Occohannock Creek

TMDL-Implementation Plan

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

This Implementation Plan (IP) is a companion document to the report, "Total Maximum Daily Load (TMDL) Report for Shellfish Areas Listed Due to Bacteria Contamination – Occohannock Creek,"(DEQ 2006). The TMDL Study set allocations to limit bacteria pollutant loads discharged to the Occohannock Creek watershed to levels that were modeled to achieve compliance with the state water quality criteria for bacteria for shellfish waters. This IP bridges the gap between those specified pollutant load allocations and actual reductions in bacteria counts by recommending a set of actions to be taken in the watershed during a fifteen year project timeframe.

State and Federal Requirements

Two sets of regulatory requirements for the development of TMDL IPs are applicable in the state of Virginia.

- Virginia Water Quality Monitoring, Information and Restoration Act of 1997 (WQ MIRA)

- §303(d) of the Federal Water Pollution Control Act of 1972 commonly known as the Clean Water Act (CWA)

WQMIRA requires the State to develop reports assessing water quality of state waters, to provide data to develop programs addressing water quality impairments, to develop TMDLs and to develop IPs. CWA strives "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The inception of the federal TMDL program is found in section 303(d) of that legislation.

1.2 Review of the TMDL

As a result of monthly monitoring conducted by the Virginia Department of Health's Division of Shellfish Sanitation (DSS), the Virginia Department of Environmental Quality (DEQ) listed sections of Occohannock Creek as impaired on Virginia's Section 303(d) list for being unable to attain the criteria for the production of edible and marketable natural resources due to elevated levels of fecal coliform bacteria. The criteria are in place to protect the public from health effects associated with the consumption of bacteriologically contaminated shellfish.

A TMDL study completed by DEQ in January 2006, examined the watershed characteristics and the sources of fecal coliform to the bays. Using monthly monitoring data, bacterial source tracking (BST), and a tidal volumetric model, DEQ assigned maximum allowable loads to each source in the watersheds in order to bring Occohannock Creek into compliance with the water quality standard for shellfish propagation.

Table 1-1: TMDL Reduction in Fecal Coliform Loadings from Existing Conditions

Growing Area	Wildlife	Human	Pets	Livestock	Total
Occohannock Creek	67%	100%	100%	100%	86.6%

The core of this IP is a set of actions to reduce the levels of fecal coliform bacteria. The actions chiefly target bacteria from human and pet ("anthropogenic") sources. This reflects the staged implementation recommended by the Virginia Department of Environmental Quality and referenced in the TMDL Study.

1.3 Public Participation

Two public meetings were held in the watershed to engage the public in the development of the TMDL Implementation. A steering committee composed of representatives from Accomack County, Northampton County, the Accomack-Northampton Planning District Commission (A-NPDC), state agencies, and local environmental groups was formed to guide development of the TMDL IP.

1.4 Implementation Actions

The management actions outlined in this IP capitalize on existing and planned programs and efforts within the watershed and will be implemented in three phases. Phase I actions are those that have already been initiated or are scheduled for completion within five years. Phase II activities are those that are planned for implementation within the next five years but may not have approved funding sources yet. Phase III actions may require regulatory changes, but they may be implemented as necessary if Phase I and Phase II actions do not significantly improve water quality within the study area. All management actions were divided into the following management categories:

- Agriculture Control Measures
- Residential Control Measures
- Additional Control Measures

1.5 Associated Costs and Benefits

The primary benefit of the implementation of the management actions described in this IP is the reduction of bacteria levels in the Occohannock Creek. The programs and actions contained within this IP will serve to reduce the anthropogenic sources of bacteria. MapTech Inc estimated costs for management categories using knowledge of current program costs and best professional judgment.

1.6 Measurable Goals and Milestones

The goal of the TMDL Report is to bring the impaired water segments within the Occohannock watershed into compliance with the water quality standard for bacteria in shellfish waters. Once the water segment achieves compliance with the bacteria criteria, then the segment can be removed from the 303(d) Impaired Waters List. Throughout the ten-year project timeframe, DSS will continue its monthly monitoring of stations. Project progress will be tracked throughout the timeframe of the implementation plan, and the effectiveness of the management actions proposed in this IP will be evaluated at the end of five, ten, and fifteen years.

1.7 Stakeholders Roles and Responsibilities

Stakeholders are individuals who live or have land management responsibilities in the watershed, including government agencies, businesses, private individuals and special interest groups. Stakeholder participation and support is essential for achieving the goals of this TMDL effort. Stakeholders for this project were identified at the beginning of IP development and invited to sit on the Steering Committee for the project.

