


Figure 1. Watersheds location.

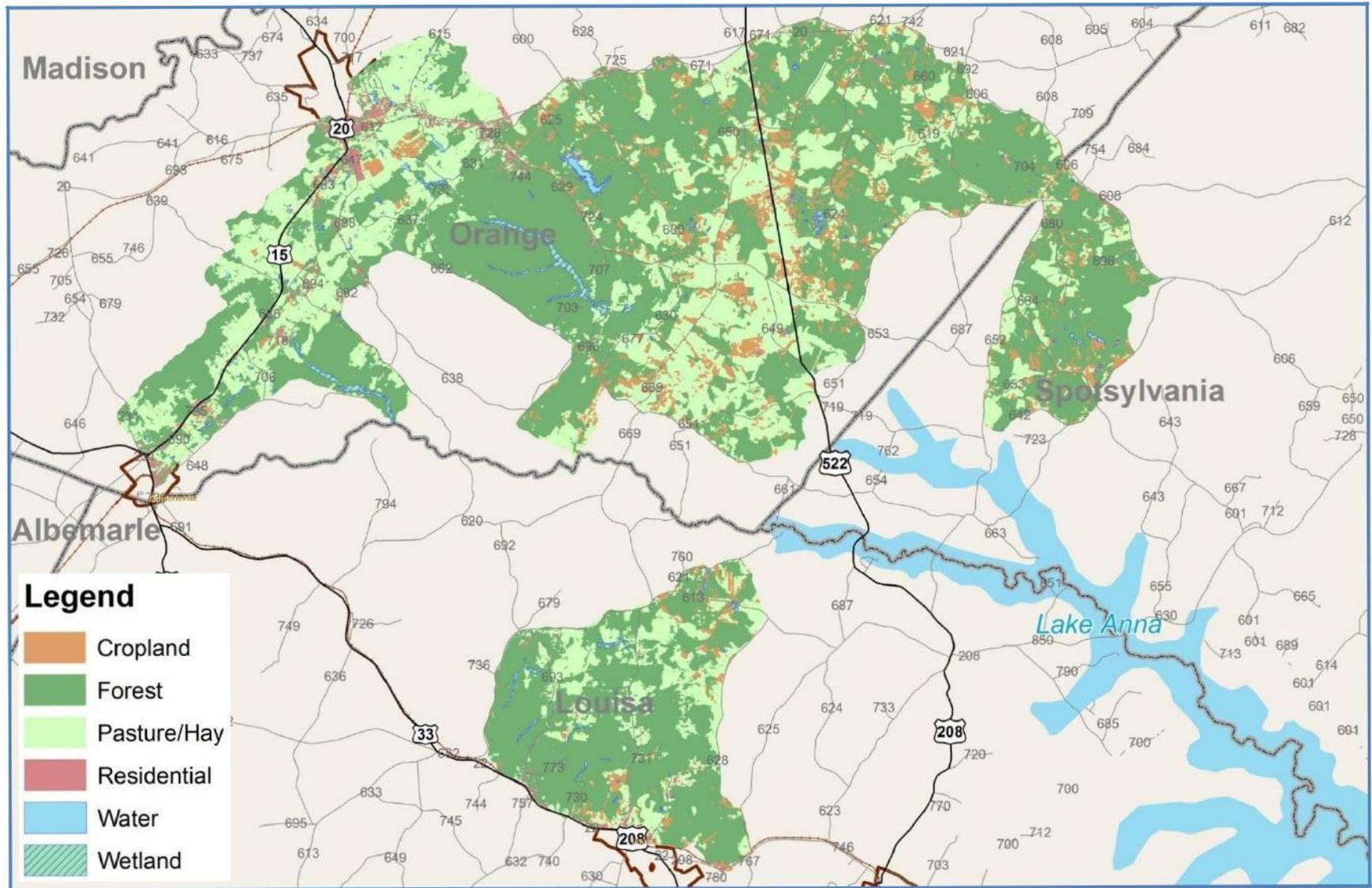


Figure 2. Land uses in the watersheds.

Bacteria Sources

Potential sources of bacteria considered in TMDL development included both point source and nonpoint source contributions. Permitted point sources are listed in Table 1.

Table 1. VPDES permitted point sources listed in TMDL study for the watersheds.

Impairment	Permit Number	Facility Name	Design Flow (MGD)
Goldmine Creek	VA0023957	Louisa STP	0.0624
Mountain Run	VA0025348	Liberty Fabrics	0.0060
Mountain Run	VAG406289	Private Residence	0.0010
Terrys Run	VA0060330	Unionville Elementary	0.0047
Terrys Run	VA0062961	Lightfoot Elementary	0.0040
Terrys Run	VAG406241	Private Residence	0.0010
Terrys Run	VAG406328	Private Residence	0.0010

Non-point bacteria sources from livestock, human, pets, and wildlife were considered in the watersheds. It is important to understand the types of sources modeled, their delivery mechanisms, and temporal variations. Table 2 gives a summary of non-point source pollution loads. Loads were represented as either land-based loads, where bacteria were deposited on land and available for wash-off during a rainfall event, or as direct loads, where bacteria were directly deposited to the stream. Loads that varied temporally were delivered at a constant rate throughout any given month, but varied on a monthly basis. All loads were spatially distributed based on land use types (e.g. land-based loads from beef cattle were applied to pasture). A portion of the non-point source load from cattle, straight pipes, and a portion of the wildlife load were modeled as a direct load to the stream.

Table 2. Sources of bacteria in the impaired watersheds.

Source Category	Source / Animal Type	Applied To	Variation
Human and Pets	Permitted Discharges	Stream	Temporal and Spatial
Human and Pets	Straight Pipes	Stream	Temporal and Spatial
Human and Pets	Failing Septic Systems	Land	Spatial
Human and Pets	Biosolids Applications	Land	Spatial
Human and Pets	Dogs/Cats	Land	Spatial
Agricultural	Beef	Land, Stream	Temporal and Spatial
Agricultural	Dairy	Land, Stream	Temporal and Spatial
Agricultural	Horses	Land	Temporal and Spatial
Agricultural	Turkey	Land	Temporal and Spatial
Agricultural	Other Livestock	Land	Temporal and Spatial
Wildlife	Deer	Land, Stream	Spatial
Wildlife	Turkeys	Land, Stream	Spatial
Wildlife	Raccoon	Land, Stream	Spatial
Wildlife	Muskrats	Land, Stream	Spatial
Wildlife	Beavers	Land, Stream	Spatial
Wildlife	Geese	Land, Stream	Spatial
Wildlife	Ducks	Land, Stream	Spatial

Modeling Procedures

In order to understand the implications of the load allocations determined during TMDL development, it is important to understand the modeling methods used in the analysis. The United States Environmental Protection Agency (USEPA) and United States Geological Survey (USGS) Hydrologic Simulation Program - Fortran (HSPF) water quality model was selected as the modeling framework to simulate the bacteria fate and transport for existing conditions and perform TMDL allocations. Seasonal variations in hydrology, climatic conditions, and watershed activities can be explicitly accounted for in the HSPF model. To identify localized sources of bacteria, the watersheds were divided into subwatersheds. These subdivisions were based primarily on homogeneity of land use. The Pamunkey Creek hydrologic model was calibrated using observed flow values from USGS station #01670180 at Lahore, VA for the period August 25, 1989 to July 15, 1992. The calibration period covered a wide range of hydrologic conditions, including low- and high-flow conditions, as well as seasonal variations. The calibrated HSPF data set was validated on a separate period from July 16, 1992 to July 15, 1993. Calibration parameters were adjusted within the recommended ranges until the model performance was deemed acceptable. Observed stream flow values were not available for Beaver Creek, Goldmine Creek, Mountain Run, Plentiful Creek, and Terrys Run, therefore the Pamunkey Model was used as a “paired watershed” for hydrologic calibration and validation of those watersheds. Hydrology calibration and validation were performed based on the physical, hydrologic, and land use data for the Pamunkey Creek watershed. After calibration and validation completion, the parameterization for the Pamunkey Creek model was transferred to the Beaver Creek, Goldmine Creek, Mountain Run, Plentiful Creek, and Terrys Run

models. Parameters describing watershed characteristics such as land use, slope, infiltration rate, and F-Tables were updated to reflect the physical properties in Beaver Creek, Goldmine Creek, Mountain Run, Plentiful Creek, and Terrys Run watersheds. The periods January 1, 1994 to December 31, 1998 and January 1, 1990 to December 31, 1993 were chosen as the water quality calibration and validation periods, respectively.

TMDL Allocation and Staged Implementation Reductions

Several model runs were made investigating scenarios that would meet applicable water quality standards for the impairments. The recommended final scenario balances reductions from agricultural and residential land uses by maintaining existing watershed loading characteristics. Loadings from source categories were allocated according to their existing loads. Bacteria loads from point sources were not reduced because these facilities are currently meeting their pollutant discharge limits and other permit requirements. Current permit requirements are expected to result in attainment of the WLAs as required by the TMDL. The final TMDL load reductions required in the impairments are shown in Table 3. Bacteria load reductions required to meet the staged implementation goal (single sample maximum criterion exceedance rate below 10.5%) are listed in Table 4.

Table 3. TMDL load reductions specified during TMDL development.

Impairment	Straight Pipes*	Residential*	Livestock DD*	Pasture*	Cropland*	Wildlife DD*	Forest*
Mountain Run	100	100	98	100	99	96	0
Beaver Creek	100	100	93	100	99	93	0
Pamunkey Creek	100	100	93	100	99	74	0
Terrys Run	100	100	89	100	99	88	0
Plentiful Creek	100	100	99	100	99	99	0
Goldmine Creek	100	100	98	100	99	79	0

*Required Load Reductions (%); DD = direct deposition; ¹Failing septic systems and pets

Table 4. Staged implementation load reductions specified during TMDL development.

Impairment	Straight Pipes*	Residential*	Livestock DD*	Pasture*	Cropland*	Wildlife DD*	Forest*
Mountain Run	100	98	98	100	98	0	0
Beaver Creek	100	98	93	98	98	0	0
Pamunkey Creek	100	93	93	100	93	0	0
Terrys Run	100	100	89	99	99	0	0
Plentiful Creek	100	99	99	99	99	0	0
Goldmine Creek	100	100	95	100	99	22	0

*Required Load Reductions (%); DD = direct deposition; ¹Failing septic systems and pets

Implications of TMDL and Modeling Procedure on Implementation Plan Development

Conditions outlined in the TMDL development study to address the bacteria impairments in the Beaver Creek, Goldmine Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run watersheds include:

- Exclusion of most/all livestock including horses from streams is necessary;
- Substantial land-based NPS load reductions are called for on pasture and cropland;
- All straight pipes and failing septic systems need to be identified and corrected;
- Implicit in the requirement to correct straight pipes and failing septic systems is the requirement to maintain all properly functioning septic systems;
- Reductions to pet bacteria loads on residential land use are necessary; and
- Implicit in the requirement for no point source bacteria load adjustment is the requirement for point sources to maintain permit compliance.

PUBLIC PARTICIPATION

Process

Public participation was an integral part of the IP development, and is also critical to promote reasonable assurance that the implementation actions will occur. The actions and commitments compiled in this document are formulated through input from citizens of the watershed; Louisa, Orange, and Spotsylvania Counties government; Town of Orange government ; Culpeper Soil and Water Conservation District (CSWCD); Thomas Jefferson Soil and Water Conservation District (TJSWCD); Tri-County/City Soil and Water Conservation District (TCCSWCD); Virginia Department of Conservation and Recreation (VADCR); Virginia Department of Environmental Quality (VADEQ); Virginia Department of Health (VDH); Virginia Cooperative Extension (VCE); Natural Resources Conservation Service (NRCS); Farm Bureau; Piedmont Environmental Council (PEC); Southeast Regional Community Assistance Project (Southeast RCAP); Rappahannock-Rapidan Regional Commission (RRRC); and Blue Ridge Environmental Solutions, Inc. (BRES).

Public participation took place during IP development on three levels. First, public meetings were held to provide an opportunity for informing the public as to the end goals and status of the project, as well as, a forum for soliciting participation in the smaller, more-targeted meetings (*i.e.*, working groups and Steering Committee). Second, three working groups were formed: Agricultural, Residential, and Governmental. The overall goal of the Agricultural, Residential, and Governmental Working Groups was to identify obstacles to implementation in their respective communities and recommend workable solutions that will overcome these obstacles. In addition, the working groups were expected to: identify funding/partnering opportunities that would help to overcome obstacles to implementation, review the IP from an environmental perspective, identify the regulatory authority in the specific areas related to implementation, identify existing programs and resources that might be relevant to the situation, and propose additional programs that would support implementation. A representative from VADCR, RRRC, or BRES coordinated each working group in order to facilitate the process and integrate information collected from the various communities. Third, a Steering Committee was formed with representation from the Agricultural, Residential, and Governmental Working Groups; Louisa, Orange, and Spotsylvania Counties government; Town of Orange government; CSWCD; TCCSWCD; TJSWCD; VADCR; VADEQ; VDH; VCE; NRCS; RRRC; and BRES to guide the development of the implementation plan. The Steering Committee had the expressed purpose of formulating the TMDL IP. In addition, this committee had responsibility for identifying control measures that are founded in practicality, establishing a timeline to insure expeditious implementation, and setting measurable goals and milestones for attaining water quality standards.

All meetings conducted during the course of the IP development are listed in Table 5. Meeting summaries are located in Appendices A – E. Appendix F contains written comments received during 30-day comment period after final public meeting. Over 500 man-hours were devoted to attending these meetings by individuals representing agricultural, residential, commercial, environmental, and government interests on a local, state, and federal level.

Table 5. Meetings held during the TMDL IP development process.

Date	Meeting Type	Location	Attendance	Time (hr)
01/25/11	Public Meeting	Louisa County Administration Building	38	1
01/25/11	Agricultural Working Group	Louisa County Administration Building	16	1
01/25/11	Residential Working Group	Louisa County Administration Building	9	1
02/08/11	Public Meeting	Town of Orange Public Works Building	42	1
02/08/11	Agricultural Working Group	Town of Orange Public Works Building	22	1
02/08/11	Residential Working Group	Town of Orange Public Works Building	12	1
03/30/11	Governmental Working Group	Town of Orange Public Works Building	19	2
05/03/11	Agricultural Working Group	Town of Orange Public Works Building	14	2
05/03/11	Residential Working Group	Town of Orange Public Works Building	14	2
05/10/11	Agricultural Working Group	Louisa County Library	7	2
05/10/11	Residential Working Group	Louisa County Library	7	2
06/07/11	Steering Committee	Town of Orange Public Works Building	19	2
06/21/11	Public Meeting	Town of Orange Public Works Building	20	2

Agricultural Working Group Summary

The Agricultural Working Group (AWG) consisted predominantly of beef and dairy producers throughout the watersheds. Representatives from organizations that serve this community and will have a role in implementation were also included (*e.g.*, CSWCD, TCCSWCD, TJSWCD, NRCS, VADCR, and Farm Bureau). The AWG is confident that current BMPs eligible for cost-share in TMDL areas and proposed recommendations will provide the necessary incentive for producers and landowners to implement required BMPs to meet specified reductions to direct stream, pasture, and cropland bacteria loads. Challenges, recommendations, and keys for success discussed in the meetings included:

- * Primarily beef and dairy operations exist in these watersheds. Confined animal feeding operations consist of four dairies and two poultry facilities and it was determined that additional animal waste storage is not needed. Changes in land use since 2005 include cropland changes from corn production to pasture, and limited residential building due to the economy.

- * Providing electricity to a groundwater well can be a big issue in these watersheds due to the expense.
- * Livestock exclusion fencing is not practical in flood-prone areas and would be destroyed frequently in some areas of the watershed. If a fence is constructed using cost-share funding and is destroyed due to a natural disaster such as a flood, funding will be available to replace fence one time if the disaster did not take place within the same year as the construction of the fence.
- * More geese exist near Lake Anna than what is estimated in the 2005 TMDL study and stay year round. Natural buffers should be encouraged to deter residency.
- * Continuing Conservation Initiative Stream Exclusion fencing (CCI-SE) program is a new Department of Conservation and Recreation (DCR) cost-share practice that pays \$1/ft for five years for one-sided stream exclusion fencing and \$2/ft for both sides. Promotion of CCI-SE hopes to capture voluntary practice data. The only requirement is that the fencing must be for stream exclusion, there is no set back requirement.
- * While stream-side fencing is not popular with older farmers, they do favor water trough installations and recognize the benefits of cold, clean drinking water for their livestock.
- * Lake Anna Civic Association (LACA) is interested in funding a demonstration project in which they would partner with a farmer participating in the exclusion fencing cost-share programs by covering the difference between the cost-share amount and the total amount needed.
- * The Soil and Water Conservation Districts can assist farmers individually to find the best cost-share programs that will work for their needs – flexible options exist.
- * With regard to cost-share programs, Farm Labor and Contractor Labor cost credit may vary depending on the county. Orange County credits farm and contractor labor equally. In Spotsylvania County, contractor labor receives a higher value than farm labor. It was recommended that farm labor and contractor labor be credited equally within the watershed. Cost estimates should be irrelevant of who does the work.
- * Securing and researching funding will be critical for success of the TMDL-IP.
- * More focus should be placed on educating and supporting the Equine industry.
- * More water testing needs to be done and samples taken in other locations than where previously collected;
- * One Full Time Equivalent (FTE) technical assistant was not adequate to complete the proposed workload within a 10 year period.
- * Retention ponds should be a last resort/catch-all if needed to reduce the exceedance rate to 0% due to their considerable expense.
- * Pasture management, not just exclusion fencing, is an important factor in achieving reduction loads.
- * Applicable education/outreach methods should include farmer-to-farmer interaction, SWCD and Farm Bureau newsletters; field tours conducted by SWCDs, educational events conducted by Virginia Cooperative Extension, Cattleman's and Dairymen's Association events, FSA newsletter, information booth at CVCA Field Day and County Fair (although more residents than farmers may be reached at the fair).

Residential Working Group Summary

The Residential Working Group (RWG); consisting of watershed residents and Town of Orange; Louisa, Orange, and Spotsylvania Counties; CSWCD; TJSWCD, TCCSWCD; VADCR; VADEQ; VDH; VCE; NRCS; RRRRC; and BRES personnel; focused on means to educate and involve public with regard to implementing corrective actions to replace straight pipes, correct failing septic systems, and manage pet waste. Challenges, recommendations, and keys for success discussed in the meeting included:

- * Spotsylvania County has a county-wide stormwater ordinance and falls under the Chesapeake Bay requirements. Most of the Plentiful Creek watershed in Spotsylvania County is wooded and hasn't had a building permit issued since 2003. Louisa County requires permits for repairs to septic systems and requires 100% reserve. There might be opportunities within the Pamunkey Creek and Goldmine Creek watersheds for connecting to public sewer. Regional population growth in Louisa County has resulted in increased demands on the Louisa Sewage Treatment Plant.
- * There is not enough voluntary compliance to forgo regulation. Education for homeowners is needed to encourage participation so that regulation is a last resort.
- * Grey water containing disinfectants and detergents from maintenance activities contributes to the degradation of surface and groundwater quality.
- * Most owners of alternative on-site sewage disposal systems (OSDS), as well as those of conventional septic systems, are not informed of the system's mechanical function, cost, and failure rates.
- * Many areas within the watershed are not suited for systems of any kind-conventional or alternative. Specific soils were determined to be unsuitable (Louisa Comprehensive Plan).
- * Information regarding septic system type, function, location and maintenance, including costs, should be included in closing documents at all home sales. To reach all property owners, include septic system information with tax assessments.
- * Repairs to failing septic systems will have a greater effect at reducing the bacteria exceedance rate versus pump-outs.
- * Older structures along Tomahawk Creek and the Houseworth Street area (Pamunkey Creek Watershed) should be evaluated. Older homes along Route 15 might have failures.
- * Pet waste management information must be introduced strategically; there may be resistance to programs perceived as trivial or frivolous.
- * Pet waste management education and outreach included develop and implement public information campaigns on pet waste management; devise and implement pet waste composter construction workshops similar to rain barrel workshops offered by SWCDs; reach out to home owners associations to promote pet waste composters, collection kiosks, and other management strategies; and seek funds to install kennel waste management program as pilot project and consider offering a "clean kennel" award.

- * It was suggested the bacteria water quality standard be put in terms that the general public can understand. What does this mean to me? Suggestions included: unhealthy water that if swallowed can lead to illness, ear infection, etc.
- * Information found in the TJSWCD study examining Goldmine Creek tributaries to identify bacterial hot spots could be used as a template for how counties address all the impaired segments in a county.
- * Determine if coordination with the Army Corps of Engineers Lake Anna Ecosystem Restoration Project would be beneficial to the TMDL-IP.
- * Efforts should be made to educate high school students and get other stakeholders to assist with public education.

Governmental Working Group Summary

The Governmental Working Group (GWG) consisting of representatives from Louisa, Orange, and Spotsylvania Counties; Town of Orange; CSWCD; TCCSWCD; VADCR; VADEQ; VDH; NRCS; Farm Bureau; RRRRC; and BRES personnel, focused on funding sources, technical assistance needs, regulatory controls, and lead agencies responsible for implementation. Key topics and recommendations included:

- * Alternative systems require annual maintenance contracts that have increased in cost from \$150 - \$200 a few years ago up to \$400 currently with more than 10% of alternative systems have been installed on smaller, subdivided lots.
- * Culpeper Soil and Water Conservation District have funded more repairs than replacement of failing septic systems in their district.
- * The Health Department cannot provide an inventory of failing septic tanks or straight pipes; the TMDL study is the best tool to use. A measureable action plan is needed that includes a tracking system for all septic systems, including alternative systems – Albemarle or Gloucester Counties’ methods could be used as a model. Information on septic tanks (location, maintenance requirements, etc.) could be included as part of required sale documents by Real Estate agents.
- * Homeowners, especially in rural areas, may be reluctant to participate in cost-share programs due to anti-government philosophies and unwillingness to disclose personal financial information.
- * Cost for public sewer service, including connection to the service and on-site improvements is estimated to run from \$15,000 to \$20,000 per dwelling in all three counties.
- * Of the localities represented, only the Town of Orange has current opportunities for public sewer connections as the Town of Orange has a new waste water treatment plant. Future connections could be available in Louisa County.
- * As part of the State law requiring any homeowner residing east of Interstate 95 to have their septic system pumped every 5 years, Spotsylvania County sends homeowners letters reminding them of that requirement. Homeowners in all the counties should be informed of pump-out recommendations/requirements and cost-share programs available for pump-outs and repairs.

- * Based on soil types and Health Department experience within the region, all three counties estimate funds addressing OSDS for the IP be allocated as follows:
 - o 60% towards repairs
 - o 30% for replacement, and
 - o 10% for alternative waste treatment systems;
- * Louisa, Orange, and Spotsylvania Counties require a kennel license for owners with a certain number of dogs. More precise dog counts might be derived by determining the number of dog licenses that have been issued.
- * The Town of Orange has installed pet waste stations obtained from the Culpeper Soil and Water Conservation District through grant funds from York River and Small Coastal Basin Roundtable; a reduction in the amount of pet waste left on sidewalks has been observed. A program similar to Fauquier County's "It's Your Doodie" Pet Waste Management project could be replicated in each of the three counties.
- * The Fauquier County SPCA has implemented several strategies to properly manage animal waste and may be used as a model for commercial and private kennels such as hunt clubs and veterinary clinics. Grant funding should be sought to assist kennel owners in improving their facilities.
- * Success will be determined by the delivery of the outreach efforts and positive experiences of program participants will be helpful in gaining additional participation. It has been demonstrated that educational outreach to children and youth is very effective in conveying information and influencing responsible behavior in parents.
- * Funding must be secured and available before outreach is implemented. Efforts should be made to eliminate waiting lists – funds must be available and adjusted accordingly along the way. Farmers may also consider combining cost-share programs with conservation easements to receive additional tax incentives as offered through the Virginia Outdoors Foundation.
- * Recommended that funding be available on a bid basis to contractors (septic pump-out and repair, fencing installation, etc.) who can provide services to homeowners and farmers at discounted rates. This will circumvent concerns regarding dealing with government offices and may result in increased success.
- * Additional monitoring, including citizen monitoring, of the impaired streams is recommended. *

Proposed roles and responsibilities for agencies included:

- o **Louisa, Orange, Spotsylvania Counties and Town of Orange:** administer the counties erosion and sediment control program, provide mapping assistance, and update ordinances to promote conservation efforts.
- o **CSWCD, TCCSWCD, and TJSWCD:** provide agricultural cost-share funds, administer and provide technical assistance for agricultural and residential programs.
- o **VDH:** help develop education material and track installation, location and maintenance of all septic systems, including alternative systems

- **RRRC:** develop and distribute pet waste management educational materials
- **VADEQ:** provide ambient monitoring and assist with citizen monitoring
- **NRCS, VCE, and VADOF:** provide education/technical assistance and funding

Steering Committee Summary

The Steering Committee consisted of representatives from the AWG, RWG, and GWG; Louisa, Orange, and Spotsylvania Counties; Town of Orange; CSWCD; TCCSWCD; TJSWCD; VADCR; VADEQ; VDH; VCE; NRCS; RRRC; Farm Bureau ; PEC; and BRES. Steering Committee evaluated recommendations from working groups, reviewed BMP quantification and cost estimates, created implementation goals and milestones, reviewed monitoring plan, discussed potential funding resources available, revised implementation plan document, and evaluated materials for final public meeting. The Steering Committee will periodically revisit implementation progress and suggest plan revisions as needed.

IMPLEMENTATION ACTIONS

Identification of Control Measures

An important element of the implementation plan is to encourage voluntary implementation of control measures for bacteria reductions on the part of local, state, and federal government agencies, agricultural producers, business owners, and private citizens. In order to encourage voluntary implementation, the best information available on types of control measures and program options that achieve the bacteria reduction goals practically and cost-effectively was obtained. Potential control measures were identified through Steering Committee and working group input; literature review; and discussion with the CSWCD; TCCSWCD; TJSWCD; NRCS; VADCR; VADEQ; VDH; VCE; LACA; PEC; York River and Small Coastal Basin Roundtable; and Louisa County, Orange County, Spotsylvania County, and Town of Orange government personnel. Control measures were assessed based on cost, availability of existing funds, reasonable assurance of implementation, and water quality impacts (Table 6).

The cost of installing potential control measures was determined based on published values and discussion with working groups, Steering Committee, CSWCD, TCCSWCD, TJSWCD, NRCS, VADCR, VADEQ, VDH, VCE, and local contractors. Control measures that can be promoted through existing programs were identified, as well as control measures that are not currently supported by existing programs and their potential funding sources. Availability of existing programs was determined through discussion with CSWCD, TCCSWCD, TJSWCD, VADCR, VADEQ, VDH, NRCS, VCE, LACA, PEC, York River and Small Coastal Basin Roundtable, and officials from Louisa County, Orange County, Spotsylvania County, and Town of Orange participating in the working groups and Steering Committee. The assurance of implementation of specific control measures was assessed through discussion with the AWG, RWG, and GWG.

The allocations determined during the TMDL development dictate, largely, the control measures that must be employed during implementation. In order to meet the stated reductions in direct deposition from livestock, some form of stream exclusion is necessary. Fencing is the most obvious choice, however, the type of fencing, distance from the stream bank, and most appropriate management strategy for the fenced pasture are less obvious. Accounting for this variability at each farm, a full livestock exclusion system was used to estimate the control measure needed to reduce livestock direct deposition.

Due to the treatment capacity of a 35-foot buffer along the streambank, it is preferred that all fence, even that which is installed solely at the landowners expense, be placed at least 35 feet from the stream. The LE-2 livestock exclusion system with 10-foot set-back was included to address farmers wanting to minimize fencing costs and the amount of pasture lost. An alternative water source will typically be required with the livestock exclusion system. SWCD and NRCS staffs have assisted with the installation of various types of alternative water systems, including; wells, spring developments, pumped stream water, and public water. The main criterion is that the system be dependable. From an environmental perspective, the best management scenario would be to exclude livestock from the stream bank 100% of the time and establish permanent vegetation in the buffer area. This prevents

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

Improved Pasture Management BMPs will be utilized to reduce bacteria loads from pasture land-use. If needed, retention ponds will be installed during Stage II of implementation for additional treatment of the stormwater runoff from pasture land. Conversion of cropland field borders to vegetated buffers or forest and manure incorporation into the soil will be utilized to reduce bacteria loads from cropland. Average parameters of the SL-1 Permanent Vegetative Cover and FR-1 Reforestation of Erodible Crop and Pastureland BMPs previously installed in the CSWCD, TCCSWCD, and TJSWCD areas as reported in the VADCR BMP Database were utilized. Manure incorporation or injection is a practice in which farmers inject liquid manure below the soil surface or spread manure, then disk the land. The disking mixes manure with soil and has shown to keep manure and nutrients on the land longer. This practice can be done on cropland or pasture/hay land use where manure or biosolids are applied.

Septic system repair, conventional septic system installation, and alternative on-site sewage disposal system installation will be needed to fix failed septic systems and replace straight pipes. Pet contributions to bacteria runoff from residential land use will be reduced through implementation of pet waste control program in the watersheds, installation of pet waste enzyme digesting composters, installation of confined canine unit waste treatment systems, and installation of vegetated buffers, rain gardens and infiltration trenches.

Table 6. Control measures with average unit cost and reduction efficiency identified to meet implementation goals for bacteria reductions.

Pasture and Livestock Exclusion Control Measures	Unit	Unit Cost¹	Reduction Efficiency (%)
Livestock Exclusion System (CREP)	System	25,000	50 (100) ²
Livestock Exclusion System (EQIP and CBWI)	System	19,500	50 (100) ²
Livestock Exclusion with Riparian Buffers (LE-1T)	System	19,500	50 (100) ²
Small Acreage Grazing System (SL-6AT)	System	13,500	50 (100) ²
Livestock Exclusion with Reduced Setback (LE-2T)	System	15,750	50 (100) ²
Stream Protection (WP-2T)	System	5,000	50 (100) ²
Improved Pasture Management ³	Acres-Installed	150	50
Retention Ponds	Acres-Treated	2,000	75
Cropland Control Measures	Unit	Unit Cost¹	Reduction Efficiency (%)
Dairy Liquid Manure Storage Tank	System	N/A	99
Permanent Vegetative Cover on Cropland (SL-1)	Acres - Installed	370	75
Reforestation of Erodible Crop and Pastureland (FR-1)	Acres - Installed	450	75
Manure/Litter Incorporation into Soil	Acres - Installed	25	100
Onsite Sewage Disposal Control Measures	Unit	Unit Cost¹	Reduction Efficiency (%)
Septic Tank Pump-out	System	300	N/A
Connection to public sewer	System	15,000	100
Septic System Repair	System	4,000	100
New Conventional Septic System	System	8,000	100
Alternative Onsite Sewage Disposal System	System	20,000	100
Pet Waste Management Control Measures	Unit	Unit Cost¹	Reduction Efficiency (%)
Pet waste education program	Program	5,000	50
Pet waste digesters	System	50	50
Confined canine unit (CCU) Waste Treatment System	System	20,000	100
Stormwater Runoff Control Measures	Unit	Unit Cost¹	Reduction Efficiency (%)
Vegetated Buffers	Acres-Installed	400	50
Bioretention	Acres-Treated	15,000	90
Infiltration Trench	Acres-Treated	11,300	90
Technical Assistance	Unit	Unit Cost¹	Reduction Efficiency (%)
Agricultural	Full Time Equivalent	65,000 / yr	N/A
Residential	Full Time Equivalent	65,000 / yr	N/A

¹ Unit cost = installation or one-time incentive payment, ² Direct load reduction efficiency in parentheses;

³Improved pasture management comprised of Pasture Management, Pasture and Hayland Planting (512), and Prescribed Grazing (528) BMPs.