1.8 Potential Funding Sources

One of the objectives of this TMDL Implementation Plan is to maximize utilization of existing programs and resources to achieve the goal of reducing bacteria levels. In general, funding for these programs and the management actions described in this IP will come from four sources:

- Locality funds
- Private / nonprofit funds
- Virginia State funds
- Federal funds

2.0 INTRODUCTION

2.1 Purpose, Scope, and Timeframe

This Implementation Plan (IP) is a companion document to the report, "Total Maximum Daily Load (TMDL) Report for Shellfish Areas Listed Due to Bacteria Contamination – Occohannock Creek," completed by the Virginia Department of Environmental Quality (DEQ) in January 2006, which will henceforth be referred to as the TMDL Study. The IP creates a framework to achieve the reductions in bacteria counts recommended in the TMDL Study. The core of this IP is the set of actions presented in Section 7 intended to reduce the levels of fecal coliform. The goal of the IP is compliance with the Commonwealth of Virginia water quality standard for bacteria for shellfish waters. This

IP follows the State guidance for TMDL implementation plans published by DEQ. This TMDL and Implementation Plan are the first of many to be completed within the jurisdiction of Accomack and Northampton Counties. It is the intention that this document will serve as a framework for TMDL Implementation Plans that will be completed in the future.

The TMDL study that was approved by the US Environmental Protection Agency (USEPA) in June 2006 examined the watersheds, their characteristics, and the sources of fecal coliform. Using monthly monitoring data, bacterial source tracking (BST), and a tidal volumetric model, DEQ was able to assign maximum allowable loads to each source in the watersheds in order to bring Occohannock Creek into compliance with the water quality standard. This IP outlines a strategy and the proposed actions to reduce anthropogenic loading of bacteria to the level set forth in the TMDL study in order to comply with the water quality standard for fecal coliform for shellfish waters. These actions are expected to be completed within a ten to fifteen year timeframe.

The pollutant reductions will be implemented in a staged fashion. Staged implementation is an iterative process that first addresses those sources with the largest impact on water quality. During the implementation of the stage 1 scenario, all controllable sources will be reduced to the maximum extent practicable using an iterative approach. DEQ will re-assess water quality data collected by the Virginia Department of Health, Division of Shellfish Sanitation (DSS) during and subsequent to the implementation of the stage 1 scenario to determine if the water quality standard is attained.

Stage I actions are those that have already been initiated or are scheduled for completion within five years. Phase II actions may be implemented as necessary if Stage I actions do not significantly improve water quality within the study area.

The TMDL may be reevaluated by DEQ after implementation of Stage I management actions or if new information on water quality or hydrodynamics becomes available. Only DEQ can revise a TMDL.

In some water bodies for which TMDLs have been developed, water quality modeling indicates that even after removal of all bacteria sources (other than wildlife), the water body will not attain standards under all flow regimes at all times. As is the case for the Occohannock Creek, these water bodies may not be able to attain standards without some reduction in wildlife load. Virginia and EPA are not proposing the elimination of wildlife to allow for the attainment of water quality standards. While managing over populations of wildlife remains as a limited option to local stakeholders, the reduction of wildlife or changing of a natural background condition is not the intended goal of a TMDL. If water quality standards are not being met after implementation of Stage I management actions, then it may be determined through a Use Attainability Analysis (UAA) that shellfish propagation is not a viable use for the Creek.

2.2 Regulatory Background

Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for water bodies which are exceeding water quality standards. TMDLs represent the total pollutant loading that a water body can receive without violating water quality standards. Water quality standards are numeric or narrative limits on pollutants that are developed to ensure the protection of human health and aquatic life. The TMDL process establishes the allowable loading of pollutants for a water body based on the relationship between pollution sources and in-stream water quality conditions. By following the TMDL process, states can establish water quality based controls to reduce pollution from both point and non-point sources to restore and maintain the quality of their water resources (EPA 1991).

In accordance with Federal regulations at 40 CFR § 130.7, a TMDL must comply with the following requirements: (1) designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality), (7) consider reasonable assurance that the TMDL can be met, (8) be subject to public participation.

Once a TMDL is developed and approved by EPA, measures must be taken to reduce pollution levels in the stream. These measures, which can include the use of better treatment technology and the installation of best management practices (BMPs), are implemented in a staged process that is described along with specific BMPs in the IP. In general, the Commonwealth intends for the pollutant reductions to be implemented in a staged fashion. Staged implementation is an iterative process that first addresses those sources with the largest impact on water quality.

2.3 Designated Use and Water Quality Standard

According to Virginia Water Quality Standards (9 VAC 25-260-5), the term "water quality standards means provisions of state or federal law which consist of a designated use or uses for the waters of the Commonwealth and water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water and serve the purposes of the State Water Control Law (§62.1-44.2 et seq. of the Code of Virginia) and the federal Clean Water Act (33 USC §1251 et seq.)."

According to Virginia Water Quality Standards (9 VAC 25-260-10A), "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 be reasonably expected to inhabit them; wildlife; and the production of edible and marketable natural resources (e.g., fish and shellfish)."

For a shellfish supporting water body to be in compliance with Virginia's bacteria standards for the production of edible and marketable natural resources use, DEQ specifies the following criteria (9VAC 25-260-160): "In all open ocean or estuarine waters capable of propagating shellfish or in specific areas where public or leased private shellfish beds are present, and including those waters on which condemnation or restriction classifications are established by the State Department of Health the following criteria for fecal coliform bacteria shall apply; The geometric mean fecal coliform value for a sampling station shall not exceed an MPN (most probable number) of 14 per 100 milliliters. The 90th percentile shall not exceed an MPN of 43 for a 5 tube, 3 dilution test or 49 for a 3 tube, 3 dilution test"

The impairment for Occohannock Creek is based on restrictions placed upon the harvesting of shellfish from these waters. The restrictions, which are issued by the Virginia Department of Health's Division of Shellfish Sanitation (DSS), are based on monthly monitoring data. DSS collects monthly fecal coliform bacteria samples from each of its sampling stations. DSS calculates geometric mean and 90th percentile concentration values based on the most recent 30-months of sampling data.

2.4 TMDL Efforts

Several segments have been restricted pursuant to Title 28.2 Chapter 8, sections 228.2-803, 228.2-808, 32.1-20 and 9-6.14:4.1 B16 of the Code of Virginia by the Virginia Department of Health, Division of Shellfish Sanitation (VDH-DSS). Notice and Description of Shellfish Condemnation Area 084-043, Occohannock Creek describes and delineates harvest areas that are restricted because water quality monitoring data show excessive levels of bacteria in these waters. The waters also were classified as impaired on the state's 303(d) list of impaired waters and require a TMDL.

In response to Section 303(d) of the CWA, the Virginia Department of Environmental Quality (DEQ) listed Occohannock Creek as impaired on Virginia's Section 303(d) list for being unable to attain the criteria for the production of edible and marketable natural resources due to elevated levels of fecal coliform bacteria. The criteria are in place to protect the public from health affects associated with the consumption of bacteriologically contaminated shellfish.

A TMDL study for the Occohannock Creek was completed by DEQ in January 2006 and approved by the US Environmental Protection Agency (USEPA) in June 2006. The TMDL study examined the watersheds, their characteristics, and the sources of fecal coliform throughout the watersheds. Using monthly monitoring data, bacterial source tracking (BST), and a tidal volumetric model, DEQ assigned maximum allowable loads to each source in the watersheds in order to bring the Creek into compliance with the water quality standard for shellfish propagation.

2.5 Occohannock Watershed

The Occohannock Watershed is located within Accomack and Northampton Counties on the Eastern Shore of Virginia. The watershed drains into the Chesapeake Bay and is subject to the ebb and flow of the tides. It was determined based on consultation with the Virginia Department of Conservation and Recreation and the Eastern Shore Soil and Water Conservation District that the land use used in developing the TMDL was inaccurate. Most of the land classified as pasture was in fact cropland. MapTech conducted a revision of the land use and presented the results in the November 2007 Technical Advisory Committee (TAC) meeting, which were approved during that meeting. MapTech followed the following procedure in determining the current land use in the watershed.

Land use was obtained from multiple sources.

1. The total watershed size was obtained from delineating watershed boundary upstream of the lower end of the area of interest.
2. ***Water*** size was obtained from NHD waterbody class.
3. ***Cropland*** size was obtained from USDA Common Land Use polygons.
4. Pasture was estimated based on correspondence with DCR, ESSWCD. Land mis-classified as pasture in the MRLC data was transferred mostly to crop land.
5. The remaining land uses, namely Barren, Residential, Forest, and Wetlands were adjusted proportionally to match the total drainage area.

This procedure resulted in the following land use acreage provided in Table 1 and Figure 1.