Quantification of Control Measures

An assessment was conducted to quantify actions and cost for two implementation stages. Actions and cost that translate to an instantaneous standard exceedance rate of 10.5% or less, resulting in removal of these streams from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters were quantified. This is referred to as the Stage I implementation goal. The Stage II implementation goal is TMDL source allocation attainment. Estimated units presented in Tables 11 and 12 depict the Stage I and Stage II goals. The quantity of control measures, or BMPs, recommended during implementation was determined through spatial analyses and modeling alternative implementation scenarios. Spatial analyses of land use, stream-network, and the Commonwealth of Virginia aerial maps along with regionally appropriate data archived in the VADCR Agricultural BMP Database and TMDL document were utilized to establish average estimates of control measures to reduce bacteria loads in the watersheds. Additionally, input from local agency representatives, citizens, and contractors were used to verify the analyses.

Agricultural Implementation Needs

To estimate the exclusionary fencing requirements, the National Hydrography Dataset (NHD) stream network was overlaid on aerial photography. Open areas were identified as having the potential to support livestock. Not every pasture area has livestock on it at any given point in time. However, it is assumed that all pasture areas have the potential for livestock access. Additionally, livestock will occasionally be given access to areas identified as cropland (e.g., following the last cutting of hay for the season) and forest. Perennial stream segments that flowed through or adjacent to pasture (open) areas were identified. If the stream segment flowed through the pasture area, it was assumed that fencing was required on both sides of the stream, while if a stream segment flowed adjacent to the pasture area; it was assumed that fencing was required on only one side of the stream. This initial classification was updated by examining land use criteria, size of resultant pasture, and existing BMPs. The CSWCD, TCCSWCD, and TJSWCD were consulted to further update the potential fencing designations based on existing system installations and local knowledge of the watershed. Additionally, the AWG was asked to provide input at the second meeting. Analysis results for portion of Plentiful Creek watershed are displayed in Figure 3. Overall results for the watersheds are depicted in Figure 4. Additionally, results were printed on large-scale paper maps and can be viewed at the CSWCD, TCCSWCD, and TJSWCD offices. There are approximately 356 miles of perennial streams in these six watersheds. Currently in these watersheds, approximately 11 miles of exclusion fencing have been installed through cost-share programs. Exclusion fencing necessary to prevent access to perennial streams and meet the stated TMDL reductions was estimated at approximately 141 miles of fence (Table 7).

Legend

- No fencing needed
- One-sided fencing needed
- Two-sided fencing needed
- Existing fencing or no livestock
- Watershed Boundary

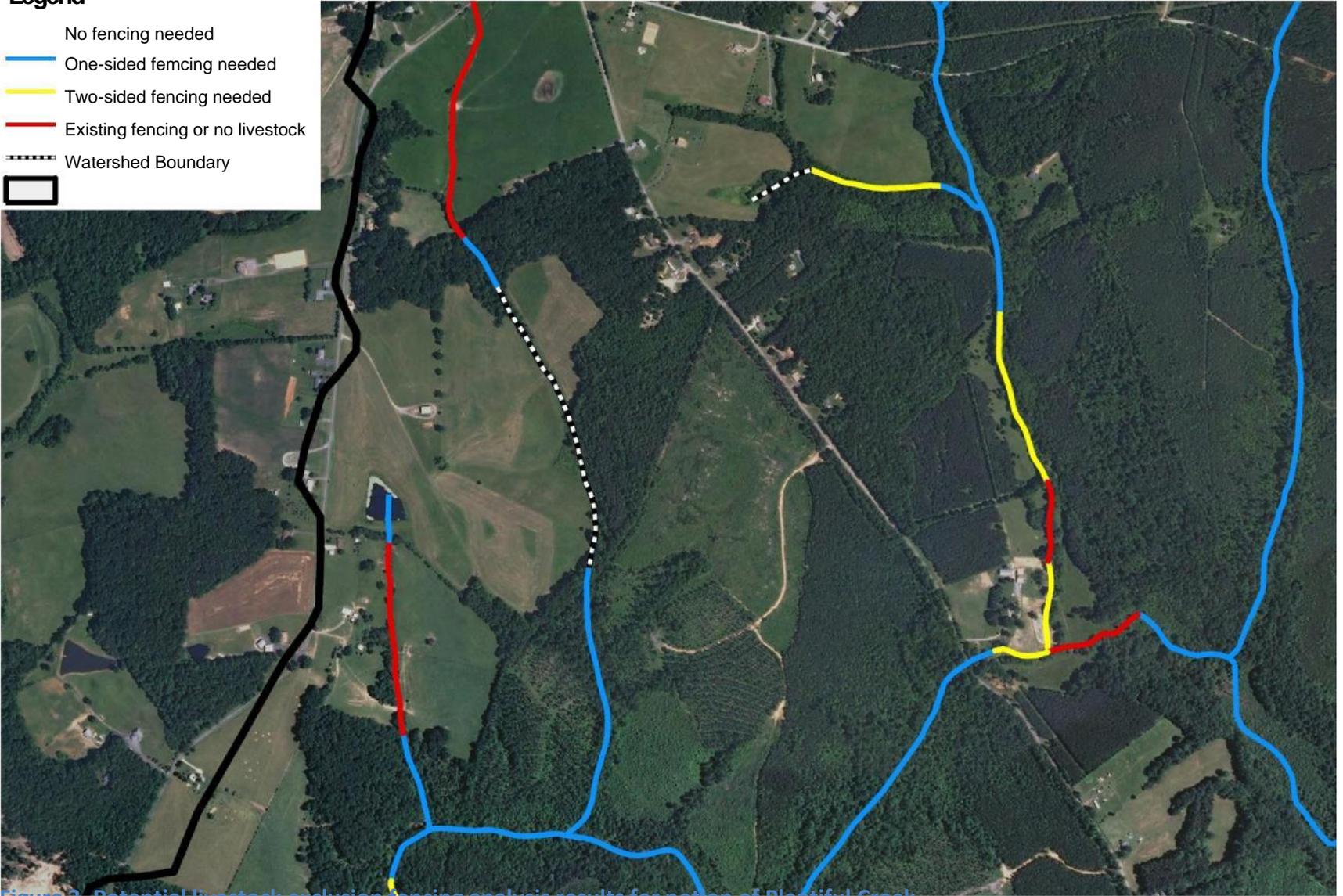


Figure 3. Potential livestock exclusion fencing analysis results for portion of Plentyful Creek.

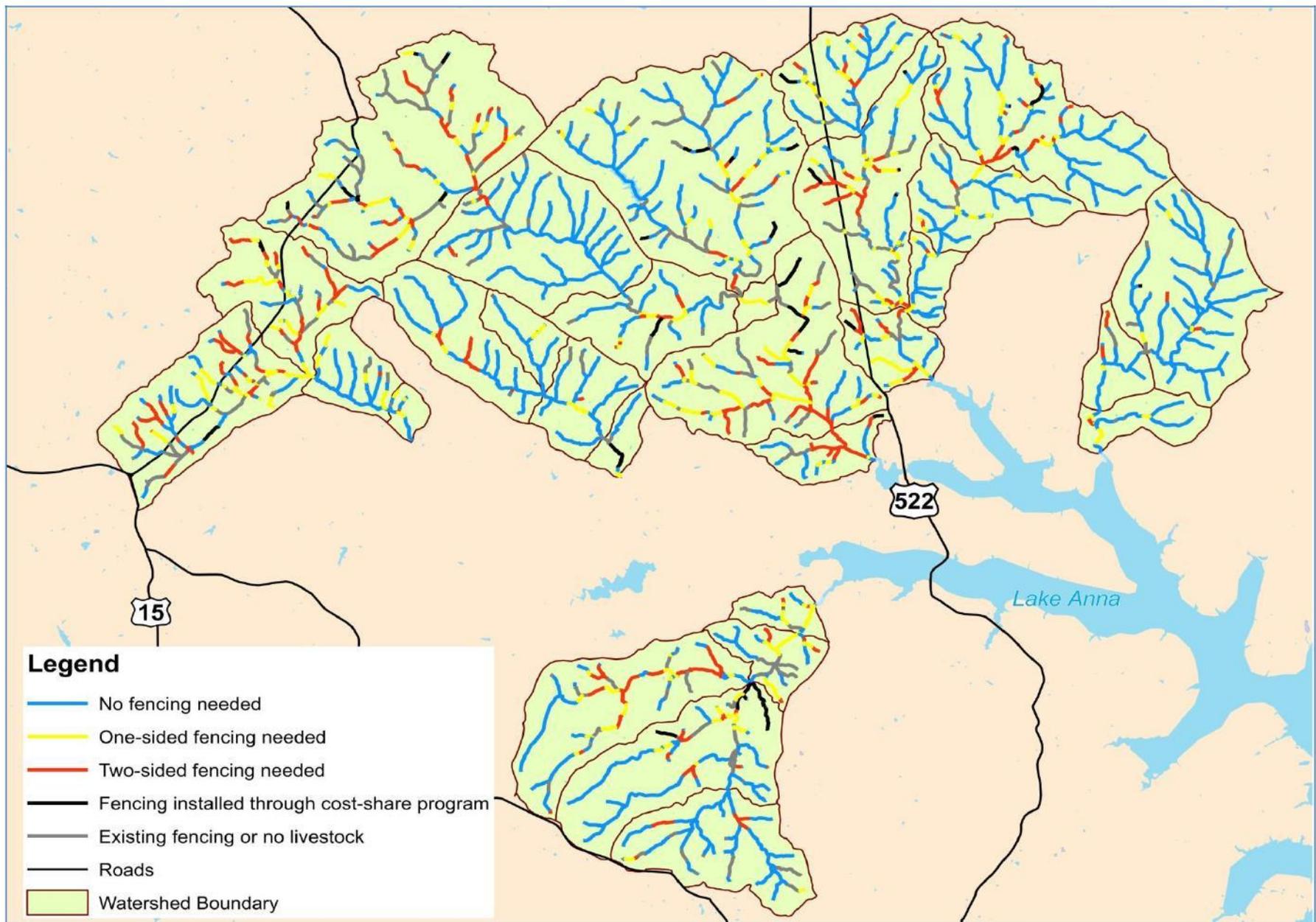


Figure 4. Potential livestock exclusion fencing analysis results for the watersheds.

Table 7. Existing livestock exclusion fencing and estimated exclusion fencing length needed in the impairments.

Cost-share Exclusion Fencing(ft)	Beaver Creek	Goldmine Creek	Mountain Run	Pamunkey Creek	Plentiful Creek	Terrys Run	Total
Existing	3,396	12,021	3,726	26,804	369	369	56,319
Estimated Exclusion Fencing(ft)	Beaver Creek	Goldmine Creek	Mountain Run	Pamunkey Creek	Plentiful Creek	Terrys Run	Total
One-sided	6,001	33,085	41,419	67,969	6,207	6,207	202,232
Two-sided	16,499,	87,762	101,292	208,369	12,552	12,552	540,057
Total Fencing	22,500	120,847	142,711	276,338	18,759	18,759	742,289

The VADCR Agricultural BMP Database was utilized to determine typical characteristics (e.g., streamside fencing length per practice) of full livestock exclusion systems leading to the quantification of the number of required systems. The database was queried for information on livestock exclusion systems installed in the CSWCD district. Average streamside fencing and system cost for incentive programs used to estimate livestock exclusion system quantity and cost are listed in Table 8. An SL-6 system was categorized based on funding program, CRSL-6 (CREP) versus SL-6 (VA Agricultural BMP Cost-share Program). The query was limited to exclusion systems with “linear feet” as the “extent installed”. Potential streamside fencing was divided by the average streamside length per system to estimate a total of 320 exclusion systems are needed to insure full exclusion of livestock from the streams. In order to provide implementation options to producers, several cost-share programs with varying goals and requirements were included. Based on historical cost-share program participation and working group feedback, total exclusion systems were divided between Conservation Reserve and Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP), Livestock Exclusion with Riparian Buffers (LE-1T), Livestock Exclusion with Reduced Setback (LE-2T), Small Acreage Grazing System (SL-6AT), and Stream Protection (WP-2T) (Table 9). A typical LE-1T system includes streamside fencing, cross-fencing for pasture management, hardened crossing, alternative watering system, watering trough, water distribution piping, and a 35-ft buffer from the stream.

In order to address the pasture bacteria load reductions, the benefit of installing the livestock exclusion systems was calculated. A reduction efficiency of 100% was assumed for the buffered area (i.e. fenced out pasture) coupled with 50% efficiency for upland area twice that of the buffered area. Using these efficiencies, the area treated by the buffer was calculated for each watershed. The ratio of the buffered area bacteria load and the applied bacteria load from the TMDL was calculated for pasture livestock access. The bacteria load from the remaining pasture land use would be managed using improved pasture management BMPs. Total of 26,966 acres in the watershed would require pasture management with portions of this acreage improved by the Pasture and Hayland Planting (NRCS Code 512) and Prescribed Grazing (NRCS Code 528) BMPs. Given reductions were not sufficient to meet TMDL reduction goals, installation of retention ponds may be necessary to treat runoff from this acreage during Stage II of implementation.

Bacteria reduction provided by liquid dairy storage tanks installed in the watersheds was accounted for in the land-applied loads. The AWG decided the primary control measure for cropland bacteria load reduction will be permanent conversion of cropland to pasture and forest land uses. The conversion of cropland to pasture or forest land uses results in a bacteria load reduction. The conversion was divided between SL-1 Permanent Vegetative Cover and FR-1 Reforestation of Erodible Crop and Pastureland BMPs based on input from AWG and landuse difference. Additionally, manure incorporation into soil was needed in the watersheds. The VADCR Agricultural BMP Database was utilized to determine typical characteristics of SL-1 and FR-1 systems installed in the CSWCD, TCCSWCD, and TJSWCD areas. Currently in these watersheds, approximately 376 cropland acres have been converted utilizing the SL-1 (343 ac) and FR-1 (33 ac) practices. Converting 346 acres to pasture and 336 acres to forest land uses and

incorporating manure / biosolids into soil on approximately 2,320 cropland acres during Stage II satisfied the TMDL goal (Table 9).

Table 8. Average streamside fencing and system cost for incentive programs used to estimate livestock exclusion system quantity and cost.

Practice Name and Code	Avg. Streamside Fencing per System (ft)	Average System Cost (\$)
Livestock Exclusion System (CREP)	4,400	25,000
Livestock Exclusion System (EQIP and CBWI)	2,150	19,500
Livestock Exclusion with Riparian Buffers (LE-1T)	2,150	19,500
Small Acreage Grazing Systems (SL-6AT)	1,500	13,500
Livestock Exclusion with Reduced Setback (LE-2T)	1,750	15,750
Stream Protection (WP-2T)	1,950	5,000

Table 9. Estimation of control measures needed to meet pasture and cropland bacteria load reduction implementation goals.

Pasture and Livestock Exclusion Control Measures	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
Livestock Exclusion System (CREP)	1	8	16	9	1	7	42
Livestock Exclusion System (EQIP and CBWI)	3	17	31	19	3	14	87
Livestock Exclusion System (LE-1T)	3	17	32	19	2	14	87
Livestock Exclusion System (SL-6AT)	0	0	2	2	0	1	5
Livestock Exclusion System (LE-2T)	3	16	32	18	2	14	85
Livestock Exclusion System (WP-2T)	0	3	6	3	0	2	14
Improved Pasture Management ¹	562	3,999	12,09	5,280	1,443	3,621	26,966
Retention Ponds	269	2,123	7,025	2,904	872	1,948	15,141
Cropland Control Measures	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
Permanent Vegetative Cover on Cropland (SL-1)	1	5	200	55	30	55	346
Reforestation of Erodible Crop and Pastureland (FR-1)	1	5	200	50	30	50	336
Manure Incorporation into Soil	4	14	1,050	420	272	560	2,320
Technical Assistance	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
Agricultural – Pasture and Cropland	--	--	--	--	--	--	2/yr

¹Improved pasture management comprised of Pasture Management, Pasture and Hayland Planting (512), and Prescribed Grazing (528) BMPs.

Residential Implementation Needs

Number of straight pipes and failing septic systems to correct during implementation was established during TMDL development. Based on discussion with Virginia Department of Health and RWG, it was assumed that 90% of the straight pipes would be replaced with a conventional septic system and 10% replaced with an alternative on-site sewage disposal system (OSDS). Ten connections to sanitary sewer were estimated in the Pamunkey Creek watershed to correct failing septic systems. All other failing septic systems were assumed to be corrected by repairing the existing septic system (60%), installing a new conventional septic system (30%), or installing a new alternative OSDS (10%). Number of septic tank pump-outs was listed as the estimated failing septic systems. It is estimated that 514 septic tank pump-outs, 302 septic system repairs, 201 new conventional septic systems, and 55 alternative OSDS are considered necessary to correct straight pipes and failing septic systems during implementation (Table 10). The VADCR BMP Database was utilized to determine average costs for RB-1, RB-2, RB-3, RB-4, and RB-5 practices installed in these areas.

A four-step program was proposed to address pet waste reductions. In the first step, a pet waste control program consisting of educational packets, signage, and disposal stations in public areas will be instituted in each watershed. The second step will be installing pet waste enzyme digesting composters at 120 residences. The third step will be identification of confined canine units (CCU) and installing approximately seven CCU waste treatment systems throughout the watersheds. The installation of vegetated buffers, bioretention, and infiltration trenches on residential land use is the fourth step. Components of the four-step program are outlined in Table 10.

Other Potential Implementation Needs

Implicit in the TMDL is the need to avoid increased delivery of pollutants from sources that have not been identified as needing a reduction, and from sources that may develop over time. Future residential development was identified as potential sources to deliver bacteria to streams through additional septic systems and pets. Care should be taken to monitor these activities and the impact on water quality. This needs to be carefully considered during permit issuance, site plans, and development.

Table 10. Estimation of control measures needed to meet residential and straight pipe bacteria load reduction implementation goals.

Failing Septic Systems Control Measures	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
Septic Tank Pump-out	27	134	179	92	45	37	514
Connection to Public Sewer	0	0	10	0	0	0	10
Septic System Repair	16	81	101	55	27	22	302
New Conventional Septic System	8	40	51	28	14	11	152
Alternative Onsite Sewage Disposal System	3	13	17	9	4	4	50
Straight Pipe Control Measures	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
New Conventional Septic System	0	11	19	8	2	9	49
Alternative Onsite Sewage Disposal System	0	1	2	1	0	1	5
Pet Waste Management Control Measures	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
Pet Waste Education Program	.25*	.25*	.25*	.25*	1	1	3
Pet Waste Digesters	20	20	20	20	20	20	120
Confined Canine Unit Waste Treatment System	1	1	2	1	1	1	7
Stormwater Runoff Management Control Measures	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
Vegetated Buffers	1	16	16	9	2	16	60
Bioretention	0	5	120	1	1	20	147
Infiltration Trench	0	2	20	0	0	13	35
Technical Assistance	Beaver Creek Units Needed	Mountain Run Units Needed	Pamunkey Creek Units Needed	Terrys Run Units Needed	Plentiful Creek Units Needed	Goldmine Creek Units Needed	Total
Agricultural – Pasture and Cropland	--	--	--	--	--	--	1.8/yr
Pet Waste Management	--	--	--	--	--	--	0.2/yr

*One Pet Waste Education program will be implemented collectively across Beaver Creek, Mountain Run, Pamunkey Creek, and Terrys Run watersheds.

Assessment of Technical Assistance Needs

Members of the AWG, RWG, GWG, and Steering Committee agree that technical assistance and education are keys to getting people involved in implementation. There must be a proactive approach to contact farmers and residents to articulate exactly what the TMDL means to them and what will most practically get the job done. Several education/outreach techniques will be utilized during implementation. Articles describing the TMDL process, the reasons why high levels of fecal bacteria are a problem, the methods through which the problem can be corrected, the assistance that is currently available for landowners to deal with the problem, and the potential ramifications of not dealing with the problem should be made available to the public through as many channels as possible (*e.g.*, Farm Bureau, SWCD, NRCS, FSA newsletters; and targeted mailings). Workshops and demonstrations should be organized to show landowners the extent of the problem, the effectiveness of control measures, and the process involved in obtaining technical and financial assistance.

For the agricultural community, field tours conducted by SWCDs, pasture walks, educational events conducted by Virginia Cooperative Extension, Cattleman's Association events, and information booth at County Fair were recommended. The emphasis was on having local farmers discuss their experiences with the cost-share programs, demonstrating the advantages of clean water source and pasture management, and presenting monitoring results to demonstrate the problem. It is generally accepted that farmers will be more persuaded by discussion with local technical personnel or fellow farmers who have implemented the suggested control measures than through presentations made by state-agency representatives. Notices using all media outlets (*e.g.*, cable television, public access channel programming, newspapers, and links on County website) need to be posted regarding status of implementation. Posting of informative/recognition signage throughout watershed (*e.g.*, conservation practices implemented on farm) may prompt neighbors to participate. In general, a proactive approach to education needs to take place, whereby, technicians need to contact each landowner instead of waiting for the landowner to make contact.

For residential issues, public outreach should focus on means to educate and involve public with regard to implementing corrective actions to replace straight pipes, correct failing septic systems, and manage pet waste. Several education/outreach techniques need to be utilized during implementation of corrective actions for straight pipes and failing septic systems. The focus must be on obstacles (*e.g.*, money, information, and understanding of issues) that property owners face in correcting problems and proper operation and maintenance of systems. Examples included: press releases identifying levels of cost-share available for fixing on-site sewage disposal systems problems; small community meetings; workshops; model septic system and video displayed in public buildings; demonstration at county fair; information packet provided through realtors on proper operation and maintenance of on-site sewage disposal systems; educational materials to encourage home owners' associations, veterinarians, kennels, hunt clubs and pet stores to practice and promote proper pet waste management; and mailings.

Technical assistance and educational outreach tasks were identified during plan development that would be needed during implementation. The following tasks associated with agricultural and residential programs were identified:

Agricultural Programs

1. Make contacts with landowners in the watershed to make them aware of implementation goals and cost-share assistance programs.
2. Provide technical assistance for agricultural programs (e.g. survey, design, layout, and approval of installation).
3. Develop educational materials & programs.
4. Organize educational programs (e.g., pasture walks, presentations at field days or club events...).
5. Distribute educational materials (e.g., informational articles in FSA or Farm Bureau newsletters, local media).
6. Handle and track cost-share.
7. Assess and track progress toward BMP implementation goals.
8. Follow-up contact with landowners who have installed BMPs.
9. Coordinate use of existing agricultural programs and suggest modifications where necessary.

Residential Programs

1. Identify failing septic systems & straight-pipes (e.g., stream walks, analysis of aerial photos, mailings, monitoring, and home visit).
2. Identify confined canine units (e.g., mailings, County databases, site visit).
3. Track on-site sewage disposal system repairs/ replacements/ installations for human and confined canine units.
4. Handle and track cost-share.
5. Develop educational materials & programs.
6. Organize educational programs and demonstration projects.
7. Distribute educational materials (e.g., informational pamphlets on TMDL & on-site sewage disposal systems).
8. Assess progress toward implementation goals.
9. Follow-up contact with landowners who have participated in the program(s).

To determine the number of full time equivalents (FTE) considered necessary for agricultural and residential technical assistance during implementation, the average cost-share amount of practices needed to be installed per year during implementation was divided by an average cost-share amount that one FTE can process in a year (\$380,000 agricultural and \$135,000 residential). It was assumed that all BMPs would need some level of technical assistance and the FTE would be responsible for educational outreach. Coupling the number of BMPs processed historically and estimates provided by SWCDs and Steering Committee, two agricultural FTE per year and 1.8 residential OSDS FTE per year are needed during Stage I of implementation. It was estimated that 0.2 FTE per year are needed to administer the pet waste management program. Two agricultural FTE per year are needed during Stage II of implementation.

Cost Analysis

Associated cost estimations for each implementation action were calculated by multiplying the average unit cost (Table 6) per the number of units shown in Tables 9 and 10. Tables 11 and 12 list installation

and technical assistance costs to implement agricultural and residential programs for implementation Stages I and II in all impairments combined. Focusing on Stage I (*i.e.*, removal of impairments from impaired waters list) costs, the total average installation cost for livestock exclusion systems and improved pasture management is \$9.16 million. The total installation cost for converting cropland to permanent vegetative cover and forest is estimated at \$0.22 million. Accordingly, total agricultural corrective action costs equal \$9.38 million. Estimated corrective action costs needed to replace straight pipes and fix failing septic systems during Stage I totals \$4.22 million. The cost to implement the pet waste reduction process totals an estimated \$0.16 million. Cost to install vegetated buffers, rain gardens, and infiltration trenches during Stage I equal \$0.54 million.

It was determined by the CSWCD, TCCSWCD, TJSWCD, VADCR, VDH, GWG, and Steering Committee members that it would require \$65,000 to support one technical FTE per year. The total costs to provide assistance in the agricultural and residential programs during Stage I implementation are expected to be both equal \$1.04 million (Table 15). The total Stage I implementation cost including technical assistance is \$16.38 million with the agricultural cost being \$10.42 million and residential cost \$5.96 million (Table 15).

Table 11. Implementation cost for control measures installed addressing livestock access, pasture, and cropland bacteria load reductions in all impairments.

Livestock Exclusion, Pasture, and Cropland Control Measures	Beaver Creek Cost (\$)	Mountain Run Cost (\$)	Pamunkey Creek Cost (\$)	Terrys Run Cost (\$)	Plentiful Creek Cost (\$)	Goldmine Creek Cost (\$)	Total Cost
Livestock Exclusion System (CREP)	25,000	200,000	400,000	225,000	25,000	175,000	1,050,000
Livestock Exclusion System (EQIP)	58,500	331,500	604,500	370,500	58,500	273,000	1,696,500
CRP	0	0	0	0	0	0	0
Livestock Exclusion with Riparian Buffers System (LE-1T)	58,500	331,500	624,000	370,500	39,000	273,000	1,696,500
Small Acreage Grazing System (SL-6AT)	0	0	27,000	27,000	0	13,500	67,500
Livestock Exclusion with Reduced Setback System (LE-2T)	47,300	252,000	504,000	283,500	31,500	220,500	1,338,800
Stream Protection System (WP-2T)	0	15,000	30,000	15,000	0	10,000	70,000
Prescribed Grazing	84,300	599,900	1,814,000	792,000	216,500	543,200	4,049,900
Retention Ponds	538,000	4,246,000	14,051,000	5,808,000	1,744,000	3,896,000	30,283,000
Permanent Vegetative Cover on Cropland (SL-1)	400	1,900	74,000	20,400	11,100	20,400	128,200
Reforestation of Erodible Crop and Pastureland (FR-1)	500	2,300	90,000	22,500	13,500	22,500	151,300
Manure/Biosolids Incorporation into Soil	100	400	26,300	10,500	6,800	14,000	58,100
Total Installation Cost	812,600	5,980,500	18,244,800	7,944,900	2,145,900	5,461,100	40,589,800
Technical Assistance Cost	--	--	--	--	--	--	1,300,00

Total Livestock Exclusion, Pasture and Cropland Costs: \$41,889,800

Table 12. Implementation cost for control measures installed addressing on-site sewage disposal systems bacteria load reductions in all impairments.

Onsite Sewage Disposal System, Pets, and Stormwater Runoff Control Measures	Beaver Creek Cost (\$)	Mountain Run Cost (\$)	Pamunkey Creek Cost (\$)	Terrys Run Cost (\$)	Plentiful Creek Cost (\$)	Goldmine Creek Cost (\$)	Total Cost
Septic Tank Pumpout	8,100	40,200	53,700	27,600	13,500	11,100	154,200
Hook-up to Sanitary Sewer	0	0	150,000	0	0	0	150,000
New Conventional Septic System	64,000	408,000	560,000	288,000	128,000	160,000	1,608,000
Alternative Sewage Disposal System	60,000	280,000	380,000	200,000	80,000	100,000	1,100,000
Septic System Repair	64,000	324,000	404,000	220,000	108,000	88,000	1,208,000
Pet Waste Education Program	1,300	1,300	1,300	1,300	5,000	5,000	15,200
Pet Waste Digesters	1,000	1,000	1,000	1,000	1,000	1,000	6,000
Confined Canine Unit Waste Treatment System	20,000	20,000	40,000	20,000	20,000	20,000	140,000
Vegetated Buffers	400	6,400	6,400	3,600	3,600	64,000	24,000
Bioretention	0	75,000	1,800,000	15,000	15,000	300,000	2,205,000
Infiltration Trench	0	22,6000	226,000	0	0	146,900	395,500
Total Installation Cost	218,800	1,178,500	3,622,400	776,500	776,500	838,400	7,005,900
Technical Assistance Cost	--	--	--	--	--	--	1,300,000

Total Onsite Sewage Disposal, Pets, and Stormwater Runoff BMPs cost: \$8,305,900

Benefit Analysis

The primary benefit of implementation is cleaner waters in Virginia, where bacteria levels in the Beaver Creek, Goldmine Creek, Mountain Run, Pamunkey Creek, Plentiful Creek, and Terrys Run impairments will be reduced to meet water quality standards. Actions during implementation can improve human and livestock herd health, local economies, and aquatic ecosystem health.

Human Health

It is hard 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, the incidence of infection from fecal sources, through contact with surface waters, should be reduced considerably. The residential programs will play an important role in improving water quality, since human waste can carry with it human viruses in addition to the bacterial and protozoan pathogens potentially found in all fecal matter.

Livestock Herd Health

A clean water source coupled with exclusionary fencing has been shown to improve weight gain; decrease stress; reduce herd health risks associated with increased exposure to water-transmitted diseases, bacteria, virus and cysts infections; reduce mastitis and foot rot; and decrease herd injuries associated with cattle climbing unstable streambanks, or being stuck in mud.

Economics

An important objective of the IP is to foster continued economic vitality and strength. Healthy waters can improve economic opportunities for Virginians, and a healthy economic base can provide the resources and funding necessary to pursue restoration and enhancement activities. The agricultural and residential practices recommended in this document will provide economic benefits to the landowner, along with the expected environmental benefits on-site and downstream. For example, installing a livestock stream exclusion system with an alternative (clean) water source, improving pasture condition, performing sewage system maintenance, and improving aesthetics throughout the watershed can have an economic benefit on the local economy. Additionally, money spent by landowners, government agencies, and non-profit organizations in the process of implementing the IP will stimulate the local economy.

The benefit of a Grazing Land Protection System BMP is improved profit through more efficient utilization and harvest of forage by grazing animals. 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 (VCE, 1996). Several factors contribute to greater profitability: stocking rate can usually be increased by 30% to 50%; high-quality, fresh, and unsoiled vegetative growth available throughout the grazing system increases weight gain per acre; vigor of the pasture sod is improved; and handling and checking grazing animals is easier. More accurate estimates of the amount of forage available, greater uniformity in grazing of pastures, flexibility of harvesting and storing forage not needed for grazing, and extending the length of the grazing

season while providing a more uniform quality and quantity of forage throughout the season are important benefits afforded by this system.