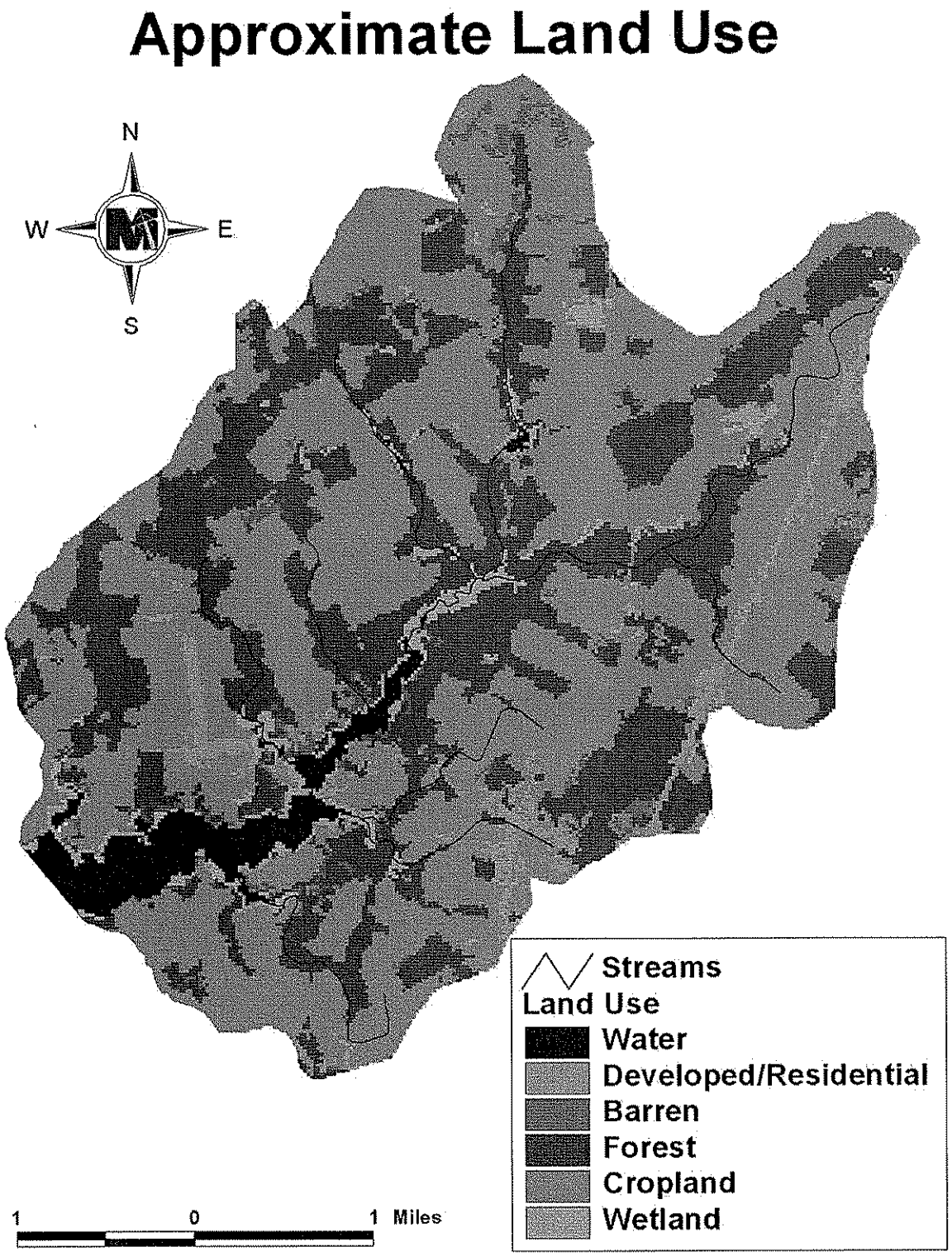

Figure 1. Approximate land use of the area of interest within Occohannock Creek watershed.

Table 1. Land use acreage within area of interest.

Land Use	Acreage	Percentage
Barren	273.2	2.6%
Cropland	4,593.3	44.5%
Residential	389.3	3.8%
Forest	4,188.8	40.5%
Pasture	50.0	0.5%
Water	429.0	4.2%
Wetland	406.6	3.9%
Total	***10,330.2***	

3.0 STATE AND FEDERAL REQUIREMENTS

3.1 Background

There are two sets of regulatory requirements for the development of TMDL Implementation Plans (IPs) in the Commonwealth of Virginia.

- Virginia Water Quality Monitoring, Information and Restoration Act of 1997 (WQ MIRA)
- §303(d) of the Federal Water Pollution Control Act of 1972 commonly known as the Clean Water Act (CWA)

3.2 State Requirements

The TMDL Implementation Plan is a requirement of Virginia's 1997 Water Quality Monitoring, Information, and Restoration Act (§62.1-44.19:4 through 19:8 of the Code of Virginia), or WQMIRA. WQMIRA directs the Virginia Department of Environmental Quality (DEQ) to "develop and implement a plan to achieve fully supporting status for impaired waters." In order for Implementation Plans to be approved by the Commonwealth, they must include the following:

- Date of expected achievement of water quality objectives;
- Measurable goals;
- Necessary corrective actions;
- Associated costs, benefits, and environmental impact of addressing the impairment.

3.3 Federal Requirements

Section 303(d) of the CWA and current EPA regulations do not require the development of implementation strategies. EPA 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:

- A description of the implementation actions and management measures,
- A time line for implementing these measures,
- Legal or regulatory controls,
- The time required to attain water quality standards, and
- A monitoring plan and milestones for attaining water quality standards.

3.4 Federal Consent Decree

The Commonwealth of Virginia was a signatory to the June 11, 1999 consent decree settling federal case no. 98-979-A "American Canoe Association, Inc. and the American Littoral Society v. USEPA and USEPA – Region III." By signing the consent decree, Virginia committed to develop TMDL studies by 2010 for all Virginia water segments listed on the 1998 303(d) Impaired Waters list.

4.0 REVIEW OF TMDL DEVELOPMENT

4.1 Description of Impairment

The impaired section of Occohannock Creek dealt with throughout this report includes the following sections of Occohannock Creek:

Downstream End: just below the confluence of Shields Cove and Occohannock Creek

Upstream End: headwater of the tidal section of Occohannock Creek

4.2 Description of Water Quality Monitoring

Based on the TMDL, the water quality monitoring network consists of 15 monitoring stations which were monitored by the VDH-DSS for fecal bacteria. The period of monitoring examined in the TMDL study was from 1995 through August 2003. Table 2 summarizes the water quality data. Data from all stations within the condemnation area were averaged for the purpose of the TMDL study.

For this shellfish impairment, two water quality standards are applicable. The first is a 30-month geometric mean standard of 14 MPN/100ml. The second standard is a 30-month 90th percentile concentration of 49 MPN/100ml.

Table 2. Water quality data used in the TMDL within the area of interest.

Station ID	Condemnation Area	# of Observations	Geometric Mean	90Th Percentile
84-10		178	10.3	45.1
84-11	43	179	15.9	108.1
84-12	43	179	19.0	150.0
84-13	43	179	35.4	316.1

4.3 Description of Water Quality Modeling

The TMDL was developed using a steady-state tidal prism model since the modeled segment is tidal and subjected to mixing of water through ebb and flood tides. This modeling approach accounts for tidally induced transport, fresh water input, and the decay of bacteria through the use of a constant first order decay rate.

4.4 Description of Sources Considered

Nonpoint sources of bacteria were considered in Study. Nonpoint source pollutants originate from multiple sources over a relatively large area, and can be divided into source activities related to either land or water use including failing septic tanks, improper animal-keeping practices, forest practices, and urban and rural runoff. The 2007 Virginia Department of Heath, Department of Shellfish Sanitation (DSS) Shoreline Sanitary Survey was reviewed and information obtained from the survey was discussed during the November 2007 TAC meeting. Virginia Department of Health personnel in the area are currently working on correcting all issues raised in the survey report. Any pertinent information within the survey was used in determining populations of contributing bacteria sources. During the development of the TMDL, no actual bacteria loading were estimated from each contributing source. Rather, the bacteria concentrations in the tidal section were estimated from monitored water quality data.

In the implementation phase of this study, a comprehensive source assessment was conducted and bacteria loads were estimated based on populations and bacteria content within each source. Table 3 shows the sources of bacteria reflecting the existing conditions within the area of interest for 2007. These populations were presented and during the November 2007 TAC meeting and were refined based on discussion during the meeting and follow up correspondence. The "Miscellaneous Wildlife" source was added based on the November 2007 Technical Advisory Committee) TAC meeting to account for wildlife species not estimated in this study.

Table 3. Water quality data used in the TMDL that falls within the area of interest.

Bacteria Source	Populations within Area of Interest
Human:	
Human population	1,906
Housing Units	796
Houses with Failing septic systems	80
Houses with Pit Privies	30
Livestock:	
Sheep	8
Horses	15
Hogs	2
Poultry Litter (ton/yr)	500
Pets:	
Dogs	459
Cats	527
Wildlife:	
Deer	750
Turkey	50
Raccoon	422
Muskrat	1,000
Duck	150
Geese	300
Miscellaneous Wildlife	20% of total wildlife load

4.4.1 Non-Point Source Contributions

Non-point source contributions to the bacterial levels result from both anthropogenic and natural sources. Potential human activities, which may contribute to the bacterial pollution, include failing septic systems and their associated drain fields, improper pet waste disposal practices, and sheet flow runoff from lawns and cropland. Natural sources include the abundance of migratory and resident species of birds along with the natural wildlife populations, which occupy the watershed area.

The latest DSS Shoreline Sanitary Survey for this area was completed in May 2007 and identified 32 on site deficiencies related to septic systems. There are 9 additional septic systems noted in the potential pollution sections. The shoreline survey also noted the existence of several pipes of unknown origin without discharge that may also be sources of pollution.