In terms of economic benefits to homeowners, an improved understanding of private OSDS, 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. In addition, investment in the home is protected with a properly functioning sewage disposal system. A home's value can be decreased up to 40% with a failed septic system. The average septic system will last 20-25 years if properly maintained. Proper maintenance includes: knowing the location of the system components and protecting them by 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 an entire system.

Improved aesthetics in public areas (*e.g.*, parks) and surrounding businesses provided by control measures (*e.g.*, pet waste kiosks and bioretention) has the potential to draw local citizens and visitors to these areas. In addition, a healthy waterway has the potential to attract local citizens and visitors for recreation. With a major recreation area just downstream, Lake Anna, this is a vital enhancement to the public's enjoyment of the area.

Aquatic Community Improved

Stream bank protection provided through exclusion of livestock including horses from streams will improve the aquatic habitat in these streams. Vegetated buffers that are established will also help reduce sediment and nutrient transport to the stream from upslope locations. The installation of improved pasture management systems should also reduce soil and nutrient losses and increase infiltration of precipitation, thereby decreasing peak flows downstream. Reductions in nutrient and sediment loadings contribute to attainment of nutrient and sediment reduction goals for the Chesapeake Bay TMDL. Local initiatives, such as riparian easements, will additionally be complemented by actions performed during TMDL implementation.

MEASUREABLE GOALS AND MILESTONES FOR ATTAINING WATER QUALITY STANDARDS

The end goals of implementation are:

- 1) Restored water quality in the impaired waters, and
- 2) Subsequent de-listing of streams from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters.

Expected progress in implementation is established with two types of milestones: *implementation milestones* and *water quality milestones*. Implementation milestones establish the percentage of control measures installed within certain timeframes, while water quality milestones establish the corresponding improvements in water quality that can be expected as the implementation milestones are met.

Progress toward end goals will be assessed during implementation through tracking of control measure installations by CSWCD; TCCSWCD; TJSWCD; NRCS; VADCR; VDH; Louisa, Orange, and Spotsylvania Counties, and RRRRC. The VADEQ will continue to assess water quality through its monitoring program. Other monitoring project activities in the watershed (e.g. citizen monitoring) will be coordinated to augment the VADEQ monitoring program. Implementation will be assessed based on reducing exceedances of the bacteria water quality standard, thereby improving water quality.

Implementation of control measures is scheduled for 10 years and will be assessed in two stages beginning in January 2012 and lasting to December 2021. Stage I is based on meeting source allocations that translate to an instantaneous standard exceedance rate of 10.5% or less resulting in removal of streams from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters. The Stage II goal is based on implementing source allocations to meet the specified TMDL goal, 0% exceedance of water quality standards. After implementation inception, five milestones will be met in two-year increments until streams are removed from the Commonwealth of Virginia's Section 303(d) List of Impaired Waters.

Implementation in years one through eight for agricultural source reductions focuses on installing livestock stream exclusion systems, improving pasture management, and cropland conversion. BMPs installed in years nine and ten are based on additional treatment of bacteria load not treated during Stage I from pasture and cropland using improved pasture management, manure incorporation into soil, and retention ponds. Retention ponds are more costly and are logistically more difficult to design and locate on individual farms. Implementation of residential control measure in years one through eight focuses on performing septic tank pump-outs, identification and removal of straight pipes, repairing or replacing failed septic systems, instituting pet waste control program, installation of pet waste enzyme digesting composters, installation of confined canine unit (CCU) waste treatment systems, and installation of vegetated buffers. Vegetated buffer, bioretention, and infiltration trench installations are expected to escalate over the last

two years. Table 13 lists the targeted implementation stage for control measures installation per impairment.

Table 14 lists the cumulative progress towards the TMDL endpoint as implementation milestones are met. Water quality improvement is expected to increase each year, 12% overall bacteria load reduction is expected at the second year, 24% in the fourth year, 36% in the sixth year, and 49% in the eighth year. Based on water quality modeling projections, the impairments would be in a probable position to be de-listed from the List of Impaired Waters at the fourth milestone. Considering the dynamics of a stream ecosystem and the inherent difficulties that may arise preventing implementation, the final milestone of TMDL allocation attainment was set at 10 years following implementation commencement. Table 15 lists implementation cost associated with percentage of practices installed addressing agricultural and residential practices along with technical assistance needed in these watersheds.

Table 13. Targeted implementation stages for control measures installation.

Pasture and Livestock Exclusion Control Measures	Beaver Creek	Mountain Run	Pamunkey Creek	Terrys Run	Plentiful Creek	Goldmine Creek
Livestock Exclusion System (CREP)	I	I	I	I	I	I
Livestock Exclusion System (EQIP and CBWI)	I	I	I	I	I	I
Livestock Exclusion System (LE-1T)	I	I	I	I	I	I
Livestock Exclusion System (SL-6AT)	I	I	I	I	I	I
Livestock Exclusion System (LE-2T)	I	I	I	I	I	I
Livestock Exclusion System (WP-2T)	I	I	I	I	I	I
Improved Pasture Management ¹	I & II	I & II	I & II	I & II	I & II	I & II
Retention Ponds	II	II	II	II	II	II
Cropland Control Measures	Beaver Creek	Mountain Run	Pamunkey Creek	Terrys Run	Plentiful Creek	Goldmine Creek
Permanent Vegetative Cover on Cropland (SL-1)	I & II	I & II	I & II	I & II	I & II	I & II
Reforestation of Erodible Crop and Pastureland (FR-1)	I & II	I & II	I & II	I & II	I & II	I & II
Manure Incorporation into Soil	II	II	II	II	II	II
New Conventional Septic System	I	I	I	I	I	I
Alternative Onsite Sewage Disposal System	I	I	I	I	I	I
Straight Pipe Control Measures	Beaver Creek	Mountain Run	Pamunkey Creek	Terrys Run	Plentiful Creek	Goldmine Creek
New Conventional Septic System	I	I	I	I	I	I
Alternative Onsite Sewage Disposal System	I	I	I	I	I	I
Pet Waste Management Control Measures	Beaver Creek	Mountain Run	Pamunkey Creek	Terrys Run	Plentiful Creek	Goldmine Creek
Pet Waste Education Program	I	I	I	I	I	I
Pet Waste Digesters	I	I	I	I	I	I
Confined Canine Unit Waste Treatment System	I	I	I	I	I	I
Stormwater Runoff Management Control Measures	Beaver Creek	Mountain Run	Pamunkey Creek	Terrys Run	Plentiful Creek	Goldmine Creek
Vegetated Buffers	I & II	I & II	I & II	I & II	I & II	I & II
Bioretention	I & II	I & II	I & II	I & II	I & II	I & II
Infiltration Trench	I & II	I & II	I & II	I & II	I & II	I & II

Stage I = first eight years of implementation for a 10-year timeline

Stage II = last two years of implementation for a 10-year timeline

Table 14a. Cumulative implementation of control measures.

Pasture Control Measure	Unit	Progress Since TMDL Study	Milestone 1 Completed by Jan. 2014	Milestone 2 Completed by Jan. 2016	Milestone 3 Completed by Jan. 2018	Milestone 4 Completed by Jan. 2020	Milestone 5 Completed by Jan. 2022
Livestock Exclusion System (CREP)	System	6	9	21	31	42	42
Livestock Exclusion System (EQIP)	System	6	16	33	53	87	87
Livestock Exclusion System (LE-1T)	System	N/A	18	35	55	87	87
Livestock Exclusion System (SL-6AT)	System	N/A	0	1	3	5	5
Livestock Exclusion System (LE-2T)	System	N/A	16	32	54	85	85
Livestock Exclusion System (WP-2T)	System	N/A	0	3	7	14	14
Improved Pasture Management	Acres - Installed	N/A	5,398	10,796	16,194	21,592	26,996
Retention Pond	Acres - Treated	N/A	0	0	0	0	15,141
Cropland Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Permanent Vegetative Cover on Cropland (SL-1)	Acres - Installed	343	69	138	208	277	346
Reforestation of Erodible Crop and Pastureland (FR-1)	Acres - Installed	33	67	134	202	269	336
Manure Incorporation into Soil	Acres - Treated	N/A	0	0	0	0	2,320
Onsite Sewage Disposal Systems Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Septic Tank Pump-out	System	N/A	124	252	382	514	514
Connection to Public Sewer	System	N/A	2	4	7	10	10
Septic System Repair	System	N/A	73	148	224	302	302
New Conventional Septic System	System	N/A	46	97	149	201	201
Alternative Sewage Disposal System	System	N/A	11	24	38	55	55
Pet Waste Management Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Pet waste education program	System	N/A	3	3	3	3	3
Pet waste digesters	System	N/A	30	60	90	120	120
Confined Canine Unit Waste Treatment System	System	N/A	2	4	7	10	10
Stormwater Runoff Control Measure	Unit	Progress	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Vegetated Buffers	Acres - Installed	N/A	7	19	32	46	60
Bioretention	Acres - Treated	N/A	0	0	15	29	147
Infiltration Trench	Acres - Treated	N/A	0	0	3	7	35

Table 14a. Cumulative implementation and water quality milestones as Instantaneous Bacteria Standard Exceedance Rate (%).

Impairment	Existing	Milestone 1	Milestone 2	Milestone 3	Milestone 4	Milestone 5
Beaver Creek	23	20	16	14	10	4
Mountain Run	24	20	17	13	8	3
Pamunkey Creek	36	27	22	16	10	1
Terrys Run	37	28	23	17	9	4
Plentiful Creek	34	29	22	13	8	6
Goldmine Creek	48	38	30	17	9	1

Table 15. Implementation cost associated with percentage of practices installed along with technical assistance addressing agricultural and residential needs in the watersheds.

Year	Pasture and Livestock Access (\$)	Cropland (\$)	Technical Assistance (\$)	Agriculture Total	Onsite Sewage Disposal System (\$)	Pet Waste (\$)	Technical Assistance (\$)	Residential Total (\$)	Total Cost (\$)
1	943,000	27,900	130,000	1,100,900	394,300	36,700	130,000	561,000	1,661,900
2	1,007,000	27,900	130,000	1,164,900	554,100	22,500	130,000	706,600	1,871,500
3	1,011,500	27,900	130,000	1,169,400	402,300	22,900	130,000	555,200	1,724,600
4	1,042,000	27,900	130,000	1,199,900	634,100	23,300	130,000	787,400	1,987,300
5	1,078,700	28,300	130,000	1,237,000	426,300	3,300	130,000	559,600	1,796,600
6	1,154,700	27,900	130,000	1,312,600	657,100	258,900	130,000	1,046,000	2,358,600
7	1,401,600	27,900	130,000	1,559,500	430,300	43,300	130,000	603,600	2,163,100
8	1,520,800	27,900	130,000	1,678,700	721,700	290,400	130,000	1,142,100	2,820,800
9	15,545,300	57,000	130,000	15,732,300	0	1,034,800	130,000	1,164,800	16,897,100
10	15,547,600	57,000	130,000	15,734,600	0	1,049,600	130,000	1,179,600	16,914,200
Stage I Total (1-8)	9,159,300	223,600	1,040,000	10,422,900	4,220,200	701,300	1,040,000	5,961,500	16,384,400
Stage II Total (9-10)	31,092,900	114,000	260,000	31,466,900	0	2,084,400	260,000	2,344,400	33,811,300
Total (1-10)	40,252,200	337,600	1,300,000	41,889,800	4,220,200	2,785,700	1,300,000	8,305,900	50,195,700

Targeting

The process of a staged implementation implies targeting of control measures, ensuring optimum utilization of resources. The impaired watersheds were divided into subwatersheds during TMDL development to aid modeling procedures (Figure 5). These subdivisions were based primarily on homogeneity of land use. Subdivision can be used during implementation to identify localized sources of bacteria and target control measure installation.

In quantifying agricultural BMPs through the use of aerial photography, land use, and stream network GIS layers, maps were formulated showing potential livestock stream access, pastures, and crop fields. Large-scale paper maps depicting potential streamside fencing required in the watershed were provided to CSWCD, TCCSWCD, and TJSWCD for their use. Additionally, subwatershed priority ranking was established for potential livestock exclusion fencing based on ratio of animal population and estimated length of fencing per subwatershed (Table 16). The maps and prioritization ranking will help identify farm tracts that CSWCD, TCCSWCD, and TJSWCD should concentrate their efforts in. The appropriate district will coordinate with landowners and track BMP installation progress.

Known problem areas, clusters of older homes, or houses in close proximity to streams known by the VDH will be targeted for on-site sewage disposal system control measures. To assist VDH and district personnel in targeting financial and technical resources, subwatershed priority ranking was established based on total bacteria load from estimated failing septic systems and straight pipes in each watershed (Table 17). Steps outlined in pet waste management stages results in targeting of source type and resources. Significant exposure to a rain garden and/or infiltration trench project would be attained if installed at schools, county administration buildings, or shopping centers in watershed.

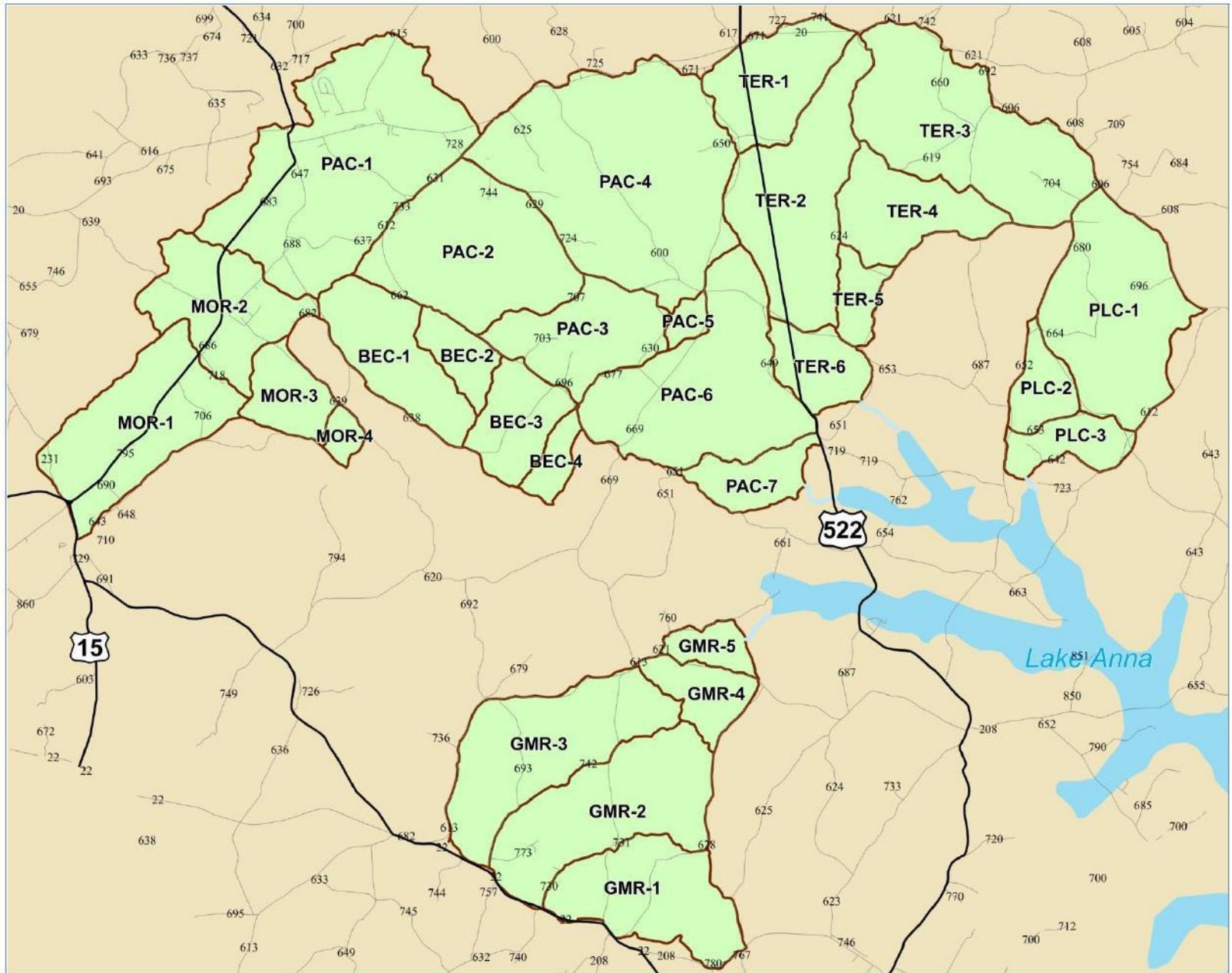


Figure 5. Subwatershed division for impaired watersheds.

Table 16. Subwatershed priority ranking for livestock exclusion fencing installation.

Overall WIP Priority	Subwatershed	SWCD
1st	BEC-4	Culpeper
2nd	PLC-2	Tri-County/City
3rd	PAC-5	Culpeper
4th	PLC-1	Tri-County/City
5th	MOR-2	Culpeper
6th	TER-5	Culpeper
7th	PAC-4	Culpeper
8th	TER-4	Culpeper
9th	PAC-6	Culpeper
10th	PAC-1	Culpeper
11th	TER-1	Culpeper
12th	GMR-1	Thomas Jefferson
13th	TER-2	Culpeper
14th	TER-3	Culpeper
15th	PAC-3	Culpeper
16th	PAC-2	Culpeper
17th	PLC-3	Tri-County/City
18th	MOR-3	Culpeper
19th	GMR-2	Thomas Jefferson
20th	GMR-5	Thomas Jefferson
21st	MOR-1	Culpeper
22nd	TER-6	Culpeper
23rd	MOR-4	Culpeper
24th	BEC-3	Culpeper
25th	BEC-2	Culpeper
26th	GMR-4	Thomas Jefferson
27th	PAC-7	Culpeper
28th	GMR-3	Thomas Jefferson
29th	BEC-1	Culpeper

Table 17. Subwatershed priority ranking for correcting failing septic systems and replacing straight pipes.

Overall WIP Priority	Subwatershed	VDH Office	SWCD
1st	PAC-1	Orange	Culpeper
2nd	PAC-4	Orange	Culpeper
3rd	MOR-2	Orange	Culpeper
4th	MOR-1	Orange	Culpeper
5th	TER-2	Orange	Culpeper
6th	PLC-1	Spotsylvania	Tri-County/City
7th	PAC-6	Orange	Culpeper
8th	TER-3	Orange	Culpeper
9th	PAC-2	Orange	Culpeper
10th	GMR-2	Louisa	Thomas Jefferson
11th	GMR-3	Louisa	Thomas Jefferson
12th	TER-4	Orange	Culpeper
13th	GMR-1	Louisa	Thomas Jefferson
14th	TER-1	Orange	Culpeper
15th	PAC-3	Orange	Culpeper
16th	BEC-1	Orange	Culpeper
17th	MOR-3	Orange	Culpeper
18th	TER-6	Orange	Culpeper
19th	BEC-3	Orange	Culpeper
20th	PLC-3	Spotsylvania	Tri-County/City
21st	GMR-4	Louisa	Thomas Jefferson
22nd	PLC-2	Spotsylvania	Tri-County/City
23rd	PAC-7	Orange	Culpeper
24th	TER-5	Orange	Culpeper
25th	BEC-2	Orange	Culpeper
26th	GMR-5	Louisa	Thomas Jefferson
27th	MOR-4	Orange	Culpeper
28th	BEC-4	Orange	Culpeper
29th	PAC-5	Orange	Culpeper

Water Quality Monitoring

Implementation progress will be evaluated through water quality monitoring conducted by VADEQ through the agency's monitoring program and any additional monitoring support (*i.e.*, citizen monitoring) that may develop as implementation progresses. Monitoring results are accessible by contacting the VADEQ regional office.

Twelve ambient VADEQ monitoring stations were utilized to assess water quality in the Beaver Creek, Mountain Run, Pamunkey Creek, Terrys Run, Plentiful Creek, and Goldmine Creek watersheds (Table 18 and Figure 6). Station 8-PMC009.85 on Pamunkey Creek is classified as a "trend station". Trend stations are historically located, long-term water quality monitoring stations used to assess changes in water quality over long periods of time and are sampled at least six times per year. The remaining stations are classified as "watershed stations". Watershed stations are typically located near mouth of a watershed, designed to provide comprehensive statewide coverage of smaller watersheds, and sampled 12 times over a consecutive two-year period (sampling occurs every other month) within a six-year rotational cycle. "Biological stations" 8-BRC001.88 and 8-PMC014.75 were utilized to assess benthic macroinvertebrates in Beaver Creek and Pamunkey Creek, respectively. Biological stations are sampled on a yearly basis in the spring and fall for benthic macroinvertebrates and observational habitat data is collected. Incorporating bacteria monitoring into existing citizen monitoring should be explored.

The citizen monitoring program can be utilized to supplement samples collected through VADEQ's ambient monitoring program. The Coliscan Easygel method is a simple to use and relatively inexpensive method that measures total coliform and *E. coli*. The Coliscan Easygel method was compared to laboratory analysis and found to be an acceptable tool for screening purposes although the data cannot be used directly by VADEQ for water quality assessments. This method is important because it can assist in locating "hot spots" for fecal contamination, assess implementation progress, and target areas for more extensive monitoring. The Coliscan Easygel method was utilized by TJSWCD to test samples collected at 12 stations in the Goldmine Creek watershed in November 2007. Monitoring results were used to target outreach efforts within the watershed. The Lake Anna Civic Association water quality monitors are trained to conduct testing at stations around the lake, but may be interested in expanding the monitoring program to the feeder streams.

The AWG, RWG, GWG, and Steering Committee request that monitoring continue at the TMDL impairment listing station for the following parameters: *E. coli* bacteria, temperature, dissolved oxygen, pH, specific conductivity, total nitrogen, total phosphorus, total suspended solids, and stream flow.

Table 18. Monitoring station identification, station location, station type, last monitoring date, and monitoring schedule for VADEQ monitoring stations in the watershed.

Station ID	Station Location	Station Type	Date Last Sampled	Monitoring Schedule
8-BRC001.88	Beaver Creek at Route 638	Watershed, biological	12/04/08	Program Dependent, Yearly (spring & fall)
8-BRY000.47	Berry Run at Route 629	Watershed	12/28/10	Program Dependent
8-GMC002.19	Goldmine Creek at Route 613	Watershed	12/02/10	Program Dependent
8-MTN000.96	Mountain Run at Route 643	Watershed	05/24/11	Program Dependent
8-PMC009.85	Pamunkey Creek at Route 651	Watershed	05/17/11	Long-term (bi-monthly)
8-PMC014.75	Pamunkey Creek at Route 630	Trend	12/28/10	Program Dependent, Yearly (spring & fall)
8-PLT002.82	Plentiful Creek at Route 653	Watershed, biological	12/01/08	Program Dependent
8-PLT004.82	Plentiful Creek at Route 601	Watershed	06/29/05	Program Dependent
8-TRY004.98	Terrys Run at Route 629	Watershed	05/24/11	Program Dependent
8-TRY006.72	Terrys Run at Route 624	Watershed	12/04/08	Program Dependent
8-TRY010.80	Terrys Run at Route 692	Watershed	12/04/08	Program Dependent
8-THK000.90	Tomahawk Creek at Route 733	Watershed	06/02/05	Program Dependent

STAKEHOLDER'S ROLES AND RESPONSIBILITIES

Stakeholders are individuals who live or have land management responsibilities in the watershed, including government agencies, businesses, private individuals, and special interest groups. Successful implementation depends on stakeholders taking responsibility for their role in the process. The primary role falls on the local groups that are most affected; that is, businesses, community watershed groups, and citizens. However, 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. Virginia's approach to correcting non-point source pollution problems continues to be encouragement of participation through education and financial incentives; that is, outside of the regulatory framework. If, however, voluntary approaches prove to be ineffective, it is likely that implementation will become less voluntary and more regulatory.

Regional and local government groups work closely with state and federal agencies throughout the TMDL process; these groups possess insights about their community that may help to ensure the success of TMDL implementation. These stakeholders have knowledge about a community's priorities, how decisions are made locally, and how the watershed's residents interact. CSWCD, TCCSWCD, and TJSWCD will have prominent roles during implementation. CSWCD, TCCSWCD, and TJSWCD will provide cost-share funds, lead education and technical assistance efforts, and track best management practice implementation for the agricultural and residential programs.

In the Commonwealth of Virginia, water quality problems are dealt with through legislation, incentive programs, education, and legal actions. State government has the authority to establish state laws that control delivery of pollutants to local waters. Local governments in conjunction with the state can develop ordinances involving pollution prevention measures. In addition, citizens have the right to bring litigation against persons or groups of people who can be shown to be causing some harm to the claimant. Through hearing the claims of citizens in civil court, and the claims of government representatives in criminal court, the judicial branch of government also plays a significant role in the regulation of activities that impact water quality. Local governments in conjunction with the state can develop ordinances involving pollution prevention measures. State agencies conducting regulatory, education, or funding procedures related to water quality in Virginia include: VADEQ; VADCR; VDH; VADACS; VDGIF; VADOF; VCE; and VOF. Governmental, agricultural, residential action items during implementation are included in Tables 19 through 21, respectively.

Table 19. Governmental implementation action items.

Source Issues	Actions & Support	Potential Funding Source	Who Will Assist?
Continual baseline water quality monitoring	Water quality monitoring: ambient/benthic	VADEQ	VADEQ
Supplemental ambient/benthic monitoring	Water quality monitoring: ambient/benthic; coliscan (bacteria monitoring)	VADEQ, NFWF grant, VA Naturally	SWCD, Citizen Volunteers, LACA
Local government incentives	Ordinance/code options to improve water quality (stream buffer overlay district)	Local Government, Grants	Local Government, RRRRC and other PDCs, as appropriate
Inadequate tracking of on-site sewage disposal systems	Develop tracking system; ensure alternative OSDS maintenance agreement in place	VDH, Local Government	VDH

Table 19. Governmental implementation action items.

Source Issues	Actions & Support	Potential Funding Source	Who Will Assist?
Continual baseline water quality monitoring	Water quality monitoring: ambient/benthic	VADEQ	VADEQ
Supplemental ambient/benthic monitoring	Water quality monitoring: ambient/benthic; coliscan (bacteria monitoring)	VADEQ, NFWF grant, VA Naturally	SWCD, Citizen Volunteers, LACA
Local government incentives	Ordinance/code options to improve water quality (stream buffer overlay district)	Local Government, Grants	Local Government, RRRRC and other PDCs, as appropriate
Inadequate tracking of on-site sewage disposal systems	Develop tracking system; ensure alternative OSDS maintenance agreement in place	VDH, Local Government	VDH

Table 20. Agricultural Implementation Actions.

Source Issues	Actions & Support	Potential Funding Source	Who Will Assist?
Livestock in stream	Livestock exclusion best management practices, Water development	Ag BMP Cost-Share, WQIF, Section 319 Funds, NRCS	SWCD, NRCS
Cropland runoff	Cropland best management practices	Ag BMP Cost-Share, NRCS	SWCD, NRCS
Pasture runoff	Pasture management best management practices	Ag BMP Cost-Share, NRCS	SWCD, NRCS
Streamside runoff	Improved buffers (grass, shrubs, trees)	CREP, EQIP, VDGIF, VADOF, Ag. BMP Cost-Share	VDGIF, VADOF, SWCD, NRCS
Lack of BMP knowledge	Ag BMP education, outreach events	WQIF, VCE, NRCS	SWCD, VCE, NRCS
Livestock access to water	Alternate water source	Ag BMP, VADEQ (low interest loan), NRCS	SWCD, VADEQ, NRCS
Targeting locations for fencing	Ground truthing, stream walks	WQIF, mini grants	SWCD, community interest groups

Table 21. Residential Implementation Actions.

Source Issues	Actions & Support	Potential Funding Source	Who Will Assist?
Lack of septic system maintenance	Regular maintenance	WQIF, NFWF grant, Homeowners, Section 319 Funds	VDH, SWCD
Septic system failure and/or straight pipes	Septic system repairs, replacement, hook-ups, & maintenance	WQIF, NFWF grant, Homeowners, Block Grants	VDH, RRRC, SWCD
No septic system pump out tracking	Computerized tracking system	VDH	VDH, Local Government
Need information on system location at time of home sale	State requirement – initiated by Board of Realtors	Homeowners	VDH
Education needed on septic system function	Septic system education program	WQIF, NFWF grant	Realtors, Teachers, VDH, School Groups, Community Interest
No pet waste management	Education, bag stations, composters, structural practices in concentrated canine	VCE, SWCD, WQIF, NFWF grant, Roundtables	Interest Groups, Local Governments, Hunt Clubs, Veterinarians, SPCA
Waterfowl impact to ponds	Buffer ponds to discourage waterfowl, especially geese	HOAs, NFWF grant, VDGIF	VADOF, Landowners
Runoff from streamside properties - non-agricultural	Low impact development techniques, install grass/shrub/tree buffers	Homeowners, Developers, NFWF grant, Green Grass Program, PEC, VADOF, NFWF grant, Private	RRRC, PEC, Local Government, VCE, Interest Groups
Best management practices education for horse owners	Pasture management education; alternative watering sources, livestock exclusion	Ag BMPs, VCE, WQIF	SWCD, VCE, Interest Groups

The roles and responsibilities of some of the major stakeholders on a local, state, and federal level are as follows:

CSWCD, TCCSWCD, and TJSWCD: The Culpeper, Tri-County/City, and Thomas Jefferson Soil and Water Conservation Districts are local units of government responsible for the soil and water conservation work within Louisa, Orange, and Spotsylvania Counties. The district's overall role is to increase voluntary conservation practices among farmers, ranchers, and other land users. District staff work closely with watershed residents and have valuable knowledge of local watershed practices. Specific to the IP, the district will provide agricultural cost-share funds, lead education and technical assistance efforts, and track best management practice implementation for the agricultural and residential programs.

Louisa, Orange, and Spotsylvania Counties Government Departments: Government staff work closely with local and state agencies to develop and implement the TMDL. Staff will administer the erosion & sediment control and stormwater programs, provide mapping assistance, and may also help to promote education and outreach to citizens, businesses, and developers to introduce the importance of the TMDL process.

Rappahannock-Rapidan Regional Commission: Environmental planning is a long-standing area of emphasis of the RRRC, which is complementary to the TMDL process. RRRC continues to promote efficient development of the environment by assisting and encouraging local governmental agencies to plan for the future. TMDL development and implementation plan development have been contracted through the RRRC. RRRC will lead the pet waste management implementation with assistance from localities and SWCDs. Additionally, RRRC will continue to work with VADCR and the Steering Committee to periodically revisit implementation progress and suggest plan revisions as needed.

Citizens & Businesses: The primary role of citizens and businesses is simply to get involved in implementation. This may include participating in public outreach, implementing BMPs to help restore water quality, and partnering with other stakeholders to improve water quality.

Lake Anna Civic Association: The purpose of the Association is to further the preservation and conservation of Lake Anna and its watershed as a clean and beautiful resource, through education, advocacy, and broad-based community involvement. Trained personnel conduct water quality monitoring at stations throughout the lake.

PEC: Piedmont Environmental Council safeguards the landscapes, communities and heritage of the Piedmont by involving citizens in related public policy and land conservation.

Community Civic Groups: Community civic groups take on a wide range of community service including environmental projects. Such groups include the Ruritan, Farm Clubs, Homeowner Associations and youth organizations such as 4-H and Future Farmers of America. These groups offer a resource to assist

in the public participation process, educational outreach, and assisting with implementation activities in local watersheds.