5.0 PUBLIC PARTICIPATION

An essential step in implementing a TMDL is the input from a broad range of individuals, agencies, organizations and businesses because of their interest and familiarity with local water quality needs and conditions. Public participation facilitates dialogue between local stakeholders and government agencies to commit resources to TMDL implementation, such as funding and technical support. Community members are best suited to identify and resolve sources of water quality problems. In order to engage the public in the development of the TMDL Implementation Plan, two public meetings were held in July 2007 and March 2008. Accomack and Northampton Counties, other state and local agencies, members of the public and community groups all took part in the public meeting. Representatives of these groups were selected to be on the plan Steering Committee. The Steering Committee met on August 9, 2007, September 13, 2007, November 8, 2007 and February 14, 2008. Members of the Steering Committee included:

- Accomack County – Departments of Planning, Public Works
- Northampton County – Department of Planning
- Accomack-Northampton Planning District Commission
- Virginia Department of Environmental Quality – Water Division
- Virginia Department of Conservation and Recreation
- Virginia Department of Health – Local, Shellfish Sanitation
- Virginia Department of Transportation
- Virginia Institute of Marine Science
- Accomack County Extension
- Northampton County Extension
- Virginia Department of Agriculture and Consumer Services
- Eastern Shore Shorekeeper
- Virginia Tech Agriculture Experiment Station
- Eastern Shore Soil and Water Conservation District

6.0 IMPLEMENTATION OPTIONS

Implementation of this TMDL will contribute to the on going water quality improvement efforts aimed at restoring water quality in the Chesapeake Bay. In general, reduction strategies will be implemented in a staged process that first addresses sources with the largest impact on water quality. Implementation will focus on reducing bacterial contamination due to wildlife, humans, and pets.

6.1 Identifying Implementation Actions

The quantity of control measures recommended during implementation was determined through spatial analyses, evaluating alternative implementation scenarios, as well as requests from TAC members. Spatial analyses included the processing of data that included land use, census data, and stream networks. The map layers and source data were combined to establish the number of control measures recommended overall in the watershed. Estimates of the amount of on–site treatment systems and the quantities of additional control measures were determined through evaluating alternative scenarios and applying the related reduction efficiencies to their associated loads.

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, as implementation proceeds. One potential for additional sources of the pollutants identified is future residential development. Care should be taken to monitor development and its impacts on water quality. Where residential development occurs there is more potential for pet waste, failing septic systems, and leaking sewer pipes.

6.1.1 Agriculture Control Measures

Land–based Best Management Practices (BMPs) are required to meet the final bacteria reductions. The estimated type and quantity of agricultural BMPs are shown in Table 10.

Waste storage facilities (WP–4) can range from dairy lagoons to simple waste sheds for composting equine manure. It is estimated that the area of interest within Occohannock Creek watershed will need several sheds for waste storage including one for sheep, one for hog, and three for horses. A larger storage facility is required for poultry litter storage. Two additional storage sheds are needed for composting waste for horses as well as a larger facility for composting poultry litter (Table 10).

Retention ponds were also required to treat flow from 50 acres of pasture, 4,364 acres of cropland not receiving poultry litter application, and 230 acres of cropland receiving poultry litter application. Retention ponds are stormwater facilities that include a permanent pool of water in which runoff during storm events may be temporarily stored above the permanent pool.

Management practices were grouped into two stages. Stage I consists of the first 6 years of implementation whereas Stage I consists of the following four years. Retention ponds required for all land uses were recommended for Stage II due to the loss of land expected from such control measures. All other control measures were recommended for Stage I.

Table 4. Estimated agricultural land–based BMPs.

Control Measure	Unit	Amount	Implementation Stage
Waste Storage Facility (WP–4) – Horse	System	2	Stage I
Waste Storage Facility (WP–4) – Hog	System	1	Stage I
Waste Storage Facility (WP–4) – Sheep	System	1	Stage I
Waste Storage Facility (WP–4) – Poultry	System	1	Stage I
Waste Storage Facility for composting – Horse	System	3	Stage I
Waste Storage Facility for composting – Poultry	System	1	Stage I
Pilot Stormwater Management Program	Program	1	Stage I
Retention Feature(s) - Pasture	Acres–Treated	50	Stage II
Retention Feature(s) – Cropland	Acres–Treated	4,594	Stage II

6.1.2 Residential Control Measures

BMPs to Correct Failing Septic Systems and Pit Privies

All pit privies and failing septic systems must be identified and corrected during implementation due to the strict TMDL requirements and the legality of these human waste disposal problems. The estimated number of failing septic systems (212) and pit privies (63) were updated since the TMDL was completed by using U.S. Census data for the study area.