Animal Clubs/Associations: Clubs and associations for various animal groups (*e.g.*, beef, equine, poultry, swine, and canine) provide a resource to assist and promote conservation practices among farmers and other landowners, not only in rural areas, but in residential areas as well.

VADEQ: The State Water Control Law authorizes the SWCB to control and plan for the reduction of pollutants impacting the chemical and biological quality of the State's waters resulting in the degradation of the recreation, fishing, shellfishing, aquatic life, wildlife, and drinking water uses. For many years the focus of VADEQ's pollution reduction efforts was the treated effluent discharged into Virginia's waters via the VPDES permit process. The TMDL process has expanded the focus of VADEQ's pollution reduction efforts from the effluent of wastewater treatment plants to the pollutants causing impairments of the streams, lakes, and estuaries. The reduction tools are being expanded beyond the permit process to include a variety of voluntary strategies and BMPs. VADEQ is the lead agency in the TMDL process. The Code of Virginia directs VADEQ to develop a list of impaired waters, develop TMDLs for these waters, and develop IPs for the TMDLs. VADEQ administers the TMDL process, including the public participation component, and formally submits the TMDLs to USEPA and the SWCB for approval. VADEQ is also responsible for implementing point source WLAs, regulation of biosolids applications, assessing water quality across the state, and conducting water quality standard related actions.

VADCR: The Virginia Department of Conservation and Recreation is authorized to administer Virginia's NPS pollution reduction programs in accordance with §10.1-104.1 of the Code of Virginia and §319 of the Clean Water Act. Because of the magnitude of the NPS component in the TMDL process, VADCR is a major participant in the TMDL process. VADCR has a lead role in the development of IPs to address correction of NPS pollution contributing to water quality impairments. VADCR also provides available funding and technical support for the implementation of NPS components of IPs. The staff resources in VADCR's TMDL program focus primarily on providing technical assistance and funding to stakeholders to develop and carry out IPs, and support to VADEQ in TMDL development related to NPS impacts. Under the Virginia Stormwater Management Program, VADCR is responsible for the issuance, denial, revocation, termination, and enforcement of National Pollutant Discharge Elimination System (NPDES) permits for the control of stormwater discharges from municipal separate storm sewer systems (MS4) and land disturbing activities. VADCR staff will be working with other state agencies, local governments, soil and water conservation districts, watershed groups, and citizens to gather support and to improve the implementation of TMDL plans through utilization of existing authorities and resources.

VDH: The Virginia Department of Health is responsible for maintaining safe drinking water measured by standards set by the USEPA. Their duties also include septic system regulation, driven by complaints. 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. For

TMDLs, VDH has the responsibility of enforcing actions to correct failed septic systems and/or eliminate straight pipes (Sewage Handling and Disposal Regulations, 12 VAC 5-610-10 *et seq.*).

VADACS: The Virginia Department of Agriculture and Consumer Services 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. 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 may include civil penalties. 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.

VDGIF: The Virginia Department of Game and Inland Fisheries manages Virginia's wildlife and inland fish to maintain optimum populations of all species to serve the needs of the Commonwealth; provides opportunity for all to enjoy wildlife, inland fish, boating and related outdoor recreation; and promotes safety for persons and property in connection with boating, hunting, and fishing. The VDGIF has responsibility for administering certain U.S. Fish and Wildlife Service funding programs. Personnel participate, review, and comment on projects processed through state and federal project and permitting review processes to insure the consideration for fish and wildlife populations and associated habitats.

VADOF: The VADOF has prepared a manual to inform and educate forest landowners and the professional forest community on proper BMPs and technical specifications for installation of these practices in forested areas (www.dof.state.va.us/wq/wq-bmp-guide.htm). Forestry BMPs are intended to primarily control erosion. For example, streamside forest buffers provide nutrient uptake and soil stabilization, which can benefit water quality by reducing the amount of nutrients and sediments that enter local streams.

VCE: Virginia Cooperative Extension is an educational outreach program of Virginia's land grant universities (Virginia Tech and Virginia State University), and a part of the national Cooperative State Research, Education, and Extension Service, an agency of the United States Department of Agriculture (USDA). VCE is a product of cooperation among local, state, and federal governments in partnership with citizens. VCE offers educational programs and technical resources for topics such as crops, grains, livestock, poultry, dairy, natural resources, and environmental management. VCE has published several publications that deal specifically with TMDLs. For more information on these publications and to find the location of county extension offices, visit www.ext.vt.edu.

VOF: The Virginia Outdoors Foundation was established in 1966, "to promote the preservation of open-space lands and to encourage private gifts of money, securities, land or other property to preserve the natural, scenic, historic, scientific, open-space and recreational areas of the Commonwealth." The primary mechanism for accomplishing VOF's mission is through open-space easements. Open-space easements allow land to continue to be privately owned but restricted to serve and protect land for the public good.

USEPA: The United States Environmental Protection Agency has the responsibility of overseeing the various programs necessary for the success of the CWA. However, administration and enforcement of such programs falls largely to the states. USEPA provides funding to implement TMDLs through Section 319 Incremental Funds.

NRCS: The Natural Resources Conservation Service is the federal agency that works hand-in-hand with the American people to conserve natural resources on private lands. NRCS assists private landowners with conserving their soil, water, and other natural resources. Local, state and federal agencies along with policymakers also rely on the expertise of NRCS staff. NRCS is a major funding stakeholder for impaired water bodies through the CREP and EQIP programs.

INTEGRATION WITH OTHER WATERSHED PLANS

Each watershed within the state is under the jurisdiction of a multitude of individual yet related water quality programs and activities, many of which have specific geographical boundaries and goals. These include but are not limited to Chesapeake Bay Watershed Implementation Plan, TMDLs, Roundtables, Water Quality Management Plans, Erosion and Sediment Control Regulations, Stormwater Management Program, Source Water Assessment Program, and local comprehensive plans. The progress of these planning efforts needs continuous evaluation to determine possible effects on implementation goals. For example, financial and technical resources may be maximized for implementation by coordinating and expanding the planning and implementation activities of these on-going watershed activities. Current initiatives within Louisa, Orange, and Spotsylvania Counties to be integrated with the Upper York River Basin TMDL IP include:

- Louisa, Orange, and Spotsylvania Counties Comprehensive Plans
- Town of Orange Comprehensive Plan
- Goldmine Creek Clean-up Project (TJSWCD)
- Chesapeake Bay Watershed Implementation Plan
- Lake Anna Watershed Management Plan / Special Area Management Plan
- Louisa Shoreline Protection Plan
- Piedmont Environmental Council Strategic Plan
- Lake Anna Civic Association Strategic Plan
- Lake Anna Ecosystem Restoration Project

POTENTIAL FUNDING SOURCES

Potential funding sources available during implementation were identified in the course of plan development. Detailed description of each source (*i.e.*, eligibility requirements, specifications, incentive payments) can be obtained from the CSWCD, TJSWCD, TCCSWCD, VADCR, VDH, VADEQ, VADGIF, VCE, VOF, and NRCS. Table 22 illustrates various financial opportunities that exist from selected cost-share programs for agricultural and residential implementation needs. Sources include:

Federal Funding Sources

Federal Clean Water Act Section 319 Incremental Funds

USEPA develops guidelines that describe the process and criteria to be used to award CWA Section 319 NPS grants to states. States may use up to 20% of the Section 319 incremental funds to develop NPS TMDLs as well as to develop watershed-based plans for Section 303(d) listed waters. The balance of funding can be used for implementing watershed-based plans for waters that have completed TMDLs. Implementation of both agricultural and residential BMPs is eligible. VADCR administers the money, in coordination with the Nonpoint Source Advisory Committee (NPSAC), to fund watershed projects, demonstration and educational programs, nonpoint source pollution control program development, and technical and program staff. VADCR reports annually to the USEPA on the progress made in nonpoint source pollution prevention and control.

<http://www.epa.gov/owow/nps/319/319stateguide-revised.pdf>

USDA Conservation Reserve Enhancement Program (CREP)

In Virginia, this is a partnership program between the USDA and the Commonwealth of Virginia, with the VADCR being the lead state agency. The program uses financial incentives to encourage farmers to enroll in contracts of 10 to 15 years or perpetual easements to remove lands from agricultural production. This program is an "enhancement" of the existing USDA CRP Continuous Sign-up. It has been "enhanced" by increasing the cost-share rates from 50% to 75% and 100%, increasing the rental rates, and offering a flat rate incentive payment to place a permanent "riparian easement" on the enrolled area. Pasture and cropland (as defined by USDA) adjacent to streams, intermittent streams, seeps, springs, ponds and sinkholes are eligible to be enrolled. Buffers consisting of native, warm-season grasses on cropland, to mixed hardwood trees on pasture, must be established in widths ranging from the minimum of 30% of the floodplain or 35 feet, whichever is greater, to a maximum average of 300 feet. Cost-sharing (75% - 100%) is available to help pay for fencing to exclude livestock from the riparian buffer, watering facilities, hardwood tree planting, filter strip establishment, and wetland restoration. In addition, a 40% incentive payment upon completion is offered and an average rental rate of \$70/acre on stream buffer area for 10-15 years. The State of Virginia will make an additional incentive payment to place a perpetual conservation easement on the enrolled area. The statewide goal is 8,000 acres. The landowner can obtain and complete CREP application forms at the FSA center. The forms are forwarded to local NRCS and SWCD offices while FSA determines land eligibility. If the land is deemed eligible, NRCS and the local SWCD determine and design

appropriate conservation practices. A conservation plan is written, and fieldwork is begun, which completes the conservation practice design phase. FSA then measures CREP acreage, conservation practice contracts are written, and practices are installed. The landowner submits bills for cost-share reimbursement to FSA. Once the landowner completes BMP installation and the practice is approved, FSA and the SWCD make the cost-share payments. The SWCD also pays out the state's one-time, lump sum rental payment. FSA conducts random spot checks throughout the life of the contract, and the agency continues to pay annual rent throughout the contract period. <http://www.dcr.virginia.gov/soil & water/crep.shtml>

USDA Conservation Reserve Program (CRP)

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

USDA Environmental Quality Incentives Program (EQIP)

This program was established in the 1996 Farm Bill to provide a single voluntary conservation program for farmers and landowners to address significant natural resource needs and objectives. Approximately 65% of the EQIP funding for the state of Virginia is directed toward "Priority Areas." These areas are selected from proposals submitted by a locally led conservation work group. Proposals describe serious and critical environmental needs and concerns of an area or watershed, and the corrective actions they desire to take to address these needs and concerns. The remaining 35% of the funds are directed toward statewide priority concerns of environmental needs. The purposes of the program are achieved through the implementation of an EQIP plan of operation, which includes structural and land management practices on eligible lands. Contracts up to ten years are written with eligible producers. Cost-share of 75%, 25% tax credit, and/or incentive payments are made available to implement one or more eligible conservation practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement one or more management practices, such as nutrient management, pest management, and grazing land management. <http://www.nrcs.usda.gov/programs/eqip/>

USDA Chesapeake Bay Watershed Initiative (CBWI)

CBWI is a voluntary initiative that assists agriculture producers with implementing conservation activities on agricultural lands in the Chesapeake Bay watershed. The initiative has been designed to complement State and Federal conservation efforts currently available in the watershed. Specifically, it will help producers enhance land and water resources by controlling erosion and reducing sediment and nutrient levels in ground and surface water and planning, designing, implementing, and evaluating habitat conservation, restoration, and enhancement measures where there is significant ecological value for either retaining the land in its current use or restoring the land to its natural condition. NRCS will deliver the funds available to implement the CBWI through USDA conservation programs currently available to agriculture producers and owners of agricultural lands

USDA Wetland Reserve Program (WRP)

The program provides an opportunity for landowners to receive financial incentives to enhance wetlands in exchange for retiring marginal lands from agriculture. The program benefits include providing fish and wildlife habitat, improving water quality, reducing flooding, recharging groundwater, protecting and improving biological diversity, and furnishing recreational and esthetic benefits. The program offers three enrollment options: permanent easements, 30-year easement, and restoration cost-share agreement (10-year agreement where USDA pays 75% of the restoration costs). Under the permanent easement option, landowners may receive the agricultural value of the land up to a maximum cap and 100% of the cost of restoring the land. For the 30-year option, a landowner will receive 75% of the easement value and 75% cost-share on the restoration. A ten-year agreement is also available that pays 75% of the restoration cost. 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. At any time, a landowner may request that additional activities be added as compatible uses. Land eligibility is dependent on length of ownership, whether the site has been degraded as a result of agriculture, and the land's ability to be restored. Restoration agreement participants must show proof of ownership. Easement participants must have owned the land for at least one year and be able to provide clear title. <http://www.nrcs.usda.gov/programs/wrp/>

USDA Wildlife Habitat Incentive Program (WHIP)

WHIP is a voluntary program for landowners and land users who want to develop or improve wildlife habitat on private agriculture-related lands. USDA and the participant enter into a five to ten year cost-share agreement for wildlife habitat development. In Virginia, high priority habitat needs include: early grassland habitats that are home to game species such as quail and rabbit, as well as other non-game species like meadowlark and sparrows; riparian zones along streams and rivers that provide benefits to aquatic life and terrestrial species; migration corridors which provide nesting and cover habitats for migrating songbirds, waterfowl and shorebird species; and decreasing natural habitat systems which are environmentally sensitive and have been impacted and reduced through human activities. Cost-share up to 75% is available for the cost of installing practices. Applicants will be competitively ranked within the state and certain areas and practices will receive higher ranking based on their value to wildlife. Types of practices include: disking, prescribed burning, mowing, planting habitat, converting fescue to warm season grasses, establishing

riparian buffers, creating habitat for waterfowl, and installing filter strips, field borders and hedgerows.
<http://www.nrcs.usda.gov/programs/whip/>

U.S. Fish and Wildlife Service Conservation Grants

Funds states to implement conservation projects to protect federally listed threatened or endangered species and species at risk. <http://www.fws.gov/grants/state.html>

U.S. Fish and Wildlife Service Private Stewardship Program

Funds individuals or groups engaged in local, private, and voluntary conservation efforts to benefit federally listed, proposed, or candidate species, or other at risk species.
http://www.fws.gov/endangered/grants/private_stewardship/index.html

Virginia Funding Sources

Virginia Agricultural Best Management Practices Cost-Share Program

The Program is administered by VADCR to improve water quality in the state's streams, rivers and the Chesapeake Bay. The basis of the program is to encourage the voluntary installation of agricultural best management practices to meet Virginia's NPS pollution water quality objectives. This program is funded by the state Water Quality Improvement Fund (WQIF) and the federal Chesapeake Bay Program Implementation Grant monies through local Soil and Water Conservation Districts (SWCDs). Farmers and landowners are encouraged to use BMPs on their land to better control sediment, nutrient loss, and transportation of pollutants into our waters due to excessive surface flow, erosion, leaching, and inadequate animal waste management. Program participants are recruited by SWCDs based upon those factors, which have a great impact on water quality. The objective is to solve water quality problems by fixing the worst problems first. Cost-share is typically 75% of the actual cost, not to exceed the local maximum. Each practice under the cost-share program has specifications and a lifetime during which the practice must be maintained. <http://www.dcr.virginia.gov/sw/costshar.htm>.

Virginia Agricultural Best Management Practices Tax Credit Program

The program provides a tax credit for approved agricultural BMPs that are installed to improve water quality in accordance with a conservation plan approved by the local SWCD. The goal of this program is to encourage voluntary installation of BMPs that will address Virginia's NPS pollution water quality objectives. For all taxable years, any individual or corporation engaged in agricultural production for market, who has in place a soil conservation plan approved by the local SWCD, shall be allowed a credit against the tax imposed by Section 58.1-320 of an amount equaling 25% of the first \$70,000 expended for agricultural best management practices by the individual. "Agricultural best management practices" are approved measures that will provide a significant improvement to water quality in the state's streams and rivers, and is consistent with other state and federal programs that address agricultural nonpoint source pollution management. Any practice approved by the local SWCD Board shall be completed within the taxable year in which the credit is claimed. The credit shall be allowed only for expenditures made by the taxpayer from funds of his/her own sources. The amount of such credit shall not exceed \$17,500 or the total amount of the

tax imposed by this program, whichever is less, in the year the project was completed, as certified by the Board. If the amount of the credit exceeds the taxpayer's liability for such taxable year, the excess may be carried over for credit against income taxes in the next five taxable years until the total amount of the tax credit has been taken. This program can be used independently or in conjunction with other cost-share programs on the stake holder's portion of BMP costs. It is also approved for use in supplementing the cost of repairs to streamside fencing. <http://www.dcr.virginia.gov/sw/costshar.htm>.

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 organizations include local governments, SWCDs, and individuals. Grants for point sources are administered through VADEQ and grants for nonpoint sources are administered through VADCR. Most WQIF grants provide matching funds on a 50/50 cost-share basis. A request for proposals is distributed annually. Successful applications are listed as draft/public-noticed agreements, and are subjected to a public review period of at least 30 days.

Information is available at <http://www.dcr.virginia.gov/sw/wqia.htm>.

Virginia Forest Stewardship Program

The program is administered by the VADOF to protect soil, water, and wildlife and to provide sustainable forest products and recreation. www.dof.virginia.gov/forms/resources/127.doc

Virginia Small Business Environmental Compliance Assistance Fund

The program provides financial assistance to small businesses by providing 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 certified as eligible by VADCR. Interest rates are fixed at 3%, and the maximum loan available is \$100,000. There is a \$30 non-refundable application processing fee. The program will not be used to make loans to small businesses for the purchase and installation of equipment needed to comply with an enforcement action. To be eligible for assistance, a business must employ 100 or fewer people and be classified as a small business under the federal Small Business Act. <http://www.dba.state.va.us/financing/programs/small.asp>

Virginia Clean Water Revolving Loan Programs

The Virginia Clean Water Revolving Loan Fund (VCWRLF), previously known as the Virginia Revolving Loan Fund, was created in 1987. The Department of Environmental Quality, on behalf of the State Water Control Board (SWCB), manages the VCWRLF, administering the policy aspects of the Fund, receiving applications and providing funding recommendations to the SWCB. The Virginia Resources Authority (VRA) serves as the financial manager of the Fund. Initially, the VCWRLF included a single program which was established to provide financial assistance in the form of low-interest loans to local governments for needed improvements at publicly-owned wastewater treatment facilities and/or collection systems. In 1999, 2001 and 2003 the scope of VCWRLF activity was expanded by the State Water Control Board and DEQ implemented additional programs to provide low interest loans related to agricultural and other non-point source water quality

issues. The following loan programs are now operated within the Virginia Clean Water Revolving Loan Fund. <http://www.deq.state.va.us/cap/wwovrview.html>

Virginia Outdoors Foundation

The Virginia Outdoors Foundation was established in 1966, "to promote the preservation of open-space lands and to encourage private gifts of money, securities, land or other property to preserve the natural, scenic, historic, scientific, open-space and recreational areas of the Commonwealth." The primary mechanism for accomplishing VOF's mission is through open-space easements. Open-space easements allow land to continue to be privately owned but restricted to serve and protect land for the public good. Conservation incentives include the Purchase of Development Rights program, tax credits that can be sold to any Virginia tax payer, and 100% reimbursement for legal, accounting, appraisal fees, etc.

York River and Small Coastal Basin Roundtable

The watershed roundtable consists of stakeholders who have a vested interest in their communities and are concerned about local water quality. The primary objective of the roundtable is to develop relationships between diverse stakeholders such that they may collaborate with, learn from, and inform each other while effectively acting to address local water issues. A roundtable can be the driving force in the watershed, providing education, outreach and solutions to restore and protect water quality. Several funding opportunities are available through the York River and Small Coastal Basin Roundtable.

Regional Funding Sources

National Fish and Wildlife Foundation

Private, non-profit 501c(3) tax-exempt organization that fosters cooperative partnerships to conserve wildlife, plants, and the habitats on which they depend. A General Challenge Grants Program and a Special Grants Program are offered. Grants are available to federal, state, and local governments, educational institutions, and non-profit organizations through General Challenge Grants. Of particular interest are the Chesapeake Bay Small Watershed Grants Program, Innovative Nutrient and Sediment Reduction Program, and Chesapeake Targeted Watershed Grants Program. Offers are accepted throughout the year and processed during fixed signup periods. The signup periods are on a year-round, revolving basis, and there are two decision cycles per year. Each cycle consists of a pre-proposal evaluation, full proposal evaluation, and a Board of Directors decision. An approved pre-proposal is a pre-requisite to the submittal of the full proposal. Grants generally range between \$10,000 and \$150,000. Payments are based on need. Projects are funded in the U.S., and any international areas that host migratory wildlife from the U.S., marine animals, or endangered species. Grants are awarded for the purpose of conserving fish, wildlife, plants, and their habitats. If the project does not fall into the criteria of any special grant programs, the proposal may be submitted as a general grant if it falls under the following guidelines: 1) it promotes fish, wildlife and habitat conservation, 2) it involves other conservation and community interests, 3) leverages available funding, and 4) evaluates project outcomes. A pre-proposal that is not accepted by a special grant program may be deferred to the general grant program. http://www.nfwf.org/programs/grant_apply.htm

Chesapeake Bay Foundation

The Chesapeake Bay Foundation (CBF) is a catalyst for bold and creative solutions to Bay problems. Staff members set the agenda, serve as watchdogs, and speak out on behalf of the Chesapeake Bay to business, government, and the public. The CBF partners with a variety of organizations to provide grants and funding for projects in favor of preserving the Chesapeake Bay. <http://www.cbf.org>

Southeast Rural Community Assistance Project (Southeast RCAP)

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 Southeast RCAP central office staff across the region. They can provide (at no cost to a community): on-site technical assistance and consultation, operation and maintenance/management assistance, training, education, facilitation, volunteers, and financial assistance. Financial assistance includes \$1,500 toward repair/replacement/installation of a septic system and \$2,000 toward repair/replacement/installation of an alternative waste treatment system. Funding is only available for families making less than 125% of the federal poverty level. The federal poverty threshold for a family of four is \$18,850. <http://www.sercap.org>

Community Development Block Grant Program (HUD/CDBG)

The Community Development Block Grant (CDBG) program is a flexible program that provides communities with resources to address a wide range of unique community development needs. Beginning in 1974, the CDBG program is one of the longest continuously run programs at HUD. The CDBG program provides annual grants on a formula basis to 1180 general units of local government and States. <http://www.hud.gov/offices/cpd/communitydevelopment/programs/>

Rapidan Better Housing

Rapidan Better Housing was established in 1994 as the sister organization to Fauquier Housing Corporation. RBH now exists as a part of the Foothills Housing Coalition providing services to residents in Madison, Rappahannock and Orange Counties. Rapidan Better Housing offers the following funding programs: Emergency Home Repair (EHR), Ramp Lending, and Indoor Plumbing and Repair (IPR).

Fluvanna-Louisa Housing Foundation

The Foundation is organized as a non-stock, not for profit corporation exclusively for community services purposes without pecuniary gain or profit to its members. Its purposes shall be to promote, develop and encourage activities and means to improve the ability of low-income, elderly and/or disadvantaged persons to meet their housing needs, without regard to race, religion or national origin: and to that end sponsor, support, promote, and undertake housing projects within the Counties of Fluvanna and Louisa, Virginia. Assistance programs offered include: Housing Choice Voucher Program, Emergency Repairs, Home, Handicap Ramps, Rental Units, First Time Home Buyers, and Indoor Plumbing.

Table 22. Control measures with estimated cost-share program and landowner costs.

Control Measure	Program Code	Unit	Cost-share	Average Cost/Unit to State or Federal Program (\$)	Average Cost/Unit to Landowner (\$)¹
Livestock exclusion with 35 ft buffer	CREP	System	50% + varied incentive	22,500	2,500
Livestock exclusion with 35 ft buffer	EQIP/CBWI	System	75%	14,625	4,875
Livestock exclusion with 35 ft buffer	LE-1T	System	85%	16,575	2,925
Small Acreage Grazing System with 35 ft setback	SL-6AT	System	50%	6,750	6,750
Livestock exclusion with 10 ft setback	CBWI	System	75%	14,625	4,875
Livestock exclusion with 10 ft setback	LE-2T	System	50%	7,875	7,875
Stream Protection	WP-2T	System	75% + \$0.50/ft incentive	4,725	1,250
Pasture and Hayland Re-planting	512	Acres	\$165/ac	165	130
Prescribed grazing	528	Acres	\$30/ac	30	40
Permanent vegetative cover on cropland	SL-1	Acres	75% + varied incentive	313	57
Reforestation of erodible crop and pastureland	FR-1	Acres	up to \$300/ac	300	150
Manure incorporation into soil	N/A	Acres	N/A	0	25
Septic Tank Pump-out	RB-1	System	50%	150	150
Connection to Public Sewer	RB-2	System	50% - 75%	4,500 – 6,750	2,250 - 4,500
Septic Tank System Repair	RB-3	System	50% - 75%	2,000 – 3,000	1,000 - 2,000
Septic Tank System Installation / Replacement	RB-4	System	50% - 75%	4,000 – 6,000	2,000 - 4,000
Septic Tank System Installation / Replacement w/ Pump	RB-4P	System	50% - 75%	4,500 – 6,750	2,250 - 4,500
Alternative On-site Waste Treatment System	RB-5	System	50% - 75%	10,000 – 15,000	5,000 - 10,000

¹ Does not include tax credit or in-kind service.

LIST OF ACRONYMS

AWG	Agricultural Working Group
BMP	Best Management Practice
CBWI	Chesapeake Bay Watershed Initiative
CCU	Confined Canine Unit
CREP	Conservation Reserve and Enhancement Program
CRP	Conservation Reserve Program
CRSL-6	Grazing Land Protection System funded through CREP program
CSWCD	Culpeper Soil and Water Conservation District
CWA	Clean Water Act
EQIP	Environmental Quality Incentive Program
FR-1	Reforestation of Erodible Crop and Pastureland
FSA	Farm Service Agency
FTE	Full Time Equivalent
GWG	Government Working Group
IP	Implementation Plan
LE-1T	Livestock Exclusion with Riparian Buffers
LE-2T	Livestock Exclusion with Reduced Setback
LID	Low Impact Development
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NWBD	National Watershed Boundary Dataset
OSDS	On-Site Sewage Disposal System
RB-1	Septic System Pump-Out
RB-2	Connection of Malfunctioning OSSDS or Straight Pipe to Public Sewer
RB-3	Septic Tank System Repair
RB-4	Septic Tank Installation / Replacement
RB-5	Alternative On-Site Waste Treatment System
RCAP	Rural Community Assistance Program
RRRC	Rappahannock-Rapidan Regional Commission
RWG	Residential Working Group
SL-1	Permanent Vegetative Cover on Cropland
SL-6	Grazing Land Protection System funded through VA Ag. BMP Cost-share program
SL-6AT	Small Acreage Grazing System
SWCB	State Water Control Board
TCCSWCD	Tri-County/City Soil and Water Conservation District
TJSWCD	Thomas Jefferson Soil and Water Conservation District
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VADACS	Virginia Department of Agriculture and Consumer Services
VADCR	Virginia Department of Conservation and Recreation
VADEQ	Virginia Department of Environmental Quality
VADOF	Virginia Department of Forestry
VCE	Virginia Cooperative Extension
VDGIF	Virginia Department of Game and Inland Fisheries

VDH	Virginia Department of Health
VOF	Virginia Outdoors Foundation
WP-2T	Stream Protection System
WQIF	Water Quality Improvement Fund
WQMIRA	Water Quality Monitoring, Information and Restoration Act
WHIP	Wildlife Habitat Incentive Program
WRP	Wetland Reserve Program

GLOSSARY

Anthropogenic - involving the impact of humans on nature; specifically items or actions induced, caused, or altered by the presence and activities of humans.

Assimilative Capacity - a measure of the ability of a natural body of water to effectively degrade and/or disperse chemical substances. Assimilative capacity is used to define the ability of a waterbody to naturally assimilate a substance without impairing water quality or degrading the aquatic ecosystem. Numerically, it is the amount of pollutant that can be discharged to a specific waterbody without exceeding water quality standards. (see Loading Capacity)

Benthic – refers to material, especially sediment, at the bottom of a waterbody. It can be used to describe the organisms that live on, or in, the bottom of a waterbody.

Best Management Practices (BMPs) - reasonable and cost-effective means to reduce the likelihood of pollutants entering a water body. BMPs include riparian buffer strips, filter strips, nutrient management plans, conservation tillage, etc.

Cost-share Program - a program that allocates funds to pay a percentage of the cost of constructing or implementing a BMP. The remaining costs are paid by the producer(s).

Delisting - the process by which an impaired waterbody is removed from the Section 303(d) Impaired Waters List. To remove a waterbody from the Section 303(d) list, the state must demonstrate to USEPA, using monitoring or other data, that the waterbody is attaining the water quality standard.

Die-off (of fecal coliform) - Reduction in the fecal coliform population due to predation by other bacteria as well as by adverse environmental conditions (e.g., UV radiation, pH).

Discharge - flow of surface water in a stream or canal or the outflow of groundwater from a flowing artesian well, ditch or spring; can also apply to discharge of liquid effluent from a facility or to chemical emissions into the air through designated venting systems.

E. coli - A type of bacteria found in the feces of various warm-blooded animals that is used as an indicator of the possible presence of pathogenic (disease causing) organisms.

Erosion - detachment and transport of soil particles by water and wind. Sediment resulting from soil erosion represents the single largest source of nonpoint source pollution in the United States.

Failing septic system - Septic systems in which drain fields have failed such that effluent (wastewater) that is supposed to percolate into the soil, now rises to the surface and ponds on the surface where it can flow over the soil surface to streams or contribute pollutants to the surface where they can be lost during storm runoff events.

Fecal coliform - A type of bacteria found in the feces of various warm-blooded animals that is used as an indicator of the possible presence of pathogenic (disease causing) organisms.

Full Time Equivalent (FTE) - Is a way to estimate staff needed for a project. A FTE of 1.0 means that the position is equivalent to a full-time worker, while a FTE of 0.5 indicates a part-time worker.

Geographic Information System (GIS) - a system of hardware, software, data, people, organizations and institutional arrangements for collecting, storing, analyzing and disseminating information about areas of the earth. An example of a GIS is the use of spatial data for Emergency Services response (E-911). Dispatchers use GIS to locate the caller's house, identify the closest responder, and even determine the shortest route. All these activities are automated using the electronic spatial data in the GIS.

Geographic Information System (GIS) - a system of hardware, software, data, people, organizations and institutional arrangements for collecting, storing, analyzing and disseminating information about areas of the earth. An example of a GIS is the use of spatial data for Emergency Services response (E-911). Dispatchers use GIS to locate the caller's house, identify the closest responder, and even determine the shortest route. All these activities are automated using the electronic spatial data in the GIS.

Geometric mean - The geometric mean is simply the n th root of the product of n values. Using the geometric mean lessens the significance of a few extreme values (extremely high or low values). In practical terms, this means that if you have just a few bad samples, their weight is lessened.

Mathematically the geometric mean, \bar{x}_g , is expressed as: $\bar{x}_g = \sqrt[n]{x_1 \cdot x_2 \cdot x_3 \dots x_n}$ where n is the number of samples, and x_i is the value of sample i .

HSPF (Hydrological Simulation Program-Fortran) - A computer-based model that calculates runoff, sediment yield, and fate and transport of various pollutants to the stream. The model was developed under the direction of the U.S. Environmental Protection Agency (EPA).

Impaired waters - those waters with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality standards.

Instantaneous criterion - The instantaneous criterion or instantaneous water quality standard is the value of the water quality standard that should not be exceeded at any time. For example, the Virginia instantaneous water quality standard for E.coli is 235 cfu/100 mL. If this value is exceeded at any time, the water body is in exceedance of the state water quality standard.

Load allocation (LA) - portion of the loading capacity attributed to 1) the existing or future nonpoint sources of pollution, and 2) natural background sources. Wherever possible, nonpoint source loads and natural loads should be distinguished.

Margin of safety (MOS) - a required component of the TMDL that accounts for the uncertainty in calculations of pollutant loading from point, nonpoint, and background sources.

Modeling - a system of mathematical expressions that describe both hydrologic and water quality processes. When used for the development of TMDLs, models can estimate the load of a specific pollutant to a waterbody and make predictions about how the load would change as remediation steps are implemented.

Monitoring - periodic or continuous sampling and measurement to determine the physical, chemical, and biological status of a particular media like air, soil, or water.

Nonpoint source pollution - pollution originating from multiple sources on and above the land. Examples include runoff from fields, stormwater runoff from urban landscapes, roadbed erosion in forestry, and atmospheric deposition.

Nutrient - any substance assimilated by living things that promotes growth. The term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements.

Pathogen - Disease-causing agent, especially microorganisms such as certain bacteria, protozoa, and viruses.

Point source pollution - pollutant loads discharged at a specific location from pipes, outfalls, and conveyance channels from either municipal wastewater treatment plants or industrial treatment facilities or any conveyance such as a ditch, tunnel, conduit or pipe from which pollutants are discharged. Point sources have a single point of entry with a direct path to a water body. Point sources can also include pollutant loads contributed by tributaries to the main receiving stream or river.

Riparian - pertaining to the banks of a river, stream, pond, lake, etc., as well as to the plant and animal communities along such bodies of water

Runoff - that part of precipitation, snowmelt, or irrigation water that does not infiltrate but flows over the land surface, eventually making its way to a stream, river, lake or an ocean. It can carry pollutants from the land and air into receiving waters.

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

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

Simulation - The use of mathematical models to approximate the observed behavior of a natural water system in response to a specific known set of input and forcing conditions. Models that have been validated, or verified, are then used to predict the response of a natural water system to changes in the input or forcing conditions.

Stakeholder - any person or organization with a vested interest in development and implementation of a local watershed water quality implementation plan (e.g., farmer, landowner, resident, business owner, or government official)

Straight pipe - Delivers wastewater directly from a building, e.g., house or milking parlor, to a stream, pond, lake, or river.

Total Maximum Daily Load (TMDL) - a pollution "budget" that is used to determine the maximum amount of pollution a waterbody can assimilate without violating water quality standards. The TMDL includes waste load allocations (WLAs) for permitted point sources, load allocations (LAs) for nonpoint and natural background sources, plus a Margin of Safety (MOS). A TMDL is developed for a specific pollutant and can be expressed in terms of mass per time, toxicity, or other appropriate measures that **relate to a state's water quality standard**.

Wasteload allocation (WLA) - the portion of a receiving water's loading capacity that is allocated to one of its existing or future permitted point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.

Water quality - the biological, chemical, and physical conditions of a waterbody. It is a measure of a waterbody's ability to support beneficial uses.

Water quality standards - a group of statements that constitute a regulation describing specific water quality requirements. Virginia's water quality standards have the following three components: designated uses, water quality criteria to protect designated uses, and an anti-degradation policy.

Watershed - area that drains to, or contributes water to, a particular point, stream, river, lake or ocean. Larger watersheds are also referred to as basins. Watersheds range in size from a few acres for a small stream, to large areas of the country like the Chesapeake Bay Basin that includes parts of six states.

APPENDIX A

Agricultural Working Group Meeting Notes

Agricultural Working Group January 25, 2011 Meeting Summary

Louisa County Administration Building; Louisa, VA

Meeting Attendees

Jenny Biche , RRRC
Willie Coleman, Citizen
Byron Petrauskas, BRES
Bob Weiner, Citizen
William Biscoe, Citizen
J.R. Goodwin, Citizen
Helene Purcell, Citizen
Jennifer Carlson, VADEQ

Vernon Jones, Citizen
Doug Smith, Citizen
Raleigh Coleman, TJSWCD
James Kean, Citizen
Clorese Vaughan, Citizen
Sonny Coleman, Citizen
Patty Madison, Citizen
Joey Vaughan, Citizen

Meeting Summary

Byron Petrauskas with Blue Ridge Environmental Solutions, Inc. (BRES) led the facilitation at the Agricultural Working Group meeting. This group is to focus on identifying constraints to implementation, recommend control measures to obtain the livestock bacteria load reductions listed in the TMDL study, determine appropriate outreach methods, discuss identity to provide technical assistance, and identify funding sources / partnerships. The group received a handout with information and questions regarding best management practice (BMP) identification and implementation.

Agricultural Status in Watershed

Current operational status of producers and landuse changes since the TMDL study were discussed. Primarily beef operations exist in these watersheds. Confined animal feeding operations (CAFOs) consist of four dairies and two poultry facilities. It was noted the milking herd in the Plentiful Creek dairy was currently at about 100. Attendees were unsure if sufficient waste storage facilities existed at all the dairy operations. Litter storage sheds were believed to exist at the poultry operations. It was noted that sufficient exporting of manure was not prevalent in these watersheds. Members noted the horse population in Goldmine Creek was probably lower than the 89 horses listed in TMDL study. Attendees also suggested that a few more horses have been added in Pamunkey Creek since 2005. Changes noted in landuse since 2005 include: increase in residential development in Terrys Run and Pamunkey Creek; more houses are being built in Gold Mine Creek; and an increase in cropland is being seen. Carolina farmers are moving up and taking pasture and hayland and converting it to cropland. Gold Mine Creek has had an increase in logging, after which, land is used for residential growth. An inquiry was made as to whether the TMDL IP should look at logging in the watershed. Since the TMDL IP is focused on bacteria, effects of logging are incorporated by estimating potential bacteria load from the landuse forest is converted to, such as pasture.

BMP Identification

An inquiry was made as to whether implementation was voluntary. Currently, Virginia relies on a voluntary and incentive based program to encourage installation of conservation practices.

The group reviewed a list of best management practices (BMPs) that could address livestock with stream access and bacteria loads on pasture and cropland. Average component costs based on Culpeper Soil and Water Conservation District historical data for various livestock exclusion systems were analyzed. Fencing costs listed for 5-strand barbed wire fencing (\$3 - \$4 per foot) would apply to 5-strand high tensile fencing. Cost for 5-strand barbed wire fencing would be about \$5 to \$6 per foot. Attendees suggested average cost to drill a groundwater well would range from \$6,000 to \$10,000 depending on depth. Providing electricity to a groundwater well can be a big issue in these watersheds. It can cost from \$2,000 to \$15,000 to install the base depending on how far you have to go. Grant money is needed for farmers who don't have electricity where they have their cattle.

Consequences of the livestock exclusion fencing buffer, such as non-native vegetation species growth, were discussed. It was noted that buffer maintenance (e.g., mowing) is allowed in some livestock exclusion practices. Livestock exclusion fencing is not practical in flood-prone areas and would be wiped out quite frequently in some areas of watershed. Current cost-share contracts require farmers to repair/replace damaged fence after each flood occurrence. In TMDL areas, farmers are eligible for cost-share funds to assist with the repair/replacement if the practice is still in life span, and funding is available. Also there is a 25% tax credit for their out of pocket costs, WP-2D. A suggested recommendation to include supplemental cost-share for fence repair/replacement when fencing is destroyed by flood was made. The WP-2T practice also provides \$.50 per linear foot of stream fencing as an incentive payment to assist with stream fencing maintenance. The answer whether cost-share assistance is available for water troughs is yes. Pumping from the stream itself is a possible solution instead; however, cows prefer to drink clean, cold water. If your upstream neighbor is dumping pollutants into the water, it will affect the water quality your cattle drinks. VADCR provided a brochure to attendees on the benefits of clean water and improved pasture management.

BMP Implementation

An inquiry was made as to why the farmer must brunt the cost of BMPs if the public will benefit from the improved water quality, recommended the cost be shared by everyone, not just the individual farmer. Taxpayers fund the agricultural incentive programs, so cost is partially distributed if a producer participates in a program.

It was noted that a 100% cost-share incentive may be needed for some producers to agree to a 10-year BMP commitment. This would have to be from sources outside of state or TMDL cost-share funds since the funding sources cannot exceed 90% cost-share including funding from local sources and grants. Piedmont Environmental Council has assisted in covering costs in other counties. A comment was made that 5-10 year contracts is a fair term because of farm turnover. Often land is sold before the contract has been reached and the farmer has difficulty selling the property. In the last eight years there have been two instances where this has occurred in the Thomas Jefferson SWCD area. Recommendation that farmer labor is valued same as contractor labor, farmer should get same credit as if a contractor did the

work. Currently, cost-share estimates farmer labor costs at lower rate than contractor. It was noted Soil and Water Conservation District Boards determine the cost-share level credited to farmers doing the labor, it is not up to the State to decide.

Applicable educational /outreach methods that work well in the area include: personal communication through phone and site visits; farmer-to-farmer interaction; SWCD, Virginia Cooperative Extension, and Farm Service Agency newsletters; field tours conducted by SWCD; educational events conducted by Virginia Cooperative Extension; Cattleman's and Dairyman's Association events; information booth at CVCA Field Day and County Fair; and *Central Virginian* articles. It was noted that newsletters would reach old clients not new ones and the county fair would reach more residents than farmers

Other Discussion

An inquiry was made as to whether or not the TMDL-IP would address hydro-fracturing. Groundwater is a component of the TMDL model. Bacteria monitoring performed by VADEQ addresses surface water.

A comment was made that there is an imbalance between what Developers make versus what Farmers make a year. Developers are requires to pay minimal fees. It was recommended that developers incur some of the costs. BMPs are voluntary for farmers.

An inquiry was made as to whether there are any numbers indicating how much of the pollution in a river is due to farmers specifically. Is there a percentage that farmers contribute versus larger cities such as Richmond? The TMDL study does have data providing that information; however, the TMDL does not compare the numbers with larger cities. The TMDL information is locally based only.

An inquiry was made as to whether there was a computer model that utilizes DNA information and breaks down the wildlife, human and livestock bacteria contributions. The TMDL utilized a computer model coupled with information on bacteria sources. Monitoring was conducted during TMDL development and utilized antibiotic resistance analysis to differentiate human, livestock, pet and wildlife bacteria sources in a water sample.

An inquiry was made as to how much geese and muskrat bacteria contributed to the Goldmine Creek water quality exceedance levels. A citizen remembered the TMDL study estimating a geese population of 450 for the Goldmine Creek watershed. He stated there were nearly 450 geese on his land alone. He feels a more accurate, conservative estimate would be 10,000 geese for the entire Lake Anna area that stay year round. There was mention of a wildlife study being conducted on the lake. The game warden may be able to provide data on the geese population from this tagging and tracking program. The geese population has dramatically increased, not just on the lake but in the pasture. The TMDL IP's progress is tracked, and if successful BMPs are not showing a decrease in bacteria exceedance levels over a given period of time, the project will be reanalyzed. If wildlife is ultimately the problem, there are management options available to address over population or nuisance animals. In a stream on the Eastern Shore, raccoons were identified as the problem and were subsequently relocated elsewhere.

There have been cases of salmonella in cattle. VADCR has information on how much bacteria one beef cattle creates versus one beaver versus one dog, etc.

An inquiry was made as to whether or not the Louisa Sewage Plant goes into Goldmine Creek. It extends into South Anna River and the permit is about to expire.

An inquiry was made as to whether VADCR or USEPA has information on TMDL IP success stories. VADCR has information on their website of successful TMDL IP projects such as Middle Fork Holston River Blackwater River, Muddy Creek, and Willis River, which has partially been de-listed.

Agricultural Working Group February 8, 2011 Meeting Summary

Town of Orange Public Works Building; Orange, VA

Attendance (signed in: 14, attended: 22)

Bart Almond, Citizen
Jenny Biche', Rappahannock-Rapidan Regional Commission
Cynthia Bowman, Citizen
Thomas Graves, Citizen, Orange County Farm Bureau
K. Green, Citizen
Charles Lunsford, VA Dept. of Conservation and Recreation
Janice Mayhugh, Eastern View High School
Bob McConnell, Citizen
Don Ober, Citizen
Byron Petrauskas, Blue Ridge Environmental Solutions
Cody Phelps, Eastern View High School
Alison Rau, Piedmont Environmental Council
Monk Sanford, Citizen
Bob Slusser, VA Dept. of Conservation and Recreation
Richard Street, Spotsylvania County
Bryant Thomas, VA Dept. of Environmental Quality
Michael Willis, Citizen
Ron Wisniewski, Natural Resources Conservation Service
Lindsay Woolfolk, Citizen

Discussion Summary

Eastern View High School Envirothon Team distributed a survey that attendees were asked to complete. A sign up sheet and hand outs were distributed to attendees and reviewed. The following comments were made:

- The TMDL study identified 2 dairy farms in Mountain Run, one in Pamunkey Creek and one in Plentiful Creek. Attendees confirmed there were 2 dairy farms in Mountain Run and one in Plentiful Creek, but that there are no longer any dairy farms in Pamunkey Creek. There are a total of five dairy farms in all of Orange County.
- One of the dairy farms in Mountain Run does have a collection tank, but the other does not.
- The dairy farm in Pamunkey Creek is now a beef feed lot.
- The TMDL study identified one turkey farm in Mountain Run; attendees confirmed that it is still in operation and that it has a litter containment facility.
- Changes in land use since 2005 include:
 - Cropland changes from corn production to pasture
 - Limited residential building due to the economy. Building permit information is available through the county.
- An inquiry was made regarding funding, such as cost share, for voluntary fencing. Continuing Conservation Initiative (CCI) has a cost share program that pays \$1/ft. for 5 years for one-sided stream exclusion fencing and \$2/ft. for both sides. CCI hopes to capture voluntary practice data. The only requirement is that the fencing must be for stream exclusion; there is no set-back requirement. The program is funded by DCR.

- An inquiry was made regarding future funding. It was noted that funding is now available and programs are voluntary. It is not known how funding will be handled if programs become mandatory. Right now, cost share money comes from DCR. If EPA chooses to make programs mandatory, the General Assembly will have to decide whether or not to continue funding these programs and practices. Current funding is limited. BMPs will be considered first for funding, with any funds remaining after July 1st going to CCI applicants.
- In response to an inquiry regarding whether a farmer can fulfill his cost-share contract, and then re-apply when the term is up to replace the existing fence, it was noted that the CCI program enrolls farmers for another 5 years without having to repeat the process of taking down and replacing fencing.
- The most common complaints concerning participation in the proposed program are:
 - Loss of land due to set- back requirements;
 - Costs to participants; and
 - Reluctance to involve the government in personal matters.
- DCR is working to address some constraints/obstacles. For farmers in the Chesapeake Bay watershed, cost-share has been increased from 75% to 85%; cost-share funds are available if fencing is damaged due to flooding, etc. and set-backs have been reduced from 35 ft to 10 ft with 50% cost share. There is increasing flexibility among the various programs; for example, a farmer may use the 10ft. set back with 50% cost share for part of his farm, and use 85% cost-share with a 35 ft. set-back for the rest of the farm.
- FSA stated that there are 60 active cost share contracts in Orange County with additional interest in participation.
- An inquiry was made as to whether a farmer could participate in a cost share program for fencing, fulfill their 10 year contract, and then, 5 years later, apply for another cost-share program to replace the original fence. It was noted that, yes, it is allowed; or they could use the CCI program. While there is no incentive for keeping fencing in place after the contract is fulfilled, most farmers do because of the benefits.
- Educational outreach efforts should focus on:
 - Culpeper Soil and Water Conservation District newsletter
 - FSA newsletter
 - Local newspaper
 - Extension Office
 - Cattleman's Associations
 - Farm Bureau
 - Spring and Fall Field Days
 - County Fair
 - Co-op
- Equine industry:
 - Has experienced limited growth in Orange County in the last few years;
 - Historically has been underserved;
 - Horses are now included in the definition of agriculture;
 - Horse properties are often over-grazed; and
 - Ordinances can regulate animal densities, thereby reducing overgrazing and runoff from overgrazed lands.
- Irrigation:
 - Participants suggested that irrigation should be encouraged;
 - There are no known cost share programs for crop irrigation available.

- Although stream-side fencing is not popular with older farmers, they do favor trough installations and recognize the fact that cows prefer cold, clean drinking water and will walk up to $\frac{1}{2}$ mile along a stream to access a water trough.
- Electric companies that serve Orange County include Dominion, Central Virginia, Allegany, and Rappahannock Electric Cooperative. It was recognized that some companies are easier to work with than others. Some farmers feel that they are discriminated against by power companies. For example, it was stated that the cost of erecting two poles to run power to farm buildings can be as high as \$30,000; however, installation is cost-free if the property includes a home. The cost to run electric lines is based on the number of amps expected to be used.
- The estimated costs stated in Table 2 do not include in kind services or tax credits.
- In response to an inquiry, it was noted that anyone can collect a water sample and send it to a lab to be analyzed at their cost.
- Several citizens were concerned that the dump located near Lake Orange contributes pollutants to Clear Creek. Water pollution concerns may be directed to DEQ, which will send staff to investigate.
- DEQ's testing protocol was discussed:
 - Sampling is random and designed to capture all conditions;
 - A minimum of 12 samples is collected in a 2-year period;
 - Samples are kept on ice after collection and during transport;
 - Samples must be received at the lab within 24 hours of collection;
 - Testing measures the level of bacteria present and does not determine the source – agricultural or residential; and
- It was suggested that samples be taken in locations other than where they have been collected. The TMDL-IP can recommend additional monitoring and grant funding is available for citizen monitoring. However, requesting additional testing by DEQ would require more funding and budgets are tight right now.

What's Next?

Attendees were thanked for their participation and encouraged to comment on the first public meeting minutes and forward any comments or questions to Deirdre Clark, May Sligh or Byron Petrauskas before the next public meeting. All meeting notes, maps and presentations may be viewed on-line at:

<http://www.rrregion.org/yorkbasin.html>.

Agricultural Working Group May 3, 2011 Meeting Summary

Town of Orange Public Works Building; Orange, VA

General Attendance (Agricultural and Residential Working Groups)

Jenny Biche', Rappahannock-Rapidan Regional Commission
Cynthia Bowman, USDA, Natural Resources Conservation Service
Deirdre Clark, Rappahannock-Rapidan Regional Commission
Courtney Lipski, Virginia Department of Health
Steve Hopkins, Virginia Cooperative Extension
Etta Lucas, Tri-County/City Soil and Water Conservation District
Christopher Owens, Citizen
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Chip Russell, Virginia Department of Health
May Sligh, Department of Conservation and Recreation
Bob Slusser, Virginia Department of Conservation and Recreation
Greg Wichelns, Culpeper Soil and Water Conservation District
Ron Wisniewski, USDA, Natural Resources Conservation Service
Spencer Yager, Culpeper Soil and Water Conservation District

Introduction and General Information Provided

- Attendees were welcomed and introductions were made.
- Information provided included:
 - Copies of minutes from all meetings to date;
 - A general summary of recreational use of surface water – "Safely Enjoying Virginia's Natural Waters;"
 - The Action Chart listing source issues, corrective actions, potential funding and partners as edited by attendees of previous meetings; and
 - Estimates of practices needed and their potential costs prepared by Blue Ridge Environmental Solutions, Inc.(BRES);
- Highlights of previous meetings were reviewed and additional input to the Action Chart was requested;
- Attendees were informed of the function of the Steering Committee and encouraged to participate in the meeting scheduled for June 7, 2011, 6- 8 PM at the Town of Orange Public Works Community Room; and
- It was noted that the final Public Meeting will be held on June 21, 2011 from 6-8pm at the Town of Orange Public Works Community Room, at which time the Draft TMDL-IP, including Steering Committee recommendations and comments, will be presented to the public.

Agricultural and Residential Working Groups

Attendees elected to remain as one combined working group and address both the Agricultural and Residential material.

Agricultural Discussion Points

Byron Petrauskas, BRES, conducted a discussion of the information contained in the handout entitled “Upper York River Basin Watershed Implementation Plan”:

- It was noted that partnering Soil and Water Conservation Districts had not yet completed their reviews of the aerial maps provided by BRES to determine the accuracy of data on practices as compiled by DCR;
 - DCR's data includes only those practices installed with cost share funding and doesn't capture voluntary BMPs;
 - The need for ground-truthing was discussed, as was the importance of local knowledge of farms and practices;
- Attendees reviewed Table 2: “Estimation of control measures with unit cost (average) needed to meet pasture and cropland bacteria load reductions.” The following comments were made;
 - Retention ponds are listed as a last resort/catch-all if needed to reduce the exceedance rate to 0%, as required to comply with the TMDL;
 - TMDL-IPs have been approved by EPA with a 3-4% exceedance rate of the bacteria standard and retention ponds are not included; and
 - Work load will determine the number of projects completed within the allotted time.
- Table 4: “Control measures with estimated cost-share program and landowner costs” was reviewed and the following comments/suggestions were made:
 - Prescribed grazing includes rotational grazing, development of multiple pastures, alternative water sources/livestock ponds, etc. and is an individualized plan;
 - Change the CREP cost share category to read “50% + varied incentives;”
 - Change the SL-1 cost share category to read “75% + incentives;”
 - Change the Septic Tank System Installation/Replacement w/ Pump average unit cost to read “\$9,000;”
 - It was suggested that the footnote indicate that the cost share amount listed is the maximum allowed; and
 - It was noted that CREP is the most lucrative program available.

Residential Discussion Points

- Table 3: “Estimation of control measures with unit cost (average) needed to meet on-site sewage disposal system and pet waste bacteria load reductions” was reviewed and the following comments were made:
 - The Pamunkey Creek watershed in the Town of Orange may be the only with a public sewer option still available. It's possible the Gold Mine Creek area has the capacity, as well; however, it is not a cost effective option;
 - In response to an inquiry regarding the determination of on-site sewage treatment units needed, it was noted that these are estimates based on participation rates from other TMDL-IP areas and are open for discussion;

- Discussion included whether or not the number of units should be based on what is needed versus what could be accomplished
- Since every repair requires a pump-out, the total number of pump-outs should reflect this;
- It was suggested that maintenance pump-outs for non-failing tanks be separated from the pump-outs required for failing tanks either in the chart itself as a separate designation, or by footnote;
- Repairs to a failing septic tanks will have a greater affect at reducing the bacteria exceedence rate versus pump outs; [Later part of this statement is not true because we do get a bacteria load reduction credit and a small nutrient reduction credit for pumpouts.]
- Attendees discussed including pump-outs in a separate category from repairs;
- The benefits of installing an access port to facilitate septic tank pumping were discussed;
- Along with access ports, filters can be added to reduce the frequency of pumping needed;
- Cost of installation of an access port is estimated at \$400-\$500;
 - As part of the TMDL-IP in Thumb Run watershed, post cards were mailed promoting a 50% cost share pump out program; it is uncertain if responses were tracked;
 - The Chesapeake Bay Program offers eligibility-based opportunities for pump outs;
 - The promotion of pet waste digesters and collection kiosks would be more successful in neighborhoods with HOAs;
 - HOAs can be identified by counties and targeted for educational programs;
 - Adjustments for the allotment of pet waste practices can be made as home density numbers are identified;
 - Attendees agreed that once introduced, pet waste management practices will continue to be implemented;
 - It was not known how pet waste compost residue is commonly handled;
 - Grants may be available for stormwater BMPs - \$15,000 an acre for bio-retention and \$12,000 an acre for infiltration. [What is the basis for this? We certainly don't have any cost-share for these stormwater practices. There may be some grants that have funded theses at these cist estimates.]
 - Possible funding sources include DCR's Water Quality Improvement Fund and the National Fish and Wildlife's small watershed grant;
 - Watersheds that have an approved TMDL-IP in place are received more favorably, as are areas that might be used as demonstration sites;
 - Mt. Zion Church on Harrison Road in Spotsylvania received a grant to assist with bio-retention.
 - A suggestion was made to include information on the impact of the practice of hydrofracing on existing wells and structures; [What is this and why is it relevant to this IP?]
- It was noted that there is an opportunity to revisit the TMDL-IP again in 5years to reassess the plan and its progress and adjustments, if needed.

Combined Considerations

- Table 5: "Targeted implementation stage for control measures installation" was reviewed and the following comments were made:
 - The purpose is to provide a timeline and prioritize goals and milestones;
 - Participants discussed the relative benefits of addressing those watersheds identified as needing the least number of practices (Beaver Creek and Plentiful Creek) to meet water quality goals versus those that are more seriously impaired;
 - Participants considered whether to apply different timelines to different counties and/or watersheds;

- The TMDL was developed to meet a 0% water quality standard exceedance rate ; [This is not exactly accurate.]
- The level of bacteria must be below the DEQ standard of 235 counts of colony forming *E. coli* bacteria per 100mL of water;
- Stage 1 focuses on reducing the bacteria level below the 10.5% exceedance rate that placed the stream segments on the impaired waters list;
- Stage 2 focuses on getting the bacteria level to a zero exceedance rate or as close as possible considering reasonable assurance based on costs and practicality of recommended BMPs
- It was recommended that the footnote include information explaining each reduction stage;
- Stages 1 and 2 can be divided in various ways and can include 10-15 year time line;
 - Examples - 12 years for Stage 1 and 3 years for Stage 2, or 5 years for Stage 1 and 5 years for Stage 2 with the determination of stages based on funding, staffing and project numbers;
- Soil and Water Conservation District contracts with DCR are issued every 2 years;
- It was noted that the Robinson River-Little Dark Run TMDL-IP has a 15 year timeline addressing bacteria, and the South River TMDL-IP has a 20 year timeline, but focuses on nutrients, sediments and bacteria;
- Attendees stated that one FTE (full time equivalent) technical assistant was not adequate to complete the proposed workload within a 10 year period;
- Attendees expect the Chesapeake Bay TMDL to influence the success of the local TMDL-IPs;
- Participants indicated that one advantage to a 10 year timeline is that it might provide more immediate opportunities for funding – if the Bay TMDL imposes regulations or offers funding sources, the locality would be "shovel ready;"
- A ten-year timeline, with all watersheds receiving equal attention, was agreed upon; eight years will be devoted to stage 1, with the remaining two years focused on stage 2. It was decided that the timeline would be for 10 years and that all watersheds would be the same.

Additional Comments

- Educational programs should focus on tangible improvements and practices - fencing, buffers, septic tanks repairs and replacements;
- Pet waste management information must be introduced strategically; there may be resistance to programs perceived as trivial or frivolous;
- Efforts should be made to educate high school students and get other stakeholders to assist with public education;
- There are a number of communities and interests - the lake, headwaters, homeowners and farmers;
- All stakeholders communicate:
- Suggested message- "Keeping the lake safe for swimming."

What's Next?

Upcoming meetings: ALL ARE WELCOME!

Second Agricultural and Residential Working Group

May 10, 2011, 6-8 PM

Jefferson-Madison Regional Library

881 Davis Highway, Mineral, VA

Steering Committee

June 7, 2011, 6-8 PM

Town of Orange Public Works Room

235 Warren Street, Orange, VA

Final Public Meeting

June 21, 2011, 6-8 PM

Town of Orange Public Works Room

235 Warren Street, Orange, VA

All meeting notes, maps and presentations, as well as the draft document, may be viewed on-line: http://www.rrregion.org/tmdl_york.html

Agricultural Working Group May 10, 2011 Meeting Summary

Jefferson-Madison Library; Louisa, VA

General Attendance (Agricultural and Residential Working Groups)

Jenny Biche', Rappahannock-Rapidan Regional Commission
Deirdre Clark, Rappahannock-Rapidan Regional Commission
Willie Gentry, Chair, Louisa County Board of Supervisor
Christopher Owens, Citizen
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
May Sligh, Department of Conservation and Recreation
Doug Smith, Citizen

Introduction and General Information Provided

- Attendees were welcomed and introductions were made. Attendees were provided with minutes from the last Public Meetings, Residential, Agricultural and Government Working Group Meetings, as well as various hand-outs on the Upper York River Watershed TMDL-IP. The material was reviewed and high-lights of each meeting were noted.
- After summarizing the previous meeting minutes, the following questions and comments were shared:
 - **Citizen is aware of a fencing contractor who charges \$3.25 per foot of installed 6 inch mesh fencing with one barb wire top strand in Louisa County. Mesh fencing is safer for horses, goats, etc. than tinsel wire.**
Staff will research to determine if mesh fencing meets the requirements for any cost share programs.
 - **When standards are being set, such as requirements for fencing type used in cost share programs, input should be collected from the public.**
Comment will be forwarded to the Department of Conservation and Recreation (DCR). The cost share programs factor in universal cost for an area when setting price standards.
 - **Have wetlands in Goldmine Creek helped improve the water quality? The wetlands have been expanded by the beaver population.**
Wetlands are a natural feature that helps improve water quality. The section of Goldmine Creek in the wetlands has not been placed on the Impaired Waters List, so bacteria levels there must be below the standard.
 - **Lake Anna Civic Association (LACA) has a monitoring station in the wetland area and their water testing has always demonstrated acceptable bacteria levels except after heavy rains.**
 - **Has wetland construction ever been used as a BMP in a TMDL-IP?**
The South River TMDL-IP recommended wetland construction as a BMP. Wetlands can be very expensive to construct, so is not typically an affordable option.
 - **Is there any data stating how much of an impact wetlands have on water quality improvement?**
The Department of Environmental Quality's (DEQ) website has the most up to date information available.

- **Terry's Run also has wetlands.**
- **It was suggested that the definition of the bacteria standard (235 E. coli colony forming units per 100 mL water) be put in terms that the general public can understand for the final public meeting. What does this mean to me? Unhealthy water that if swallowed can lead to illness, ear infection, etc.**
- **Will the TMDL-IP have the capacity to measure progress?**
Yes, part of the TMDL-IP includes phasing so that we can assess how much progress is being made. It also encourages the Department of Environmental Quality (DEQ) to commit resources to continue to monitor the stations.
- **Goldmine Creek has 8 tributaries. Has there been any research to determine whether one tributary is contributing more bacteria than the others?**
Yes. Thomas Jefferson Soil and Water Conservation District conducted a 2 month study examining all 8 tributaries to identify hot spots of bacteria. The project summary is available. It was funded through a Department of Conservation and Recreation mini-grant 3 years ago.
- **The information from that project summary would be useful to the Louisa County Board of Supervisors. It could be used as a template for how counties can address all the impaired watersheds.**
- **Why are the other rivers and creeks in Louisa County not being addressed in this TMDL-IP? Are they not impaired? Why is South Anna not included?**
The watersheds in this TMDL-IP only include the rivers and creeks identified as on the impaired waters list in the TMDL study completed by the Department of Environmental Quality (DEQ) in 2005. The remaining rivers and creeks may be included in a separate TMDL study. DEQ and DCR (Department of Conservation and Recreation) maintain a list of completed TMDL studies and address TMDL-IP's one at a time until they have completed the list. Louisa County Board of Supervisors may want encourage a TMDL-IP be started for South Anna.
- **There should be some coordination between this TMDL-IP and the Lake Anna Ecosystem Restoration Project the Army Corps of Engineers is overseeing.**
Staff agreed to learn more about this project and determine how it relates to the TMDL-IP.
- **What is the consensus regarding the EPA and the Chesapeake Bay TMDL initiatives? Is Virginia doing more than its fair share?**
The consensus appears to be that the states are hoping if there is a change in the administration in 2012, the Bay TMDL will go away. Law suites have already been filed. Virginia is not currently doing more than its fair share.
- **LACA is interested in funding a demonstration project in which they would partner with a farmer participating in the exclusion fencing cost share programs by covering the difference between the cost-share amount and the total needed. LACA hopes to demonstrate the benefits of the program and encourage more farmers to participate. LACA would monitor the water quality before, during and after the construction of the exclusion fence.**
If a farmer is chosen from an area identified by DEQ as being in the impaired watershed, the cost share could be as high as 85%. Success stories have been instrumental in increasing farmer participation in other watersheds. Grant funds may be available to match the money donated by the Lake Anna Civic Association.