Several BMPs were identified to correct failing septic systems and pit privies. As for failing septic systems, two BMPs were identified including septic system repairs and new septic system installation. It was estimated that 75% of the failing septic systems would be corrected with conventional septic system installation and 25% would be septic repairs. Houses on pit privies were assumed to have no indoor-plumping and, are therefore in need of indoor-plumping in addition to installing a septic system. Septic system pump-outs were also included for systems that are not failing as a preventative measure. A total of 100 pump-outs were recommended for the duration of the implementation plan. The BMPs discussed in this section are summarized in Table 11.

Table 5. Estimated residential waste treatment systems for the area of interest

Control Measure	Number of Systems	Implementation Stage
Septic Systems Pump–out (RB–1)	100	Stage I
Septic System Repair (RB–3)	18	Stage I
Septic System Installation/Replacement (RB–4)	62	Stage I
Indoor-plumping plus Septic System Installation	30	Stage I

Residential Land–Based BMPs

In order to meet the overall reduction required in the TMDL, all the BMPs in Table 12 should be implemented. However, a staged approach to implementation will be planned. In addition to these control measures, it was recognized that educational efforts are vital to the successful implementation of this plan. Education should include a pet litter program to educate pet owners on the benefits of cleaning up after their pet through education materials, signage in public areas that encourage proper disposal of waste, and pet waste disposal stations in public areas. The Occohannock Creek watershed offers some opportunities to implement these actions at residential areas, boat docking stations, convenience stores, parks, and anywhere travelers stop to walk their dogs.

Pet waste composters are small plastic bins buried in a yard for a place to dispose of pet waste. The pet waste will break down, or compost, in the bin. The compost can be placed on flowerbeds, but should not be used on plants grown from human consumption (vegetable gardens).

Septic tank pump–outs will benefit water quality by preventing failing septic systems. Retention ponds on residential areas are recommended in the final stage of implementation if after implementing all practices in the first stage does not achieve water quality standards.

Table 6. Recommended Residential land–based BMPs

Residential Control Measure Description	**Unit**	**Number of Units**	**Implementation Stage**
Pet Litter Education Program	Program	1	Stage I
Pet Waste Composter	Number	250	Stage I
Pilot Stormwater Management Program	Program	1	Stage I
Retention Feature – Residential	Acres - Treated	389	Stage II

6.1.3 Additional Control Measures

The TAC identified wildlife sources as a major source of the impairments in the creek. Additional BMPs were needed to meet the strict reduction requirements set forth in the TMDL (86.6% overall). Retention features were needed to treat 273 acres of barren land as well as 3,895 acres of forested land (Table 13). The TMDL does not call for a reduction in wildlife populations but the TAC has added Wildlife Management Control Actions to the plan. Implementing practices such as retention features on certain land uses may lower wildlife bacteria contributions but could also increase wildlife bacteria contributions if the feature attracts wildlife such as geese. The TAC identified a Pilot Stormwater Management Program to evaluate the type of retention feature that would reduce bacteria contributions from wildlife. These practices are part of Stage II, and should be implemented after evaluating impact of Stage I control measures on water quality.

Table 7. Additional Recommended BMPs

Residential Control Measure Description	Unit	Number of Units	Implementation Stage
Wildlife Control Actions	Program	1	Stage I
Pilot Stormwater Management Program	Program	1	Stage I
Retention Feature – Barren	Acres - Treated	273	Stage II
Retention Feature – Forest	Acres - Treated	3,895	Stage II

6.2 Implementation Costs and Benefits

The cost of control measures was based on experience, literature review, and communication with the Accomack-Northampton Planning District Commission. Table 14 summarizes the cost of all control measures recommended in this study.

Table 8. Cost of control measures needed in the area of interest.