- A pamphlet was distributed informing attendees of the “Restoration of the Chesapeake Bay and its Tributaries: A Working Seminar for Local Officials” meeting to be held on May 26, 2011 at the Hanover County Board of Supervisors Auditorium. All were encouraged to attend.
- **Steering Committee Meeting:**
 - Will be held on June 7, 2011, 6-8 PM, Town of Orange Public Works Community Room;
 - Representatives from the Agricultural, Residential and Government Working Groups will present summaries of issues discussed at respective meetings;
 - Byron Petrauskas, BRES, Inc., will present the draft TMDL-IP for review and comment; and
 - All interested are encouraged to participate and should contact Jenny Biche’ or Byron Petrauskas to indicate their intent.
- The **Final Public Meeting:**
 - Will be held on June 21, 2011, 6-8 PM, Town of Orange Public Works Community Room; and
 - Draft TMDL-IP will be presented for public comment.

Agricultural and Residential Working Groups

Attendees elected to remain as one combined working group and address both the Agricultural and Residential material.

Agricultural Discussion Points

- A summary of proposed practices, “Upper York River Basin Watershed Implementation Plan,” as prepared by BRES was distributed for review and comment:
- **Table 1:** “Existing livestock exclusion fencing and estimated exclusion fencing length needed in each impairment.” Questions and comments include the following:
 - Data was generated through aerial map analysis and then ground-truthed by the locality’s Soil and Water Conservation District. Their comments and edits will be incorporated and the table will be modified prior to the Steering Committee and final Public Meetings;
 - Table 1 includes all identified livestock operations and potential fencing needs;
- **Table 2:** “Estimation of control measures with unit cost (average) needed to meet pasture and cropland bacteria load reductions.” Questions and comments include the following:
 - Pasture management is an important factor in achieving reduction loads;
 - Retention ponds;
 - Listed as a catch-all if needed to get the exceedance rate down to 0% as required to comply with the TMDL;
 - TMDL-IPs have been approved by EPA with a 3-4% exceedance rate of the bacteria standard and retention ponds are not included;
 - At a cost of about \$2,000 per acre for retention ponds, costs for the TMDL-IP often doubles if retention ponds are needed;
 - The acreage needed for a retention ponds is determined by the amount of land that drains into it;
 - Retention ponds will not be implemented until the final year or two of Stage 2 and then, only if needed
 - Manure is incorporated into soil by either injection or using a disc, after which the land can be re-pastured; and
 - The amount of technical assistance required will reflect what can be funded.

Residential Discussion Points

- Table 3: “Estimation of control measures with unit cost (average) needed to meet on-site sewage disposal system and pet waste bacteria load reductions” was reviewed and the following comments made:
 - Eliminate the use of acronyms;
 - The "number of units needed" are estimates;
 - Pet waste management programs are often are viewed as unnecessary in rural areas;
- The Town of Orange has experienced a favorable response to signage and pet waste kiosks;
- Table 4: “Control measures with estimated cost-share program and landowner costs” was reviewed and the following comments made:
 - Byron Petrauskas, BRES, Inc. confirmed that cost-share amounts for septic tank repairs ranged from 50-75%. Cost share amounts for septic tank pump outs are 50%.
 - Connection to the public sewer system can cost up to \$20,000. The footnote reflects the fact that average unit costs can be higher.

Combined Agricultural & Residential Discussion Points

- Table 5: “Targeted implementation stage for control measures installation” was reviewed and the following comments made:
 - The purpose is to develop a timeline and prioritize goals and milestones;
 - Stage 1: Includes strategies to reduce the bacteria water quality standard exceedence rate to below 10.5% and remove the watershed from DEQ’s Impaired Waters List; and
 - Stage 2: Includes strategies to attain the TMDL’s goals and reduce the bacteria water quality standard to 0%.
 - It was suggested that initial efforts focus on strategies that have visible, tangible results, producing a high return for the investment such as;
 - Pet waste management education and outreach;
 - Exclusion fencing practices; and
 - Upland pasture management.
 - Attendees discussed the relative merits of focusing certain streams first:
 - Because Pamunkey Creek is well-known regionally and popular with real estate agents, it might present more opportunities for public education;
 - Among the streams included in the TMDL-IP, Terrys Run and Pamunkey Creek are more developed with a higher number of homes, more beaches and marinas, and more possibilities for citizen engagement; and
 - Gold Mine Creek should be among those streams addressed first because of the interest and support of the Town of Louisa;
 - Focusing first on Pamunkey Creek, Terrys Run and Gold Mine Creek could result in fairly significant reductions in a fairly short time if actions are initiated while funding is available. and funding will be available to get the work done;
 - Because of its characteristics – no big agricultural producers, mostly forested, and few residences – Plentiful Creek might be a good candidate for funding a study of wildlife bacteria loads versus human induced impacts.
 - Neither the Lake Anna Civic Assn., nor DEQ monitor flow volume into lake Anna; however, there apparently are models that simulate inflow;
 - The Soil and Water Conservation Districts can assist farmers individually to find the best cost share programs that will work for their needs - flexible options exist;
 - Staging issues and program balance can be addressed by the Steering Committee, as well;

What's Next?

Attendees were encouraged to participate as part of the Steering Committee by contacting Jenny Biche' or Byron Petrauskas before the schedule **Steering Committee Meeting** on June 7, 2011, 6 – 8 PM at the Town of Orange Public Works Community Room, Orange, VA. All meeting notes, maps and presentations, as well as the draft document, may be viewed on-line

http://www.rrregion.org/tmdl_york.html

The **Final Public Meeting** will be held on June 21, 2011, 6 – 8 PM at the Town of Orange Public Works Community Room in Orange, VA.

APPENDIX B

Residential Working Group Meeting Notes

Residential Working Group January 25, 2011 Meeting Summary

Louisa County Administration Building; Louisa, VA

Meeting Attendees

Tommy T. Barlow, Louisa County BOS
Deirdre Clark, R-RRC
Katie Conaway, VA DEQ
Mary E. Johnson, Thomas Jefferson SWCD
Charlie Lunsford, VA DCR
Christopher Owens, Citizen
May Sligh, VA DCR
Richard Street, Spotsylvania County
Scott Vogel, Louisa County Health Department

Opening Comments:

- The role of the Residential Working Group (RWG):
 - Participants were informed that the RWG will focus on the identification and reduction of bacterial loads from human sources and pets. This will include:
 - Determining strategies to identify and eliminate straight pipes and failing septic systems;
 - Identifying the problems faced by landowners in remediating failing septic systems and straight pipes;
 - Identifying potential funding sources for remediation;
 - Identifying strategies to encourage landowners to come forward despite fear of regulatory action and unknown costs;
 - Identifying the type(s) of technical assistance needed and methods of delivery;
 - Identifying practical and appropriate educational tools; and
 - Identifying effective pet waste management strategies.
 - Typically, the RWG is made up of homeowners, citizen organizations, and representatives from state and local governments.
 - Participants were informed that their report, along with reports from the Agricultural and Government Working Groups, will be submitted to the Steering Committee for consideration for inclusion in the Implementation Plan.
 - RWG members may serve on the Steering Committee.

Background Information

- Information contained in the TMDL study requires updating.
- **Spotsylvania:**
 - Supervisors are skeptical of testing protocols, including timing and location;
 - Has a county-wide stormwater ordinance;
 - Will implement the plan county-wide;
 - Adopted drain field reserve requirements in 1995;
 - Home-owners'-association (HOA) information may be obtained from Spotsylvania's GIS Department.
 - Falls under Chesapeake Bay requirements; and
 - Residents apparently are not complying with Chesapeake Bay Preservation Act requirements.

- Plentiful Creek watershed in Spotsylvania County:
 - 6,000 of the 7,000 acres in the watershed are wooded;
 - The last building permit was issued in 2003;
 - Most development is the result of family divisions;
 - There are 207 lots with improvements of \$10,000 or more;
 - There are no dairy farms - last one ceased operation 15 years ago;
 - Two farmers participate in BMP programs;
 - Plentiful Creek is a major spawning stream; and
 - Septic system issues are probable.

- **Louisa:**
 - Requires permits for repairs to septic systems;
 - Averages 5 or 6 repairs/replacements per year in Goldmine Creek.
 - Requires 100% reserve;
 - Wastewater discharge violations;
 - Treatment plant serves the towns of Louisa and Mineral, and portions of Louisa County;

- Goldmine Creek watershed in Louisa County:
 - Limited development.

Well, Septic, Sewage

- Lake Anna residents' concerns:
 - Lake water intruding into ground water;
 - Possible well contamination from drain fields; and
 - Unexpected impacts to wells, septic systems and lake water quality as a result of year-round occupancy of what were expected to be seasonal homes.
- Regional population growth has resulted in increased demands on the Louisa sewage treatment plant.
- Increasing "suburbanization" of the region has generated speculation regarding future water and sewer needs.

Education/ Outreach

- Homeowners
 - Need to be informed of the function and limitations of septic systems;
 - Need information on the location of their septic system – this should be included at time of property transfer.
- Pet waste management:
 - Rural pet owners unlikely to manage waste;
 - The use of pet waste composters should be promoted;
 - HOAs may be helpful in providing information to dog owners;
 - No knowledge of commercial or hunt kennels in Goldmine Creek and Plentiful creek watersheds;
 - Dog walkers use Louisa's town park;
 - Education is needed to encourage pet waste management;
 - Seek funds to install kennel waste management program as pilot project; and
 - Consideration for a "clean kennel" award.

Discussion

- Numbers representing reductions needed to de-list streams were derived from the water quality model;
 - All bacteria sources, as well as precipitation and runoff data, are integrated in the model
 - Removal of data input reveals reduction requirement for each category
- State regulations and standards need to be evaluated, agreed upon and uniformly implemented
 - Storm water regulations were cited as an example of requirements imposed while still in the refinement stage, resulting in confusion and compliance issues;
 - Contractors, developers and engineers shouldn't be expected to revise approved plans because of changes in regulations;
 - Requirements need to be simply stated, the review and approval process clearly described, and the approval action final with no revisions to follow;
- Funding for all projects is problematic;
- Concern that what is now "suggested" will become regulatory;
- There is not enough voluntary compliance to forgo regulation;
- Agency representatives are encouraged to avoid using acronyms;
- Concern for possible regulation as a result of the Bay TMDL.

Attendees indicated interest in continuing to participate as members of the Residential Working Group. They were encouraged to inform other residents of the watershed of the TMDL-IP and invite them to attend future meetings, including the second public meeting scheduled for January 26th in the Town of Orange. Participants will be notified of future meetings. Information about the project and meeting minutes may be accessed at http://www.rregion.org/tmdl_york.html

Residential Working Group February 8, 2011 Meeting Summary

Town of Orange Public Works Building; Orange, VA

Attendance

Joshua Bateman, Director, Community Development, Town of Orange
Deirdre Clark, R-RRC
Stephanie DeNicola, Culpeper SWCD
Christopher Owens, Citizen
Alex Ramey, Eastern View High School
Richela Rosales, Eastern View High School
Chip Russell, Virginia Department of Health
Jimmy Stevens, Citizen
Debra Switzer, Citizen
Gary Switzer, Virginia Department of Health
May Sligh, VA Dept. of Conservation and Recreation
Greg Wichelns, Culpeper SWCD

Opening Comments

Participants were directed to the Residential Working Group (RWG) Fact Sheet and informed that they will be asked to focus on the identification and reduction of bacterial loads from human sources and pets. This will include:

- Determining strategies to identify and eliminate straight pipes and failing septic systems;
- Identifying the problems faced by landowners in remediating failing septic systems and straight pipes;
- Identifying potential funding sources for remediation;
- Identifying strategies to encourage landowners to come forward despite fear of regulatory action and un- known costs;
- Identifying the type(s)of technical assistance needed and methods of delivery;
- Identifying practical and appropriate educational tools; and
- Identifying effective pet waste management strategies.

Participants were asked to think about effective outreach strategies and how they might be received in their communities. The group was informed that their report, along with reports from the Agricultural and Government Working Groups, will be submitted to the Steering Committee for consideration for inclusion in the Implementation Plan. In addition, it was noted that members of the RWG are welcome to participate as members of the Steering Committee.

Septic System Concerns

Participants reviewed the residential best management practices listed on the RWG Fact Sheet. The limits and function of septic systems, conventional and alternative, were discussed. Comments and observations include:

- Septic pump-outs were characterized as "eye-opening" experiences for the uninformed homeowner;
- Most localities recommend pump-out every five years – not necessarily required or tracked;
- There might be opportunities within the watershed for connecting to public sewer;

- Cost estimates, as provided by Blue Ridge Environmental Solutions, seem low for both conventional and alternative systems;
 - Spotsylvania resident with property near Lake Anna was required to include a lateral ground movement barrier in the design of his system, adding significantly to the cost; and
 - Maintenance requirements of alternative systems are costly;
- Spotsylvania adopted Chesapeake Bay regulations countywide;
 - No enforcement program – complaint driven.
 - Many landowners do not comply;
 - Septic systems may not be constructed within the 75' set-back from the high water mark of Lake Anna
 - Some counties and localities have different shoreline setback requirements.
- **Alternative systems:**
 - Recently approved Virginia legislation allows on-site systems just about anywhere
 - Legislation has created a climate in which land purchasers fully expect to be able to install some type of on-site treatment system on any parcel;
 - Most owners of alternative systems are uninformed of mechanical function, costs and failure rates;
 - Many areas within the watershed are unsuited for systems of any kind – conventional or alternative;
 - Specific soils determined to be unsuitable (Louisa Comp. Plan).
 - Virginia requires that alternative systems be inspected periodically by certified inspectors;
- **Straight pipes and failing systems:**
 - Older structures along Tomahawk Creek and the Houseworth Street area should be evaluated;
 - Annexed sections of the Town of Orange may not have been connected to public sewer;
 - Older homes along Route 15 might have failures;
 - CSWCD's staff experience suggests that projected numbers of straight pipes and failing systems might be higher;
 - The general public would probably be surprised at the number of failures;
 - Identification process
 - The older the structure, the greater the probability of straight pipes and/or failing systems;
 - Homes constructed before 1960 are suspect;
 - Building inspectors and Health Dept. employees can provide information;
 - Private sector may not want to provide any information because of fiduciary responsibility to clients;
 - GIS and tax data are key elements;
 - All model predictions must be ground-truthed;
 - Greywater discharge is illegal;
- **Municipal sewage treatment**
 - Town of Orange has new plant;
 - Rapidan Service Authority provides water and sewer for many parts of the watershed; and
 - Gordonsville has its own plant that most likely discharges into the North Anna.
- **Education and Outreach**
 - Information regarding septic system type, function, location and maintenance, including costs, should be included in closing documents at all home sales;
 - Realtors in other jurisdictions support requiring septic system information as part of closing documents;
 - To reach all property owners, include septic system information with tax assessments;

- Loudoun County/ Catoctin Watershed – Health Dept. partnered with tax office to provide information resulting in good response from residents seeking technical assistance
- Raise awareness of fact that funding and technical assistance is available;
 - Newspaper articles and word-of-mouth are most effective – more effective than brochures, mailings, etc.
 - CSWCD has had success with bulk mailings to everyone in a watershed;
- Even if a problem is identified, a warrant may be needed to access the property; and
- The Water Quality Improvement Fund has assisted with the repair and/or replacement of systems in various localities.

Pet Source Bacteria

Comments regarding pet waste management include:

- Most dog owners within the watershed are not inclined to practice effective pet waste management;
- Two pet waste collection kiosks have been strategically placed in the Town of Orange to encourage identified owners to clean up after their dogs;
- There are several hunt kennels in the watershed – it is doubtful that they have waste management plans;
- Although some localities require special use permits for kennels, many may be informal business or breeding facilities;
- Greywater containing disinfectants and detergents from maintenance activities contributes to degradation of surface and groundwater quality;
- **Education/Outreach:**
 - Develop and implement public information campaigns
 - "It's Your Doody" – Fauquier County
 - "Poop Fairy" – Virginia Beach
 - Devise and implement pet waste composter construction workshops similar to rain barrel workshops;
 - Work with a commercial kennel to develop and implement a watershed waste management pilot project;
 - Fauquier SPCA's waste management system could be used as a model for effective practices; and
 - Reach out to home owners associations to promote pet waste composters and other management strategies.

Enforcement Considerations

In response to a question regarding the regulation of bacterial impacts to streams, it was noted that impacts from untreated human waste are illegal and sources must be remediated. The Virginia Department of Health responds to such complaints. Agricultural producers are encouraged/ persuaded to reduce impacts that are associated with everyday farm operations; however, deliberate dumping of contaminants by agricultural operations is illegal. Such practices may be reported to the Virginia Department of Agriculture and Consumer Services which investigates claims. If a complaint is verified, the perpetrator will have a specific period in which to remediate the impact and/or effect improvements. Fines may be applied.

Next Steps

Attendees expressed interest in continuing to participate as members of the Residential Working Group. They were encouraged to inform other residents of the watershed of the TMDL-IP and invite them to attend future meetings. . Participants will be notified of future meetings. Information about the project and meeting minutes may be accessed at http://www.rrregion.org/tmdl_york.html. Questions and comments are welcome.

Residential Working Group May 3, 2011 Meeting Summary

Town of Orange Public Works Building; Orange, VA

General Attendance (Agricultural and Residential Working Groups)

Jenny Biche', Rappahannock-Rapidan Regional Commission
Cynthia Bowman, USDA, Natural Resources Conservation Service
Deirdre Clark, Rappahannock-Rapidan Regional Commission
Courtney Lipski, Virginia Department of Health
Steve Hopkins, Virginia Cooperative Extension
Etta Lucas, Tri-County/City Soil and Water Conservation District
Christopher Owens, Citizen
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Chip Russell, Virginia Department of Health
May Sligh, Department of Conservation and Recreation
Bob Slusser, Virginia Department of Conservation and Recreation
Greg Wichelns, Culpeper Soil and Water Conservation District
Ron Wisniewski, USDA, Natural Resources Conservation Service
Spencer Yager, Culpeper Soil and Water Conservation District

Introduction and General Information Provided

- Attendees were welcomed and introductions were made.
- Information provided included:
 - Copies of minutes from all meetings to date;
 - A general summary of recreational use of surface water – "Safely Enjoying Virginia's Natural Waters;"
 - The Action Chart listing source issues, corrective actions, potential funding and partners as edited by attendees of previous meetings; and
 - Estimates of practices needed and their potential costs prepared by Blue Ridge Environmental Solutions, Inc.(BRES);
- Highlights of previous meetings were reviewed and additional input to the Action Chart was requested;
- Attendees were informed of the function of the Steering Committee and encouraged to participate in the meeting scheduled for June 7, 2011, 6- 8 PM at the Town of Orange Public Works Community Room; and
- It was noted that the final Public Meeting will be held on June 21, 2011 from 6-8pm at the Town of Orange Public Works Community Room, at which time the Draft TMDL-IP, including Steering Committee recommendations and comments, will be presented to the public.

Agricultural and Residential Working Groups

Attendees elected to remain as one combined working group and address both the Agricultural and Residential material.

Agricultural Discussion Points

Byron Petrauskas, BRES, conducted a discussion of the information contained in the handout entitled “Upper York River Basin Watershed Implementation Plan”:

- It was noted that partnering Soil and Water Conservation Districts had not yet completed their reviews of the aerial maps provided by BRES to determine the accuracy of data on practices as compiled by DCR;
 - DCR's data includes only those practices installed with cost share funding and doesn't capture voluntary BMPs;
 - The need for ground-truthing was discussed, as was the importance of local knowledge of farms and practices;
- Attendees reviewed Table 2: “Estimation of control measures with unit cost (average) needed to meet pasture and cropland bacteria load reductions.” The following comments were made;
 - Retention ponds are listed as a last resort/catch-all if needed to reduce the exceedance rate to 0%, as required to comply with the TMDL;
 - TMDL-IPs have been approved by EPA with a 3-4% exceedance rate of the bacteria standard and retention ponds are not included; and
 - Work load will determine the number of projects completed within the allotted time.
- Table 4: “Control measures with estimated cost-share program and landowner costs” was reviewed and the following comments/suggestions were made:
 - Prescribed grazing includes rotational grazing, development of multiple pastures, alternative water sources/livestock ponds, etc. and is an individualized plan;
 - Change the CREP cost share category to read “50% + varied incentives;”
 - Change the SL-1 cost share category to read “75% + incentives;”
 - Change the Septic Tank System Installation/Replacement w/ Pump average unit cost to read “\$9,000;”
 - It was suggested that the footnote indicate that the cost share amount listed is the maximum allowed; and
 - It was noted that CREP is the most lucrative program available.

Residential Discussion Points

- Table 3: “Estimation of control measures with unit cost (average) needed to meet on-site sewage disposal system and pet waste bacteria load reductions” was reviewed and the following comments were made:
 - The Pamunkey Creek watershed in the Town of Orange may be the only with a public sewer option still available. It's possible the Gold Mine Creek area has the capacity, as well; however, it is not a cost effective option;
 - In response to an inquiry regarding the determination of on-site sewage treatment units needed, it was noted that these are estimates based on participation rates from other TMDL-IP areas and are open for discussion;
 - Discussion included whether or not the number of units should be based on what is needed versus what could be accomplished
 - Since every repair requires a pump-out, the total number of pump-outs should reflect this;
 - It was suggested that maintenance pump-outs for non-failing tanks be separated from the pump-outs required for failing tanks either in the chart itself as a separate designation, or by footnote;

- Repairs to a failing septic tanks will have a greater affect at reducing the bacteria exceedence rate versus pump outs; [Later part of this statement is not true because we do get a bacteria load reduction credit and a small nutrient reduction credit for pumpouts.]
- Attendees discussed including pump-outs in a separate category from repairs;
- The benefits of installing an access port to facilitate septic tank pumping were discussed;
- Along with access ports, filters can be added to reduce the frequency of pumping needed;
- Cost of installation of an access port is estimated at \$400-\$500;
 - As part of the TMDL-IP in Thumb Run watershed, post cards were mailed promoting a 50% cost share pump out program; it is uncertain if responses were tracked;
 - The Chesapeake Bay Program offers eligibility-based opportunities for pump outs;
 - The promotion of pet waste digesters and collection kiosks would be more successful in neighborhoods with HOAs;
 - HOAs can be identified by counties and targeted for educational programs;
 - Adjustments for the allotment of pet waste practices can be made as home density numbers are identified;
 - Attendees agreed that once introduced, pet waste management practices will continue to be implemented;
 - It was not known how pet waste compost residue is commonly handled;
 - Grants may be available for stormwater BMPs - \$15,000 an acre for bio-retention and \$12,000 an acre for infiltration. [What is the basis for this? We certainly don't have any cost-share for these stormwater practices. There may be some grants that have funded theses at these cist estimates.]
 - Possible funding sources include DCR's Water Quality Improvement Fund and the National Fish and Wildlife's small watershed grant;
 - Watersheds that have an approved TMDL-IP in place are received more favorably, as are areas that might be used as demonstration sites;
 - Mt. Zion Church on Harrison Road in Spotsylvania received a grant to assist with bio-retention.
 - A suggestion was made to include information on the impact of the practice of hydrofracing on existing wells and structures; [What is this and why is it relevant to this IP?]
- It was noted that there is an opportunity to revisit the TMDL-IP again in 5years to reassess the plan and its progress and adjustments, if needed.

Combined Considerations

- Table 5: "Targeted implementation stage for control measures installation" was reviewed and the following comments were made:
 - The purpose is to provide a timeline and prioritize goals and milestones;
 - Participants discussed the relative benefits of addressing those watersheds identified as needing the least number of practices (Beaver Creek and Plentiful Creek) to meet water quality goals versus those that are more seriously impaired;
 - Participants considered whether to apply different timelines to different counties and/or watersheds;
- The TMDL was developed to meet a 0% water quality standard exceedance rate ; [This is not exactly accurate.]
- The level of bacteria must be below the DEQ standard of 235 counts of colony forming *E. coli* bacteria per 100mL of water;

- Stage 1 focuses on reducing the bacteria level below the 10.5% exceedence rate that placed the stream segments on the impaired waters list;
- Stage 2 focuses on getting the bacteria level to a zero exceedence rate or as close as possible considering reasonable assurance based on costs and practicality of recommended BMPs
- It was recommended that the footnote include information explaining each reduction stage;
- Stages 1 and 2 can be divided in various ways and can include 10-15 year time line;
 - Examples - 12 years for Stage 1 and 3 years for Stage 2, or 5 years for Stage 1 and 5 years for Stage 2 with the determination of stages based on funding, staffing and project numbers;
- Soil and Water Conservation District contracts with DCR are issued every 2 years;
- It was noted that the Robinson River-Little Dark Run TMDL-IP has a 15 year timeline addressing bacteria, and the South River TMDL-IP has a 20 year timeline, but focuses on nutrients, sediments and bacteria;
- Attendees stated that one FTE (full time equivalent) technical assistant was not adequate to complete the proposed workload within a 10 year period;
- Attendees expect the Chesapeake Bay TMDL to influence the success of the local TMDL-IPs;
- Participants indicated that one advantage to a 10 year timeline is that it might provide more immediate opportunities for funding – if the Bay TMDL imposes regulations or offers funding sources, the locality would be "shovel ready;"
- A ten-year timeline, with all watersheds receiving equal attention, was agreed upon; eight years will be devoted to stage 1, with the remaining two years focused on stage 2. It was decided that the timeline would be for 10 years and that all watersheds would be the same.

Additional Comments

- Educational programs should focus on tangible improvements and practices - fencing, buffers, septic tanks repairs and replacements;
- Pet waste management information must be introduced strategically; there may be resistance to programs perceived as trivial or frivolous;
- Efforts should be made to educate high school students and get other stakeholders to assist with public education;
- There are a number of communities and interests - the lake, headwaters, homeowners and farmers;
- All stakeholders communicate:
- Suggested message- "Keeping the lake safe for swimming."

What's Next?

Upcoming meetings: ALL ARE WELCOME!

Second Agricultural and Residential Working Group

May 10, 2011, 6-8 PM

Jefferson-Madison Regional Library

881 Davis Highway, Mineral, VA

Steering Committee

June 7, 2011, 6-8 PM

Town of Orange Public Works Room

235 Warren Street, Orange, VA

Final Public Meeting

June 21, 2011, 6-8 PM

Town of Orange Public Works Room

235 Warren Street, Orange, VA

All meeting notes, maps and presentations, as well as the draft document, may be viewed online: http://www.rrregion.org/tmdl_york.html

Residential Working Group May 10, 2011 Meeting Summary

Jefferson-Madison Library; Louisa, VA

General Attendance (Agricultural and Residential Working Groups)

Jenny Biche', Rappahannock-Rapidan Regional Commission
Deirdre Clark, Rappahannock-Rapidan Regional Commission
Willie Gentry, Chair, Louisa County Board of Supervisor
Christopher Owens, Citizen
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
May Sligh, Department of Conservation and Recreation
Doug Smith, Citizen

Introduction and General Information Provided

- Attendees were welcomed and introductions were made. Attendees were provided with minutes from the last Public Meetings, Residential, Agricultural and Government Working Group Meetings, as well as various hand- outs on the Upper York River Watershed TMDL-IP. The material was reviewed and high-lights of each meeting were noted.
- After summarizing the previous meeting minutes, the following questions and comments were shared:
 - **Citizen is aware of a fencing contractor who charges \$3.25 per foot of installed 6 inch mesh fencing with one barb wire top strand in Louisa County. Mesh fencing is safer for horses, goats, etc. than tinsel wire.**
Staff will research to determine if mesh fencing meets the requirements for any cost share programs.
 - **When standards are being set, such as requirements for fencing type used in cost share programs, input should be collected from the public.**
Comment will be forwarded to the Department of Conservation and Recreation (DCR). The cost share programs factor in universal cost for an area when setting price standards.
 - **Have wetlands in Goldmine Creek helped improve the water quality? The wetlands have been expanded by the beaver population.**
Wetlands are a natural feature that helps improve water quality. The section of Goldmine Creek in the wetlands has not been placed on the Impaired Waters List, so bacteria levels there must be below the standard.
 - **Lake Anna Civic Association (LACA) has a monitoring station in the wetland area and their water testing has always demonstrated acceptable bacteria levels except after heavy rains.**
 - **Has wetland construction ever been used as a BMP in a TMDL-IP?**
The South River TMDL-IP recommended wetland construction as a BMP. Wetlands can be very expensive to construct, so is not typically an affordable option.
 - **Is there any data stating how much of an impact wetlands have on water quality improvement?**
The Department of Environmental Quality's (DEQ) website has the most up to date information available.

- **Terry's Run also has wetlands.**
- **It was suggested that the definition of the bacteria standard (235 E. coli colony forming units per 100 mL water) be put in terms that the general public can understand for the final public meeting. What does this mean to me? Unhealthy water that if swallowed can lead to illness, ear infection, etc.**
- **Will the TMDL-IP have the capacity to measure progress?**
Yes, part of the TMDL-IP includes phasing so that we can assess how much progress is being made. It also encourages the Department of Environmental Quality (DEQ) to commit resources to continue to monitor the stations.
- **Goldmine Creek has 8 tributaries. Has there been any research to determine whether one tributary is contributing more bacteria than the others?**
Yes. Thomas Jefferson Soil and Water Conservation District conducted a 2 month study examining all 8 tributaries to identify hot spots of bacteria. The project summary is available. It was funded through a Department of Conservation and Recreation mini-grant 3 years ago.
- **The information from that project summary would be useful to the Louisa County Board of Supervisors. It could be used as a template for how counties can address all the impaired watersheds.**
- **Why are the other rivers and creeks in Louisa County not being addressed in this TMDL-IP? Are they not impaired? Why is South Anna not included?**
The watersheds in this TMDL-IP only include the rivers and creeks identified as on the impaired waters list in the TMDL study completed by the Department of Environmental Quality (DEQ) in 2005. The remaining rivers and creeks may be included in a separate TMDL study. DEQ and DCR (Department of Conservation and Recreation) maintain a list of completed TMDL studies and address TMDL-IP's one at a time until they have completed the list. Louisa County Board of Supervisors may want encourage a TMDL-IP be started for South Anna.
- **There should be some coordination between this TMDL-IP and the Lake Anna Ecosystem Restoration Project the Army Corps of Engineers is overseeing.**
Staff agreed to learn more about this project and determine how it relates to the TMDL-IP.
- **What is the consensus regarding the EPA and the Chesapeake Bay TMDL initiatives? Is Virginia doing more than its fair share?**
The consensus appears to be that the states are hoping if there is a change in the administration in 2012, the Bay TMDL will go away. Law suites have already been filed. Virginia is not currently doing more than its fair share.
- **LACA is interested in funding a demonstration project in which they would partner with a farmer participating in the exclusion fencing cost share programs by covering the difference between the cost-share amount and the total needed. LACA hopes to demonstrate the benefits of the program and encourage more farmers to participate. LACA would monitor the water quality before, during and after the construction of the exclusion fence.**
If a farmer is chosen from an area identified by DEQ as being in the impaired watershed, the cost share could be as high as 85%. Success stories have been instrumental in increasing farmer participation in other watersheds. Grant funds may be available to match the money donated by the Lake Anna Civic Association.

- A pamphlet was distributed informing attendees of the “Restoration of the Chesapeake Bay and its Tributaries: A Working Seminar for Local Officials” meeting to be held on May 26, 2011 at the Hanover County Board of Supervisors Auditorium. All were encouraged to attend.
- **Steering Committee Meeting:**
 - Will be held on June 7, 2011, 6-8 PM, Town of Orange Public Works Community Room;
 - Representatives from the Agricultural, Residential and Government Working Groups will present summaries of issues discussed at respective meetings;
 - Byron Petrauskas, BRES, Inc., will present the draft TMDL-IP for review and comment; and
 - All interested are encouraged to participate and should contact Jenny Biche’ or Byron Petrauskas to indicate their intent.
- The **Final Public Meeting:**
 - Will be held on June 21, 2011, 6-8 PM, Town of Orange Public Works Community Room; and
 - Draft TMDL-IP will be presented for public comment.

Agricultural and Residential Working Groups

Attendees elected to remain as one combined working group and address both the Agricultural and Residential material.

Agricultural Discussion Points

- A summary of proposed practices, “Upper York River Basin Watershed Implementation Plan,” as prepared by BRES was distributed for review and comment:
- **Table 1:** “Existing livestock exclusion fencing and estimated exclusion fencing length needed in each impairment.” Questions and comments include the following:
 - Data was generated through aerial map analysis and then ground-truthed by the locality’s Soil and Water Conservation District. Their comments and edits will be incorporated and the table will be modified prior to the Steering Committee and final Public Meetings;
 - Table 1 includes all identified livestock operations and potential fencing needs;
- **Table 2:** “Estimation of control measures with unit cost (average) needed to meet pasture and cropland bacteria load reductions.” Questions and comments include the following:
 - Pasture management is an important factor in achieving reduction loads;
 - Retention ponds;
 - Listed as a catch-all if needed to get the exceedance rate down to 0% as required to comply with the TMDL;
 - TMDL-IPs have been approved by EPA with a 3-4% exceedance rate of the bacteria standard and retention ponds are not included;
 - At a cost of about \$2,000 per acre for retention ponds, costs for the TMDL-IP often doubles if retention ponds are needed;
 - The acreage needed for a retention ponds is determined by the amount of land that drains into it;
 - Retention ponds will not be implemented until the final year or two of Stage 2 and then, only if needed
 - Manure is incorporated into soil by either injection or using a disc, after which the land can be re-pastured; and
 - The amount of technical assistance required will reflect what can be funded.

Residential Discussion Points

- Table 3: “Estimation of control measures with unit cost (average) needed to meet on-site sewage disposal system and pet waste bacteria load reductions” was reviewed and the following comments made:
 - Eliminate the use of acronyms;
 - The "number of units needed" are estimates;
 - Pet waste management programs are often are viewed as unnecessary in rural areas;
- The Town of Orange has experienced a favorable response to signage and pet waste kiosks;
- Table 4: “Control measures with estimated cost-share program and landowner costs” was reviewed and the following comments made:
 - Byron Petrauskas, BRES, Inc. confirmed that cost-share amounts for septic tank repairs ranged from 50-75%. Cost share amounts for septic tank pump outs are 50%.
 - Connection to the public sewer system can cost up to \$20,000. The footnote reflects the fact that average unit costs can be higher.

Combined Agricultural & Residential Discussion Points

- Table 5: “Targeted implementation stage for control measures installation” was reviewed and the following comments made:
 - The purpose is to develop a timeline and prioritize goals and milestones;
 - Stage 1: Includes strategies to reduce the bacteria water quality standard exceedence rate to below 10.5% and remove the watershed from DEQ’s Impaired Waters List; and
 - Stage 2: Includes strategies to attain the TMDL’s goals and reduce the bacteria water quality standard to 0%.
 - It was suggested that initial efforts focus on strategies that have visible, tangible results, producing a high return for the investment such as;
 - Pet waste management education and outreach;
 - Exclusion fencing practices; and
 - Upland pasture management.
 - Attendees discussed the relative merits of focusing certain streams first:
 - Because Pamunkey Creek is well-known regionally and popular with real estate agents, it might present more opportunities for public education;
 - Among the streams included in the TMDL-IP, Terrys Run and Pamunkey Creek are more developed with a higher number of homes, more beaches and marinas, and more possibilities for citizen engagement; and
 - Gold Mine Creek should be among those streams addressed first because of the interest and support of the Town of Louisa;
 - Focusing first on Pamunkey Creek, Terrys Run and Gold Mine Creek could result in fairly significant reductions in a fairly short time if actions are initiated while funding is available. and funding will be available to get the work done;
 - Because of its characteristics – no big agricultural producers, mostly forested, and few residences – Plentiful Creek might be a good candidate for funding a study of wildlife bacteria loads versus human induced impacts.
 - Neither the Lake Anna Civic Assn., nor DEQ monitor flow volume into lake Anna; however, there apparently are models that simulate inflow;
 - The Soil and Water Conservation Districts can assist farmers individually to find the best cost share programs that will work for their needs - flexible options exist;
 - Staging issues and program balance can be addressed by the Steering Committee, as well;

What's Next?

Attendees were encouraged to participate as part of the Steering Committee by contacting Jenny Biche' or Byron Petrauskas before the schedule **Steering Committee Meeting** on June 7, 2011, 6 – 8 PM at the Town of Orange Public Works Community Room, Orange, VA. All meeting notes, maps and presentations, as well as the draft document, may be viewed on-line

http://www.rrregion.org/tmdl_york.html

The **Final Public Meeting** will be held on June 21, 2011, 6 – 8 PM at the Town of Orange Public Works Community Room in Orange, VA.

APPENDIX C

Governmental Working Group Meeting Notes

Governmental Working Group March 30, 2011 Meeting Summary

Town of Orange Public Works Building; Orange, VA

Attendance

Josh Bateman, Town of Orange
Dana Bayless, USDA Natural Resources Conservation Service
Diane Beyer, Tri-County/City Soil and Water Conservation District
Jenny Biche', Rappahannock-Rapidan Regional Commission
Deirdre Clark, Rappahannock-Rapidan Regional Commission
Katie Conaway, VA Dept. of Environmental Quality
Robert Dube', Louisa County Administrator
Lee Frame, Orange County Board of Supervisors
Thomas Graves, Orange County Farm Bureau
Willie Gentry, Chair, Louisa County Board of Supervisors
Courtney Lipski, Virginia Department of Health
Jim Miller, Orange County Farm Bureau
Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.
Jim Riddell, President, Louisa County Farm Bureau
Chip Russell, Virginia Department of Health
Scott Vogel, Louisa County Health Department
Greg Wichelns, Culpeper Soil and Water Conservation District
Ron Wisniewski, USDA Natural Resources Conservation Service
Gregg Zody, Orange County

Welcome

Attendees were welcomed and introductions were made. Participants were reminded of the TMDL Study approved in 2005 and the requirement for the TMDL-IP. Responsibilities of the Government Working Group were reviewed, as follows:

- Identify funding sources and technical resources currently available;
- Evaluate additional programs/technical resources that could enhance implementation;
- Identify lead agencies for agricultural and residential implementation;
- Identify regulatory controls currently in place that could promote water quality improvement efforts; and
- Discuss monitoring component.

Public Participation Opportunities

- The TMDL-IP process was reviewed and hand outs were provided;
- It was noted that the first public meetings were held on January 25, 2011 in Louisa and February 8, 2011 in Orange where the TMDL-IP was introduced and attendees had the opportunity to participate as members of either the Agricultural or Residential Working Group;
- The group was informed that comments captured and presentations from all meetings are available at www.rrregion.org/tmdl_york.html;

- Attendees were invited to join the Steering Committee which will be comprised of representatives of all three working groups, Government, Agricultural and Residential, as well as concerned citizens and agency representatives;
- The second Agricultural and Residential Working Group meeting will be held on May 3, 2011 at the Town of Orange Public Works Community Room from 6-8 P.M. Another meeting will be held in Louisa; however, the date and location have yet to be determined; and
- The Final Public Hearing, at which the Draft TMDL-IP will be presented for public comment, will be held in early June.

Overview of Practices / Programs

Attendees were provided with a handout entitled “Overview of Practices/Programs” and “Potential Funding Sources” that was reviewed collectively. The following comments and edits were made:

On-site Sewage Disposal Systems

- The average cost to serve a 3 bedroom, 2 bath house is estimated to be \$8,000 for a conventional system and \$20,000 for an alternative on-site sewage disposal system;
- The cost for a public sewer hook-up in Louisa County is estimated to be \$15-\$20,000 with sewer lines to the home at an additional cost;
- Of the localities represented, only the Town of Orange felt that there could be a need for new public sewer hook ups due to the present state of the housing development market;
- The Town of Orange has a new sewage treatment plant;
- More than 10% of alternative systems have been installed on smaller, subdivided lots;
- Louisa County identified Blue Ridge Shores as having a community sewage treatment system;
- Upgrades to failing systems, rather than replacements with new systems, can solve most problems;
- There is a 100% reserve requirement for new lots in all three counties;
- Septic system failures are more commonly associated with older homes;
- Alternative systems require annual maintenance contracts that have increased in cost from \$150 - \$200 a few years ago to up to \$400 currently;
- Based on soil types and Health Department experience within the region, all three counties estimate allocation of funds as follows:
 - 60% towards repairs,
 - 30% for replacement with conventional septic system, and
 - 10% for replacement with alternative on-site sewage disposal system;
- Culpeper Soil and Water Conservation District has seen more need for repair than replacement;
- Because of differences in requirements, the Health Department can make allowances for existing systems that it can't make for a new system;
- The TMDL study estimated failing septic tanks based on the age of structure, soil types, and location in relation to the floodplain;
- The model is used to identify areas where outreach and education is needed and to prioritize areas for funding areas;
- Local input is needed for ground-truthing.
- The Health Department cannot provide an inventory of failing septic tanks or straight pipes; the model is the best tool to use;
- Homeowners, especially in rural areas, may be reluctant to participate in cost share programs due to anti-government philosophies and unwillingness to disclose personal financial information;
- Success will be determined by the delivery of the outreach efforts;
- Funding must be secured and available before outreach is implemented;

- Positive experiences of program participants will be helpful in gaining additional participation;
- Efforts should be made to eliminate waiting lists - funds must be available and adjusted accordingly along the way;
- PDCs have had success implementing 50% cost share programs and are available to provide support;
- It was recommended that program funding be available on a bid basis to contractors (septic pump-out and repair, fencing installation, etc.) who can provide services to homeowners and farmers at discounted rates. This will circumvent concerns regarding dealing with government offices and may result in increased success;
- A measureable action plan is needed that includes a tracking system for all septic systems, including alternative systems – Albemarle's method could be used as a model;
- Education/ Outreach
 - Homeowners should be informed of pump out recommendations/requirements and cost share programs available for pump-outs and repairs;
 - Real estate agents in other localities have recommended that information on septic tanks (location, maintenance requirements, etc.) be included as part of required sale documents;
 - The Culpeper Soil and Water Conservation District has a model demonstrating how a septic tank system works that can be used for educational outreach to schools and homeowners;
 - The Extension Office has water testing and septic testing kits available; and
 - It has been demonstrated that educational outreach to children and youth is very effective in conveying information and influencing responsible behavior in parents.

Residential and Commercial Pet Waste

- DEQ identified pet waste as a bacteria source in every watershed listed in the TMDL. While bacteria source tracking was used in the TMDL study, emphasis is placed on an absence/presence finding;
- Fauquier County's "It's Your Doodie" pet waste management project includes installation of pet waste disposal stations along trails in parks and educational outreach materials such as flyers, brochures, magnets and bookmarks to encourage pet owners to clean up after their pets. A similar program could be replicated in each of the three counties;
- The Fauquier County SPCA has implemented several strategies to properly manage animal waste. Their facility could be used as a model for commercial and private kennels including hunt clubs and veterinary clinics;
- Grant funding could be sought to assist kennel owners to improve their facilities;
- Pet waste accounts for 5% or less of the bacteria load in rural areas; however, as might be expected, more urban areas have higher amounts;
- It was estimated that 20 pet waste digesters are needed for each impairment watershed;
- More precise dog counts might be derived by determining the number of dog licenses that have been issued;
- Spotsylvania County requires a kennel license for owners with a certain number of dogs;
- The Town of Orange has installed pet waste stations with grant funds through the Culpeper Soil and Water Conservation District; a reduction in the amount of pet waste left on sidewalks has been observed; and
- Education/outreach
 - Small grants may be used to develop and distribute educational material to the dog-owning public;
 - Homeowners' associations are effective in educating neighborhoods;
 - Localities can install waste collection kiosks with educational signage.

Stormwater Management

- Best management practices include use of vegetated buffers, bio-retention & infiltration trenches; and
- Additional practices recommended include rain gardens and retrofitting retention ponds. **Agriculture**
- Cost share programs include:
 - CREP
 - Requires exclusion fencing, installation of an alternative watering system, a 35 foot set-back, a treed buffer and a 10 year contract;
 - Farmers receive 50% cost share, an annual rental payment for the buffer, and an incentive payment that can increase the cost share percentage up to 90%;
 - Availability of funding and its non-competitive status makes CREP a popular program that is often the first alternative offered to farmers.
 - EQIP
 - Requires exclusion fencing with a 35 foot set back and provides incentive payments;
 - CBWI
 - Requires exclusion fencing with at 10 foot set back and provides incentive payments.
 - LE-1T and LE-2T
 - LE-1T offers 85% cost-share and LE-2T offers 50% cost-share;
 - Available only in areas with an approved TMDL-IP;
 - LE-1T requires a 35 foot set-back and LE-2T requires a 10 foot set-back;
- Reasons given for not participating in cost-share programs include:
 - Maintenance costs;
 - Loss of investment due to flooding;
 - Anti-government attitudes;
 - Fencing of feeder streams leading into main stream would eliminate majority of property;
 - Requirement of having to plant trees after having cleared property for pasture;
 - Loss of useable land due to set back requirements;
 - Farmers participating in some cost share programs have determined that other programs may be more costly than implementing the practices on their own;
- Program Observations/Comments
 - Tracking the success of cost-share programs is difficult because they may not be fully implemented as a system or are often hybrids of several programs;
 - EQIP data is hard to separate from CREP data;
 - Consideration should be given to increasing the percentage of funding allocation for the LE-2T program;
 - It was recommended that 95% of funding be allocated for CREP, EQIP, LE-1T and LE-2T and 5% be allocated for SL-6AT and WP-2T;
 - It was noted that feeder streams do not show up on USGS topo sheets;
 - Farmers may also consider combining cost share programs with conservation easements to receive additional tax incentives as offered through the Virginia Outdoors Foundation;
 - Only one dairy farm was identified in the watershed that did not have adequate storage;
 - Manure/Litter/Biosolids incorporation into soil can be difficult in some areas due to slopes and soil loss; and
 - Biosolids should be injected rather than worked into the soil with a disc.

Potential Funding Sources – See attached Actions Chart

- Attendees were asked to update/add to the Action Chart and submit to Deirdre Clark or May Sligh.
- The following changes were suggested:

- Under Residential Actions, include “installation/hook ups” for corrective actions for septic system failure and/or straight pipes with CDBG as a potential funding source;
- Under Residential Actions, change “local ordinance” to “state regulators” in the “corrective action” box and add “health department” in the “who will assist” box;
- Under Residential Actions, add “SWCD” in the “who will assist” box for the first 5 source issues listed on the action chart;
- Under Residential Actions, add “school groups” in the “who will assist” box; and
- Under Government Actions, change “local government” to “state mediators” in the “potential funding” box.

Proposed Responsibilities/Roles of Government Agencies in IP

- Soil and Water Conservation Districts, NRCS, Virginia Department of Health, VA Cooperative Extension, and VA Department of Forestry will provide technical assistance and information on funding options;

Regulatory Controls

- Spotsylvania County sends homeowners letters reminding them of the requirement to have their septic systems pumped every 5 years;
- State law requires any homeowner residing east of Interstate 95 to have their septic system pumped every 5 years; and
- An inquiry was made as to whether residents in an approved TMDL-IP area would be eligible for cost share programs if it is required by law to have their septic tanks pumped.

Monitoring During Implementation

Katie Conaway, DEQ, provided information on DEQ's monitoring program:

- DEQ is limited to monitoring where there is public access;
- DEQ will continue to monitor streams during implementation of plan and document progress;
- A request was made for DEQ to at least continue monitoring at TMDL listing stations;
- Citizen monitoring may be recommended in TMDL-IP - citizens may have access to areas that DEQ does not and their testing can be less expensive;
- While citizen monitoring can not be accepted by DEQ, the data can identify hot spots for further inspection by DEQ;
- Currently there are no citizen monitoring groups in the TMDL-IP region; however grants may be available to interested groups; and
- DEQ will provide training and assistance to citizen monitoring groups;
- Other
 - Thomas Jefferson SWCD conducted a study three years ago to pinpoint failing septic tanks. May Sligh will research their findings;
 - LACA completed Special Monitoring Plan in 2000 that included three counties to develop a WIP;
 - Louisa has a Shoreline Management Plan.

Next Steps

- Attendees were invited to attend the second Agricultural and Residential Working Group meetings. Meeting dates, times and locations will be listed at www.rrregion.org/tmdl_york.html;
- Attendees were asked to consider volunteering for the Steering Committee and to represent the Government Working Group by reporting on topics discussed

Participants will be notified of future meetings. Information about the project and meeting minutes may be accessed at http://www.rrregion.org/tmdl_york.html. Questions and comments are welcome.

APPENDIX D

Steering Committee Meeting Summary

Steering Committee June 7, 2011 Meeting Summary

Town of Orange Public Works Building; Orange, VA

Attendance

Josh Bateman, Director, Community Development, Town of Orange

Jenny Biche', Rappahannock-Rapidan Regional Commission

Jennifer Carlson, VA Department of Environmental Quality

Katie Conaway, VA Department of Environmental Quality

Lee Frame, Orange County BOS

Courtney Lipski, VA Department of Health

Allan Lassiter, Citizen

Etta Lucas, Tri-County/City Soil and Water Conservation District

Christopher Owens, Citizen

Byron Petrauskas, Blue Ridge Environmental Solutions, Inc.

Mary Radloff, Citizen

May Sligh, Department of Conservation and Recreation

Bob Slusser, Department of Conservation and Recreation

Doug Smith, Citizen

Richard Street, Spotsylvania County

Ron Wisniewski, USDA Natural Resources Conservation Service

Greg Wichelns, Culpeper Soil and Water Conservation District

Lindsay Woolfolk, Jr., Citizen

Erin Yancey, Thomas Jefferson Planning District Commission

Welcome and Introductions

Attendees were welcomed and introductions were made. Copies of reports to the Steering Committee from the agricultural, residential and government working groups, as well as a copy of the Action Chart were provided for review.

Working Group Reports

Residential Working Group Summary

Mr. Christopher Owens presented the Residential Working Group Report to the Steering Committee, noting the following:

- Louisa and Spotsylvania counties require permits for repairs to septic systems and require 100% reserve;
- Possible lake water intruding into ground water in both Louisa and Spotsylvania counties;
- Repairs to failing septic systems will have a greater effect at reducing the bacteria exceedence rate versus pump-outs;
- Education is needed to encourage voluntary compliance of Spotsylvania County's septic pump out ordinance, with regulation a last resort;
- Most owners of alternative and conventional septic systems are uninformed of mechanical function, costs and failure rates;
- To reach all property owners, include septic system information with tax assessments or any other county correspondence;

- Raise awareness that technical assistance is available, especially when VDH notifies a homeowner of a septic tank failure. Funding may be available;
- Recommend the definition of the bacteria standard (235 E.coli colony forming units per 100mL water) be put in terms that the general public can understand;
- The issue of specific soils being unsuitable for septic systems is addressed in the Louisa County Comprehensive Plan;
- Develop and implement public information campaigns on pet waste management;
- Seek funds to install kennel waste management program as pilot project and consider offering a “clean kennel” award; and
- Determine if coordination with the Army Corps of Engineers Lake Anna Ecosystem Restoration Project would be beneficial to the TMDL-IP process in terms of information gathered.

Comments following the presentation included:

- A colony forming unit (CFU) is a measure of the viable bacteria in a sample of water and is used to demonstrate the degree of bacterial contamination. A single bacterium or a clump of cells grow to become a colony. Colonies are counted and averaged per petri dish, which contains the medium to grow the bacteria. The bacteria standard used in determining these stream impairments was 235 cfu/100ml for an individual sample;
- Louisa County’s Comprehensive Plan soil type evaluation for septic system suitability can be a valuable tool to use in land use planning;
- Spotsylvania County sends flyers reminding homeowners to have their septic tanks pumped and requests a receipt confirming it has been done, however no one monitors if the homeowner complies. Spotsylvania County pays for the mailings and is required by the Chesapeake Bay Act to contact all homeowners having septic systems;
- No outreach is currently conducted targeting older homes with possible straight pipes. The Department of Health does educate homeowners when a site visit is conducted, such as in the case of a home addition to evaluate system capacity. However if an outside contractor provides the site visit, education is not often provided to the homeowner. Utilization of contractors will gradually eliminate the local knowledge of the Department of Health; and
- Loudon County can be a model for tracking and identifying failing septic tanks and straight pipes using GIS and real estate tax records to identify older homes. 9-1-1 systems provide a building footprint to determine street addresses so that a building layer can be compared to the septic system permit layer. Grant funding may be available to build the GIS data layer for better tracking of septic system maintenance. Madison County is currently doing a similar project through a Water Quality Improvement Fund grant.

Agricultural Working Group Summary

Mr. Greg Wichelns presented the Agricultural Working Group Report to the Steering Committee, noting the following:

- If a fence is constructed using cost-share funding and is destroyed due to a natural disaster such as a flood, it may be replaced one time if the disaster did not take place within the same year as the construction of the fence;
- With regard to cost-share programs, Farm Labor and Contractor Labor cost credit may vary depending on the county. Orange county credits farm and contractor labor equally. In Spotsylvania County, contractor labor receives a higher value than farm labor. It was recommended that farm labor and contractor labor be credited equally within the watershed. Cost estimates should be irrelevant of who does the work;

- While irrigation promotes using soil as a filter, it would not have a big enough impact on the bacteria load within the watershed and was therefore eliminated as a recommendation;
- There is a 50% cost share program available to horse owners for grazing paddocks with a \$15,000 cap. Horse owners are also eligible for cost-share for the LE-IT, LE2T and SL-6T practices at 50% up to 85% cost share. Some felt more should be done to assist and address the equine industry. For cattle, the issue is getting them out of the streams. For horses, the issue is waste management. Horse farmers need to focus on mud management while cattle farmers need to focus on pasture management. Cost share programs reflect this;
- Two Full Time Equivalent (FTE) technical assistants are recommended for the entire project area (between 3 SWCDs) to complete the 10 year implementation plan at a cost of approximately \$10 million; and
- Pasture management, not just exclusion fencing, is an important factor in achieving the reduction loads.

Comments following the presentation included:

- Meeting minutes from the February 8, 2011 meeting stated that District funding is limited. Greg Wichelns, Culpeper Soil and Water Conservation District argued that funding is higher than it has ever been through DCR's Water Quality Improvement Fund. Ron Wisniewski, USDA, Natural Resources Conservation Service, stated that generous funding has been approved this year too, but budget issues will dictate future funding level; and
- All three Soil and Water Conservation Districts have continually received applicants for cost-share programs.

Governmental Working Group Summary

Mr. Josh Bateman presented the Governmental Working Group Report to the Steering Committee noting the following:

- Based on soil types and Health Department experience within the region, all three counties estimate funds addressing septic systems for the Implementation Plan be allocated as follows:
 - 60% towards repairs
 - 30% for replacement, and
 - 10% for alternative waste treatment systems;
- A measureable action plan is needed that includes a tracking system for all septic systems, including alternative systems—Albemarle or Gloucester could be used as a model;
- Grant funding should be sought to assist kennel owners in improving their facilities. Information on grant opportunities can be shared as they become available;
- Additional Storm Water Management practices recommended for residential and urban development include rain gardens, retrofitting retention ponds, underground tension, LID, etc.;
- Homeowners should be informed of pump out recommendations/requirements and cost share programs available for pump-outs and repairs. GIS can be utilized to identify those homes that should be targeted and projects like the one in Goldmine Creek done by the Thomas Jefferson SWCD may help in determining hotspots; and
- The Extension Office has water testing and soil testing kits available. Citizen monitoring also exists throughout the region and could be expanded to these impaired streams.

Comments following the presentation included:

- Recommend construction of public sewer lines to the Orange Public Wastewater Treatment Plant;

- Director of Community Development for the Town of Orange, Josh Bateman, will provide Byron Petrauskas, Blue Ridge Environmental Solutions, Inc., with an estimate of the number of hooks ups available in the project area for the Town of Orange; and
- The Town of Orange invested \$24 million in a new wastewater treatment facility and could expand its capacity, especially to serve low to moderate income families who are eligible for higher cost share amount. Gravity sewer should be a priority rather than pump stations due to additional maintenance concerns.

Action Chart

- In an effort to allow enough time to critique the Draft TMDL Implementation Plan power point presentation, attendees were asked to review the Action Chart hand out and forward any questions or comments to May Sligh, Department of Conservation and Recreation, or Jenny Biche', Rappahannock-Rapidan Regional Commission before the public meeting on June 21, 2011 (contact information listed below).

Review of Presentation Prepared for Public Meeting

The power-point presentation prepared for the upcoming final public meeting was reviewed. Attendees were asked to provide feedback on the content as well as the presentation of information. Comments and recommendations were as follows:

- Hard copies of the maps presented in the slides are recommended for the public meeting;
- Include statement noting participation in the Agricultural Best Management Practices for the TMDL-IP is voluntary;
- It was recommended a Board of Supervisor from one of the three counties within the watershed inform audience on the differences between the local TMDL and the Chesapeake Bay TMDL;
- In the slide listing the bacteria sources, it was suggested percentages of each source be included, possibly a pie chart as a helpful visual to attendees;
- An explanation of the monitoring process should be done at a layman's level. The methodology should be explained. Department of Environmental Quality (DEQ) will provide hand outs with the information;
- Stress that bacteria is the only contaminant being address in the TMDL Implementation Plan and that it is a public health problem;
- Lake Anna is not impaired for bacteria and is not being address in the Upper York Watershed TMDL-IP. Only the six tributaries listed;
- Explain why bacteria is a problem;
- Protection of the shoreline around Lake Anna is not a focus of the Upper York Watershed TMDL-IP;
- Consider changing the title of the photo "land application" to "manure application";
- The TMDL-IP focuses on non-point sources of bacteria. Bio-solids are permitted and therefore are regulated by Department of Environmental Quality, NPDES, or National Pollution Discharge Elimination System permit;
- Bio-solids can be incorporated by disc-in on cropland, but not on pasture;
- Steering Committee chose to remove the suggestion that "bio-solids should be injected in" from the Agricultural Working Group Report recommendations because they are in dry form, unlike manure stored in a lagoon;
- Aerial maps showing the six tributaries (one map for each of the three counties) identifying where exclusion fencing is needed will be brought to the public meeting;
- Under "Implementation Actions," Cropland should remove "bio-solids;"

- Photos representing Reforestation would need to show a whole field being converted to accurately represent the SL-1 cost share program or if photo in slide is used, change the caption to “Stream Protection/Field Buffers;”
- Lake Anna Civic Association’s (LACA) offer to fund an exclusion fencing demonstration project can be mentioned but not included in the Action Chart;
- FR-4 cost share is not used often. Typically it is utilized when a non-farmer purchases a farm, but chooses not to be a farmer and converts it into a forest;
- Photo of home made pet waste compost photo should be removed;
- An inquiry was made as to whether or not more focus should be on storm water best management practices. The TMDL model focuses on failing septic tanks and pet waste. If all of the failing septic tanks are addressed and corrected, the remaining bacteria load is reduced through proper pet waste management. Not a lot of funds are allocated for storm water best management practices (bmps). Storm water bmps are more effective to remove nitrogen and phosphorus than bacteria;
- An inquiry was made as to whether or not to include wetlands as a possible storm water and/or agricultural bmp. It could be both, however it is very expensive--\$65,000 per acre. Development is used to drive the installation of an artificial wetland, but the last building permit issued was in 2003. It may be possible to secure funding for constructed wetlands to treat runoff;
- Construction of a new Lake Anna Nuclear Reactor in Spotsylvania County will raise the elevation of the lake by 3 inches and will create more wetlands. Permits are currently under consideration;
- The cost for 2 Full Time Equivalent (FTE) technical assistance position for 10 years will cost approximately \$1 million a year. Federal technical assistance staff is not included in the estimate but is also available;
- Under Funding Sources, separate Chesapeake Bay Watershed Initiative (CBWI) fund from EQIP fund;
- Please forward any information on Regional/Local/Private funding source to Byron Petrauskas, Blue Ridge Environmental Solutions, Inc. (contact info listed below);
- Change Residential Scenario example to 50% cost share at \$4,000;
- Under Contact Information, change Spotsylvania County address to 9019 and add Orange office number 540-672-1523 for Culpeper Soil and Water Conservation District Orange County office;
- The Focus Areas/Priorities should line up with the funding break down.
- An inquiry was made as to whether or not half of the money to implement the plan is spent on 10% of the problem. The Implementation Plan has two stages. Stage 1 will focus on Agriculture and on-site sewage. Stage two will focus on cropland and pet waste;
- The slide with photos of the pet waste composters should be changed so that there are 2 photos of pet waste composters, one of the rain garden, and one of a kennel; and
- Connection to public sewer availability in Louisa County should be included in the recommendations to allow for future grant opportunities.

Next Steps

Local newspapers will be provided a news release highlighting the upcoming public meeting to be held on June 21, 2011 at 6:00pm at the Town of Orange Public Works Community Room. Attendees were encouraged to invite others to attend. Fliers will be distributed throughout the watershed advertising the upcoming meeting.

APPENDIX E

Public Meetings Summary

January 25, 2011 Public Meeting Summary Louisa County Administration Building; Louisa, VA

Attendance (32 attendees signed in; 38 were present)

Tommy Barlow , Louisa Co. BOS	Mary Johnson , Citizen
Jenny Biche' , RRRC	Dale Jones , Citizen
William Biscoe , Citizen	Joyce Jones , Citizen
Jennifer Carlson , VA Dept. of Environmental Quality	Vernon Jones , Citizen
Deirdre Clark , RRRC	James Kean , Citizen
Raleigh Coleman , Thos. Jefferson SWCD	Charles Lunsford , VA DCR
William Coleman , Citizen	Patty Madison , Citizen
Katie Conaway , VA Dept. of Environmental Quality	Christopher Owens , Citizen
John Conway , Citizen	Byron Petrauskas , Blue Ridge Environmental Solutions
Carla Cunningham , Citizen	Helene Purcell , Citizen
Joe Cunningham , Citizen	Mary Radloff , Citizen
Dave Dudman , Citizen	May Sligh , VADCR
Donna Dudman , Citizen	Doug Smith , Citizen
James Foreman , Citizen	Richard Street , Spotsylvania County
Dora Foster , Citizen	Clorese Vaughn , Citizen
Jim Foster , Citizen	JB Vaughn , Citizen
Willie Gentry, Chair , Louisa Co. BOS	Larry Wallace , Southeast RCAP
Bobby Goodwin , Citizen	Bob Weiner , Citizen
Richard Havasy , Louisa Co. BOS	

Introduction

Deirdre Clark, Rappahannock-Rapidan Regional Commission, welcomed attendees and introduced Byron Petrauskas, Engineering Concepts, Inc., as well as Charles Lunsford and May Sligh, Virginia Department of Conservation and Recreation. DEQ Staff and Orange County Supervisors were introduced. Index cards were distributed for attendees to record their questions to be addressed after the presentations.

Chesapeake Bay and Upper York River Watershed TMDL-IPs-Differences and Similarities

Mr. Lunsford presented a brief overview of the differences and similarities between the Chesapeake Bay TMDL-IP and Upper York River Watershed TMDL-IP. The following points were noted:

- The Chesapeake Bay TMDL IP focuses on reducing the loads of nitrogen, phosphorus and sediment from contributing streams, while the objective of the Upper York River Watershed TMDL IP is reduction in bacteria;
- 70% of all streams listed on Virginia's Impaired Waters List are there because of unacceptable levels of bacteria;
- The Chesapeake Bay TMDL IP will include two year milestones that will have consequences mandated by EPA if reductions are not met; however, other than requirements associated with failing septic systems or straight pipes, the Upper York River Watershed TMDL IP will not include any mandates or penalties;
- The Implementation Plan will serve as a guide to reduce the bacteria load in the streams – there are no consequences associated with failure to follow the plan;

- The development of the TMDL-Implementation Plan will result in eligibility for federal and state grants and other funding opportunities;
- The Chesapeake Bay TMDL IP focuses on reducing nitrogen, phosphorus and sediment while the goal of the Upper York River Watershed TMDL IP is to reduce the bacteria as identified in the TMDL study;
- 70% of all streams listed on Virginia's Impaired Waters List are listed due to unacceptable levels of bacteria;
- The development of a TMDL Implementation Plan for listed streams is required by Virginia law.

Upper York River Watershed TMDL IP Development

Through the use of a power-point presentation, copies of which were provided to attendees, Byron Petrauskas reviewed the findings of the Upper York River Watershed TMDL. The goals, and the process, of developing the implementation plan were reviewed. May Sligh, Virginia Department of Conservation and Recreation, provided a detailed summary of the public participation process and the respective roles of the agricultural, residential and government working groups. In addition, the proposed timeline was presented. Attendees were informed that all materials related to this initiative will be available at http://www.rrregion.org/tmdl_york.html. Copies will be mailed upon request.

Attendees were invited to participate in the entire TMDL-IP process and encouraged to invite others who might be interested. It was noted that because of the geographic extend of the area addressed by this TMDL-IP, a second public meeting is scheduled for January 26, 2011 at 7 PM at the Orange Public Works Building in the Town of Orange. Attendees were cautioned to consult weather forecasts and the R-RRC website for possible re-scheduling

Questions, Comments and Summary

Before proceeding to the next agenda item, addressing questions submitted by attendees, Mr. Willie Gentry, Chair, Louisa County Board of Supervisors, requested a few minutes to read a resolution, dated November 15, 2010, of the Louisa County Board of Supervisors regarding the Chesapeake Bay TMDL. The following points were made:

- The Louisa County Board of Supervisors, including those members present - Mr. Havasy, Mr. Barlow and himself – oppose the requirements imposed on local government by the Chesapeake Bay TMDL;
- As perceived, the Upper York Watershed TMDL-IP is not a local, Louisa County plan;
- The present meeting was the first time the Louisa County BOS heard of the Upper York River Watershed TMDL-IP or of any funding opportunities available to support associated BMPs;
- The requirements of the Chesapeake Bay TMDL cannot be met without significant federal funding.

Index cards with written questions from attendees were collected. Questions were read and responses were provided by Katie Conaway, Charles Lunsford, Byron Petrauskas, May Sligh and Deirdre Clark:

How were failing septic systems quantified in the TMDL study and were other studies, such as the Army Corps of Engineers study at Lake Anna, included?

The TMDL study provides the initial count of failing septic systems based on census data, age of homes, proximity to streams, etc. to determine the likelihood of failing septic systems and identification of straight pipes. The TMDL-IP process allows for local input and an opportunity to create strategies to identify failing septic systems and straight pipes and solve the issue. Examples of strategies include

educational outreach, stream walks and canoeing down rivers to identify and locate systems, etc. There was no knowledge of the COE Lake Anna Ecosystem Restoration Study. The TMDL study is based on the specific tributaries listed.

Do the Bacteria Sources include the impact from new development? Can we limit new development to prevent new septic system installation?

Louisa County requires a 100 foot buffer. Spotsylvania County follows the Chesapeake Bay recommendations. The TMDL-IP will not address new development - that would need to be done at a county level.

How does the application of bio-solids (sludge) impact water quality?

Bio-solids are regulated by DEQ and require a permit for each county. Anyone distributing bio-solids must apply for a permit, which DEQ monitors and regulates.

The Government doesn't seem to have a problem with large metropolitan cities dumping their waste in rural communities, but when a rural county like Louisa dumps theirs, they get fined.

All discharges in excess of the permitted amounts are subject to fines. Bio-solid applications are regulated and monitored. Violations of required application and containment procedures are subject to legal action.

Who does the TMDL-IP study?

The consultant, Blue Ridge Environmental Solutions, Inc., with input from the community, will provide the background work and draft the plan. Tools will include the original TMDL study, GIS data of the area, land use information, data provided by the SWCDs, water quality models, etc.

Who pays for the consultant?

Taxpayers. The consultant was selected through a competitive bid process.

What is the normal bacteria/sediment level in its natural state?

Wildlife is considered as part of the overall bacteria load. You can have hot spots if, for example, geese concentrations result in elevated bacteria levels, but wild life is a background load. The TMDL-IP intent is to look at human sources first. If wildlife is a problem, there are government agencies that can assist to address the problem. This TMDL-IP addresses bacteria only. It doesn't address sediment; however, reductions in one area often result in reductions in others.

Can you explain the slide in the power point presentation that addresses how to get a stream de-listed?

The percentages shown are the percentages needed to get the stream off the impaired waters list for each source. For example, all straight pipes are illegal, therefore 100% of the straight pipes need to be eliminated to get the bacteria level from human sources below the standard and the stream off the impaired list.

Is the TMDL-IP for all drainages or just the impaired stream?

The TMDL-IP includes the entire watershed.

Will every farmer have to come up with a plan to give to DCR, whether they have the impaired stream running through their property or not? Will DCR require a nutrient plan for each farmer? I participated in the Storm water Plan, which came before the TMDL, and the projects in 2006-2007 were approved by VDOT, Soil Water and Conservation Districts and the County, but DCR would not come out and review them. Afterwards, DCR wouldn't approve them even though the other agencies had. If we make a TMDL-IP, who reviews it?

TMDL-IPs are watershed plans, which include all the land in the watershed, but not at a farm by farm scale. Soil and Water Conservation Districts will provide information on BMPs and cost share programs and can help develop conservation plans for individual farms. The TMDL-IP is not at that scale.

The DCR stormwater inspection form has a category for the TMDL on it.

If you are participating in storm water planning, then yes, there will be a TMDL component to it.

Is the run off pollutant from livestock, pets and farmers illegal? If so, what enforcement is there? No, if the run-off is due to a natural rain event, it is not illegal. If you are deliberately directing a pollutant into a stream, such as a hunt kennel operator hosing down kennel waste directly into a stream, then yes, that is illegal. The Health Department would address straight pipe issue, while DEQ deals with direct stream deposition. Agricultural issues are handled by VDACS.

What does VDACS stand for?

Virginia Department of Agriculture and Consumer Services. It is complaint driven and is part of the Agricultural Stewardship Act.

Is there any danger to kids swimming in Goldmine Creek?

There is that possibility. The reason for the TMDL-IP and the purpose of this meeting is because the waters listed do not meet the state standards to be safe for recreational use. It is risk based, and the Health Department can tell you more.

Why has there never been a study on how many people got sick from swimming in the impaired water? Statistics are needed; information on where, when and how many people got sick. The CDC may keep those records. The standard is taken from an EPA study and is based on 8 out of 1,000 people who would get sick. A scientific study was completed to arrive at the standard. Often sicknesses go unreported, but the Health Department might know.

Although not all written questions had been answered, it was decided to break out into the two working groups so that there might be adequate time for discussion within those groups. Those whose questions hadn't been addressed were encouraged to bring them up in the group discussions.

Video: Streamside Livestock Exclusion-Everybody Wins

Due to time constraints, the video was not shown to allow more time for public participation in the Agricultural and Residential Working Group sessions.

Break-Out Session for Working Groups

Attendees were invited to participate in one of two working groups – Agricultural or Residential

What's Next?

Attendees were thanked for their participation and encouraged to forward any comments or questions to Deirdre Clark, May Sligh or Byron Petrauskas. They were reminded that there will be additional opportunities to participate in the TMDL-IP process and encouraged to view all meeting notes, maps and presentations on R-RRC's website at http://www.rrregion.org/tmdl_york.html. All were reminded of the second public meeting scheduled for 7PM, January 26 in the Town of Orange Public Works Building.

February 8, 2011 Public Meeting Summary

Town of Orange Public Works Building; Orange, VA

Attendance (37 attendees signed in; 42 were present)

Bart Almond, Citizen
Josh Bateman, Town of Orange
Jenny Biche', RRRC
Cynthia Bowman, Citizen
Gracie Hart Brooks, Orange County Review
Deirdre Clark, RRRC
Bernard Courtney, Citizen
Doug Crain, Citizen
Stephanie DeNicola, Culpeper SWCD
Thomas Graves, Citizen, Orange County Farm Bureau
K. Green, Citizen
Charles Lunsford, VADCR
Janice Mayhugh, Eastern View High School
Doug Mayhugh, Citizen
Bob McConnell, Citizen
Don Ober, Citizen
Raymond Orndorf, Citizen
Chris Owens, Citizen
Timothy Pent, Citizen

Byron Petrauskas, Blue Ridge Environmental Solutions
Cody Phelps, Eastern View High School
Alison Rau, Piedmont Environmental Council
David Rogers, Citizen
Richela Rosales, Eastern View High School
Chip Russell, VA Dept. of Health
Monk Sanford, Citizen
May Sligh, VADCR
Bob Slusser, VADCR
Jimmy Stevens, Citizen
Debbie Switzer, VADCR
Gary Switzer, VA Dept. of Health
Richard Street, Spotsylvania County
Bryant Thomas, VADEQ
Greg Wichelns, Culpeper SWCD
Michael Willis, Citizen
Ron Wisniewski, NRCS
Lindsay Woolfolk, Citizen

Introduction

- Joshua Bateman, Director of Community Development, Town of Orange, welcomed attendees. Staff was introduced and hand outs were provided to attendees.
- Stephanie DeNicola, Education Specialist, Culpeper Soil and Water Conservation District, introduced Eastern View High School's Envirothon Team and coaches and informed the public they were there to observe. Envirothon students will be focusing on the Chesapeake Bay TMDL study in their competition.
- Index cards were distributed to capture attendee's questions to be addressed after the presentations.

Upper York River Watershed TMDL IP Development

Through the use of a power-point presentation, copies of which were provided to attendees, Byron Petrauskas reviewed the findings of the Upper York River Watershed TMDL. The goals, and the process, of developing the implementation plan were reviewed. May Sligh, Virginia Department of Conservation and Recreation, provided a detailed summary of the public participation process, the respective roles of the agricultural, residential and government working groups and the proposed timeline. Attendees were informed that all materials related to this initiative will be available at http://www.rrregion.org/tmdl_york.html. Copies will be mailed upon request.

Attendees were invited to participate in the entire TMDL-IP process and encouraged to invite others who might be interested. It was noted that because of the geographic extent of the area addressed by this TMDL-IP, another public meeting had been held in Louisa on January 25, 2011. Notes from all meetings will be posted on the R-RRC website as soon as they become available.

Questions, Comments and Summary

Index cards with written questions from attendees were collected. In response to the questions, the following information was provided by a panel made up of Charles Lunsford, Byron Petrauskas, May Sligh, Bryant Thomas, Greg Wichelns, Bob Slusser and Deirdre Clark.

Can the model (one used in TMDL Study) be revised and can testing be done to specify the source of the bacteria?

The question was clarified to ask whether the model could be re-run because the model predicts concentrations well over measured bacteria levels.

A model is a tool we use to try to understand and replicate conditions observed. We use the model in the TMDL study to make prediction. When we take a sample, we send it to the lab and the lab reports the bacteria levels as colony forming units per 100 ml of water. Samples with higher concentrations need to be diluted in order to count the bacteria colonies. The more dilutions you perform, the higher you are able to quantify a sample. The bacteria standard is 235 colonies per 100mL of water. That is what we measure and compare against. We don't need to quantify values into the thousands if we are concerned with exceedances of 235 cfu/100 ml. So, we may perform only a limited number of dilutions which can effectively cap our analytical results. Also, the more dilutions, the more it costs. However, models aren't capped; they may make predictions well over our measures. The model can be run if we need it to.

Are the growth projections based on building permits? For Plentiful Creek, the last building permit was issued in 2003. If this guideline is set by the model, you may need to tweak it.

The growth factor is typically derived from U.S. Census data or the county's comprehensive plan.

The estimate is way off on population. Many of the dwelling units are not livable, although perhaps they have straight pipes.

New development has an estimated 3% failure rate. As might be expected, older homes are greater contributors. The new census can provide new population data, although those numbers affect sediments and nutrients more so than bacteria levels.

Can you specify the sources of the bacteria?

Can it be done? Yes, and it has been done during the TMDL study through bacteria source tracking, but there are no plans to have it done now. The bacteria source tracking identified human, wildlife, livestock and pets, but did not identify specific species (geese, deer, etc.).

How often should you have your septic tank pumped?

Typically septic tanks should be pumped every 5 years, as recommended by the Health Department. However, it depends on the load. If 2 people live in the house, it may need to be pumped every 7-10

years. If 8 people live in the house, it may need to be pumped every 6 months to one year. The state code is every 3-5 years and ordinances generally state every 5 years.

Are there any cost share programs available to install new or alternative septic tank systems? *There are grant programs available to help with cost share. Culpeper Soil & Water Conservation District has cost share programs funded by the TMDL program. There are four different programs available that provide 50% cost share: pump outs, repairs, replacements and alternative systems. The maximum allowed for each are: \$150 for pump outs, \$3,000 for repairs, and \$4,000 for replacements and \$10,000 for alternative systems. 75% cost share is available for low income families. Cost share is also available for hook up.*

How do you identify where the straight pipes are?

We can provide more details in the residential working group meeting. Although it varies by community, in the past straight pipes have been identified through stream walks, canoeing and complaints.

Will the TMDL-IP coordinate with the Army Corps of Engineers?

If the Army Corps of Engineers is looking at bacteria in the same streams, then yes, we will collaborate with them.

What part of the TMDL-IP is required by law?

Straight pipes are illegal. Direct discharge into a stream is illegal. Failing septic tanks are illegal. All recommended agricultural practices are voluntary. The Agricultural Stewardship Act allows citizens to file complaints against a farmer for doing something they feel is detrimental to the environment. The Virginia Dept. of Agriculture and Consumer Services (VDACS) oversees that. However, anything found in the TMDL study or through the TMDL-IP process is not reported to VDACS. So any straight pipe, failing septic or direct discharge will be addressed by law, however everything else is voluntary.

What financial burden is there to the locality for technical assistance with the TMDL-IP?

There is none. Currently, state and federal funds are available for technical assistance.

Break-Out Session for Working Groups

Attendees were invited to participate in one of two working groups – Agricultural or Residential

What's Next?

Attendees were thanked for their participation and encouraged to forward any comments or questions to Deirdre Clark, May Sligh or Byron Petrauskas. They were reminded that there will be additional opportunities to participate in the TMDL-IP process and encouraged to view all meeting notes, maps and presentations on R-RRC's website at http://www.rrregion.org/tmdl_york.html.

June 21, 2011 Public Meeting Summary

Town of Orange Public Works Building; Orange, VA

Attendance

Shannon Abbs, Orange County BOS

Jenny Biche', Rappahannock-Rapidan Regional Commission

Cynthia Bowman, United States Department of Agriculture Farm Service Agency

Ken Brooks, Citizen

Raleigh Coleman, Thomas Jefferson Soil and Water Conservation District

Katie Conaway, VA Dept. of Environmental Quality

Courtney Lipski, VA Dept. of Health

Etta Lucas, Tri-City/County Soil and Water Conservation District

Charles Lunsford, VA Dept. of Conservation and Recreation

Christopher Owens, Citizen

Byron Petrauskas, Blue Ridge Environmental Solutions

Ken Remmers, Citizen

Chip Russell, VA Dept. Of Health

Alyson Sappington, Thomas Jefferson Soil and Water Conservation District

May Sligh, VA Dept. of Conservation and Recreation

Bob Slusser, VA Dept. of Conservation and Recreation

Richard Street, Spotsylvania County

Greg Wichelns, Culpeper Soil and Water Conservation District

Linda Wilson, Citizen

Greg Zody, Orange County Director of Planning and Zoning

Introduction

Attendees were asked to sign in, hand outs were distributed, and index cards were provided for attendees to write their questions and comments during the presentations. Attendees were informed that the cards would be collected after the presentations and addressed during the Question/Comment section of the agenda. Orange County Board of Supervisor Lee Frame and Spotsylvania County Senior Environmental Engineer Richard Street provided welcoming remarks including:

- The need and importance of communication of the implementation plan to friends, family, neighbors and colleagues;
- Spotsylvania County is taking a proactive approach to degradation of water quality due to unauthorized activity;
- Seasonal homeowners in Spotsylvania County continue to be a communication challenge getting educational information to them with regard to proper fertilization timeframes and techniques;

Upper York River Watershed TMDL IP Development

Through the use of a power-point presentation, copies of which were provided to attendees, Mr. Petrauskas reviewed:

- Explanation of TMDL, definition of terms, phases of the TMDL-IP process and steps necessary to develop a water quality improvement plan;
- Explanation of the various working groups, bacteria sources quantified in TMDL, strategies included in the TMDL-IP and a timeline was provided;

- Implementation actions including the identification of control measures, quantification of technical assistance needed, estimation of costs and determination of benefits;
- Measureable goals and milestones; stakeholders and possible funding sources;
- Examples of control measures; and
- Examples of agricultural and residential estimated funding scenarios.

Next steps:

- 30-day comment period ends July 21, 2011;
- USEPA review and approval of implementation plan;
- VADEQ review and approval of the proposed implementation plan;
- Continued encouragement of participation in cost-share programs offered through Culpeper Soil and Water, Tri-City/County Soil and Water and Thomas Jefferson Soil and Water Conservation Districts and the Virginia Department of Health.

Upper Hazel TMDL-IP Plan: A Project in Process

Greg Wichelns, Culpeper Soil and Water Conservation District provided an overview of the Upper Hazel River TMDL implementation project, noting the following:

- The project began in June 2009;
- Culpeper Soil and Water Conservation District (CSWCD) provides technical assistance and information about residential and agricultural cost-share programs and funding sources available;
- Additional federal funding due to the Chesapeake Bay Watershed Incentive allowed for more flexible cost share options as well as an increase in cost share amounts for the Upper Hazel Watershed;
- DCR hired a consultant was hired to assist with marketing the Best Management Practices (BMPs) by surveying farmers. As a result, recommendations were to have better communication with producers and more flexibility with programs to increase participation;
- The TMDL-IP allowed homeowners in Rappahannock County to take advantage of cost share programs which enabled them to locate, maintain, repair, replace and/or install on-site sewage disposal systems. It was very successful from the start;
- In the two original years utilizing a county sponsored grant, the total cost of the septic projects was \$250,000 with a breakdown of:
 - 72 pump outs
 - 34 repairs
 - 23 new systems
- Since the Upper Hazel Implementation project started, an additional 33 projects have been contracted at an estimated cost of \$110,000;
- The TMDL-IP has brought in a lot of money for the local economy through the use of local contractors and supplies. Local contractors have been instrumental in outreach efforts of the cost-share programs;
- Madison County has secured a Water Quality Improvement Fund (WQIF) grant to address residential issues in their Robinson River Little Dark Run TMDL-IP;
- Tracking success of cost share programs on the Agricultural side is a bit more challenging since it is often not a stand alone program. In the last 2 years it is estimated that 3.2 miles of stream exclusion fencing has been installed and 1,000 livestock have been excluded. There are currently 17 completed projects and 6 under construction;
- Part of the success of the Upper Hazel TMDL implementation is due to the long established relationships CSWCD and Natural Resources Conservation Service (NRCS) staff has had with the

community. Staff has over 20-30 years experience with long standing farms that had been handed down from generation to generation;

- The best outreach tool for the Agricultural cost share programs has been word of mouth, however CSWCD has utilized newsletters, held workshops, etc. in addition to contractor referrals; and
- To date the district is not aware of anyone who is sorry they signed up and implemented either their residential

Cost-Share Programs: Local Farmer Experiences

Andrew Oliver, Orange County Farmer and owner of Custom Harvester Farm, gave an overview of his experience participating in the cost-share programs. Mr. Oliver is the 2007 recipient of the Clean Water Farm Award and the York River Grand Basin Award. His testimony included the following remarks:

- To the Oliver family, it's important to take care of the quality of the water, regardless of whether or not a TMDL is in place;
- Cost-share programs can be a little restrictive at times, due to set back requirements, and each farm must be addressed individually. A one size fits all concept will not be successful in implementation. Flexibility will decide whether or not people will participate; and
- Education is key to participation. Money isn't always the incentive needed to get buy in. Explaining the benefits and showing people how things can be done better can help increase participation.

Questions / Comments

Index cards containing written questions and comments from attendees were collected and addressed. The following information was provided by a panel made up of Charles Lunsford, Byron Petrauskas, May Sligh, Katie Conaway, and Greg Wichelns who addressed the public's questions and comments:

The streams should be removed from the Impaired Waters List after Stage I is complete. How long after Stage I is complete are they removed from the list?

DEQ will continue to monitor the streams during the TMDL-IP. Data is analyzed every two years. As soon as the bacteria level is viewed as below the standard, the stream will be removed from the Impaired Waters list.

Why does the bacteria level have to be reduced to zero? Why must there be a Stage II?

The TMDL-IP focuses on delisting the streams from the Impaired Waters List which requires the violation rate not exceed the 235 colony forming units per 100 mL of water standard no more than 10% of the time in each stream. The TMDL bacteria allocations are based on a zero percent violation rate of the standard.

Are the maps showing the overlay of the stream network identifying specific areas for livestock exclusion available for viewing?

Yes. We have them here tonight if you would like to see them, and they are available on line if you would like them sent to to you.

What counties have mandatory septic system pumping requirements?

Spotsylvania County.

DEQ should state that citizen monitoring through Lake Anna Civic Association (LACA) was used in compilation of data.

LACA's data was used for Lake Anna's information, but not for the six tributaries address in the Upper York River Basin TMDL-IP.

How many samples were taken before the streams were listed as impaired?

Beaver Creek, Mountain Run, Pamunkey Creek, Plentiful Creek and Terry's Run were initially placed on the Impaired Waters List in 1998. Goldmine Creek was initially placed on the list in 2004. DEQ has different sampling techniques and schedules, but at the minimum samples are taken every other month for two years, yielding 12 samples. Monitoring continues after placement on the Impaired Waters List, and as of the last cycle, all 6 tributaries still exceed the standard for bacteria.

Thomas Jefferson Soil and Water Conservation District (TJSWCD) had to go outside Goldmine Creek to find any failing septic systems. No straight pipes were found in the watershed. Where will the money for correcting straight pipes go if none are identified and the money is not used?

TJSWCD was restricted to public access areas when trying to locate straight pipes, therefore it is not accurate to say that there are no straight pipes in Goldmine Creek. Getting the public to come forward and admit they have a straight pipe and take advantage of the cost share programs is a challenge. Many fear the Health Department will fine them and make them pay for repairs they cannot afford. People are cautious of the government. In the Upper Hazel TMDL-IP Project, communication and education of the cost share programs by local, long term staff helped ease homeowner's fears.

In the power point slide that shows the measureable goals and milestones, will the 49% cumulative bacteria reduction needed in milestone 4 reach the goal of less than 10.5% exceedence rate?

Yes.

What's Next?

Attendees were thanked for their participation and informed that comments will be accepted through July 21, 2011. Contact information was provided. All meeting notes, maps and presentations, as well as the draft document, may be viewed on-line at http://www.rrregion.org/tmdl_york.html. Hard copies may be requested and mailed as well.

APPENDIX F

Public Comments Summary

Public Written Comments on Final Draft Upper York River Basin Bacteria TMDL Implementation Plan

Comments from Allen Lassiter

We would still like to explore with you (or is it the DEQ folks?) is why the other creeks on North Anna, Pamunkey and Foremost are not included in this TMDL. Is it because they don't have bacteria, were not tested or some other reason(s)? We are trying to finalize our comments and those issues persist. Also, discussion has come up about the South Anna River and the Little River. Are they included in some other TMDL....or are they not impaired?

Response to Allen Lassiter from May Sligh, VADCR

The reason we included the 6 streams in this IP was because they were all included in the EPA approved TMDL study back in 2005. We must have an approved TMDL study before developing the IP. It provides us with the data we need to determine the best mix of BMPs for the watershed. And of course, we need the TMDL to evaluate what it will take to get them to meet water quality standards. Here is the link for the reports that show what TMDL reports have been approved (10 in the York): <https://www.deq.virginia.gov/TMDLDataSearch/ReportSearch.aspx>

You'll notice that the Pamunkey River TMDL study includes the S Anna. All I can say is I hope we can get to this one soon, but of course hard to tell because of funding. I have had other inquiries about the South Anna too, and as we have so much interest there is better likelihood for that study to move into implementation sooner than perhaps some of the others in the York basin. As to your inquiries about other upper York impairments. While I did not see Foremost listed, the others you mention are on the impaired waters list for a variety of parameters: e-coli, benthic, mercury, pH, DO. It is best to go to the DEQ website to find more about the particular reaches of these stream impairments. Here is the link for the impaired waters in each basin, the 2010 305(b) report: http://www.deq.virginia.gov/wqa/pdf/2010ir/ir10_Pt3_Ch3.3a_Category5_List.pdf

I hope this helps you both. To get the latest on Water Quality monitoring for any of these streams, I know you guys know to go to DEQ directly. They can also provide greater detail on the TMDL study development plans. Surely Katie Conaway or Jennifer Carlson can help you out with that.

Comments from Doug Smith and Response by May Sligh, VADCR

Dear Mr. Smith,

Thank you for your July 19, 2011 comments regarding the Upper York TMDL Implementation Plan. I have addressed each of your comments below.

1. *LACA supports the development of a plan to implement improvements in water quality of streams entering Lake Anna.* DCR appreciates the support of LACA and all stakeholders in the development of this plan to improve water quality in these watersheds.
2. *The draft plan is well done and sufficient to begin implementation.* DCR appreciates the confidence of LACA in moving forward with implementation efforts and we look forward to working with LACA and other stakeholders to ensure that milestones are met throughout the implementation process.
3. *We appreciate the effort that has gone into the plan so far – especially the process of public involvement.* DCR, with the assistance of the Rappahannock Regional Commission staff, felt the need to expand out normal meeting efforts for this IP due to the large, multi-county area. While we'd always like to see greater numbers of individual attendance at these meetings, we were pleased with the commitment of those who made significant efforts to attend most of the meetings, bringing creative ideas and approaches to the plan development.
4. *We think the 10 year time frame is reasonable.* DCR, along with the Steering Committee, will assess progress, and revisit the plan to determine if adjustments in corrective actions and implementation strategies are needed.
5. *We are concerned about the dependence on volunteer actions regarding livestock exclusion. The agribusiness folks we have talked with are reluctant to participate, even with 85% funding. Their view is that they are losing pasture and its costing them 15% - a lose/lose. We suggest:*
 - a. *That LACA and other community organizations fund the other 15% or attempt to raise the funds to do so.* DCR was pleased to learn of the LACA offer during the plan development and agrees that this could add to the encouragement of some farmers where it might be quite difficult to meet their portion of a BMP installation. We look forward to working with LACA to determine farmer assistance needs in the Upper York TMDL IP watersheds, and where possible in evaluating other funding possibilities to supplement BMP installation.
 - b. *To encourage volunteers in this watershed, more in terms of education and promotion will be required than is in the current plan. The plan should be revised to reflect additional promotion/education.* DCR has incorporated agricultural and residential educational programs into the document, with the expectation that a variety of groups will come forward and develop partnerships to address some of the specific tasks (see Table 9 and 10). As funding to carry out these programs is sought, greater detail will become necessary. Opportunities to reach new volunteers in the area will be a key component for educational workshops.
6. *We do not understand the absence of Christopher Run and Duckinhole Creek, and other significant streams in the watershed. If this is because they have been tested and determined to meet standard then the plan should so indicate. If they simply have been omitted or not tested, they should be tested and added if they fail to meet standard. The current plan should at least indicate that additional testing may be required and the plan may be revised if needed to include other creeks flowing into the watershed.* Both Christopher Creek and Duckinghoe Creek (Louisa) were listed as impaired for bacteria since the 2005 TMDL report, so they were not included in

this plan. Christopher Creek is listed as impaired for bacteria now and a TMDL will need to be developed.

7. *Upper York clearly includes South Anna and Little Rivers. Please clarify in the document why they are not included in this TMDL.* The reason DCR included the 6 streams in this IP was because they were all included in the same TMDL study completed in 2005. We must have an approved TMDL study before developing the IP (see page 1 of the Executive Summary). It provides us with the data we need to determine the best mix of BMPs for the watershed. We also need the TMDL to evaluate what it will take to meet water quality standards. In an earlier e-mail, I provided you with the link for the reports that show what TMDL reports have been approved to date (10 in the York):

<https://www.deq.virginia.gov/TMDLDataSearch/ReportSearch.aspx>

The Pamunkey River TMDL study includes the South Anna. DCR will begin future TMDL IP development as funding allows, and since there have been other inquiries about the South Anna there may be a better likelihood for that study to move into implementation sooner than perhaps some of the others in the York basin.

We also appreciate the additional comment you provided by e-mail on 7/20/2011 concerning the incidence of biosolids applications in the Goldmine Creek watershed during the last 3 years. Although you since realized that the document you referred to was actually the 2005 TMDL study, we will make every effort clarify biosolids references in the IP document once we obtain more information from the Biosolids staff at DEQ.

Thank you for providing the detailed comments regarding the Upper York TMDL Implementation Plan and for providing assistance during the development of the document. We look forward to working further with you and LACA on efforts to clean up streams in the Upper York Watershed.

Sincerely,

May Sligh
TMDL/Watershed Field Coordinator