Control Measure Description	Implementation Stage	Unit	Number of Units Needed	Cost Per Unit ($)	Total Cost
Agricultural Measures					
Waste Storage Facility (WP–4) – Horse	Stage I	System	2	$3,000	$6,000
Waste Storage Facility (WP–4) – Hog	Stage I	System	1	$3,000	$3,000
Waste Storage Facility (WP–4) – Sheep	Stage I	System	1	$3,000	$3,000
Waste Storage Facility (WP–4) – Poultry	Stage I	System	1	$25,000	$25,000
Waste Storage Facility for composting – Horse	Stage I	System	3	$1,500	$4,500
Waste Storage Facility for composting – Poultry	Stage I	System	1	$10,000	$10,000
Pilot Stormwater Management Program	Stage I	Program	1	TBD	TBD
Retention Feature(s) - Pasture	Stage II	Acres–Treated	50	$138	$6,900
Retention Feature(s) – Cropland	Stage II	Acres–Treated	4,594	$138	$633,972
Total Cost of Agricultural Measures					**$692,372**
Residential Measures					
Septic Systems Pump–out (RB–1)	Stage I	System	100	$400	$40,000
Septic System Repair (RB–3)	Stage I	System	18	$3,000	$54,000
Septic System Installation/Replacement (RB–4)	Stage I	System	62	$8,000	$496,000
Indoor-plumping plus Septic System Installation	Stage I	System	30	$30,000	$900,000
Pet Litter Education Program	Stage I	Program	1	$3,750	$3,750
Pet Waste Composter	Stage I	System	250	$50	$12,500
Pilot Stormwater Management Program	Stage I	Program	1	TBD	TBD
Retention Feature – Residential	Stage II	Acres-Treated	389	$138	$53,682
Total Cost of Residential Measures					**$1,559,932**
Additional Measures					
Wildlife Control Actions	Stage I	Program		TBD	TBD
Pilot Stormwater Management Program	Stage I	Program	1	TBD	TBD
Retention Feature – Barren	Stage II	Acres-Treated	273	$138	$37,674
Retention Feature – Forest	Stage II	Acres-Treated	3,895	$138	$537,510
Total Cost of Additional Measures					**$575,184**

TBD –To Be Determined

It is estimated that it will require $50,000 to support the salary, benefits, travel, training, and incidentals for education of one technical full time employee. The total potential cost to provide technical assistance during implementation is expected to be $500,000 total for 10 years. This cost could potentially be shared should other implementation plans be completed on the Eastern Shore of Virginia.

Total Estimated Costs

The total estimated costs for the implementation of BMPs in the area of interest within Occohannock Creek watershed is shown in Table 15.

Table 9. Estimated costs to meet the fecal coliform TMDL.

Agricultural BMPs ($)	Residential BMPs ($)	Additional BMPs ($)	Technical Assistance ($)	Total Cost ($)
$692,372	$1,559,932	$575,184	$500,000	$3,327,488

7.0 MEASURABLE GOALS AND MILESTONES

Given the scope of work involved with implementing this TMDL, full implementation is expected in ten years, with de–listing from the Virginia Section 303(d) list thereafter. Described in this section are funding sources, identification of milestones, timeline for implementation, and targeting of control measures.

Milestones Identification

The end goals of implementation are restored water quality of the impaired waters and subsequent de–listing from the Commonwealth of Virginia's Section 303(d) list within ten years for Occohannock Creek. Progress toward end goals will be assessed during implementation through tracking of control measure installations and continued water quality monitoring. Agricultural and residential control measures will be tracked through the Virginia Agricultural Cost–Share Program.

Expected progress in implementation is established with two types of milestones: *implementation milestones* and *water quality milestones*. Implementation milestones establish the amount 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. Since a water quality model was not used here that can provide percentage violations of water quality standards, water quality millstones are described in terms of total reduction to bacteria load. The milestones described here are intended to achieve full implementation within ten years for Occohannock Creek, leaving five years to assess water quality. These goals are the basis for two of the milestones.

Implementation of control measures described in this document will be staged. The first stage will consist of all BMPs except retention ponds. Retention ponds were suggested

for Stage II due to the loss of land associated with such. Stage III is intended strictly for monitoring to continue evaluating the impact of implementing control measures within the first two stages.

Implementation is anticipated to begin in August 2008 when Section 319 funds become available, after which two milestones will be sought during the time period. Following Stage I implementation, the steering committee should evaluate water quality improvements and determine how to proceed to complete implementation (Stage II). Table 16 shows the quantity of BMPs to be installed by each milestone. Table 17 shows the cost to implement the BMPs in Stage I, Stage II, and overall.

Table 10. Stage I and Stage II implementation goals.

Control Measure Description	Unit	Stage I installed 2008– 2013	Stage II installed 2014– 2017
Agricultural Measures			
Waste Storage Facility (WP–4) – Horse	System	2	0
Waste Storage Facility (WP–4) – Hog	System	1	0
Waste Storage Facility (WP–4) – Sheep	System	1	0
Waste Storage Facility (WP–4) – Poultry	System	1	0
Waste Storage Facility for composting – Horse	System	3	0
Waste Storage Facility for composting – Poultry	System	1	0
Pilot Stormwater Management Program	Program	1	0
Retention Feature(s) - Pasture	Acres–Treated	0	50
Retention Feature(s) – Cropland	Acres–Treated	0	4,594
Residential Measures			
Septic Systems Pump–out (RB–1)	System	100	0
Septic System Repair (RB–3)	System	48	0
Septic System Installation/Replacement (RB–4)	System	164	0
Indoor-plumping plus Septic System Installation	System	63	0
Pet Litter Education Program	Program	1	ongoing
Pet Waste Composter	System	250	0
Pilot Stormwater Management Program	Program	1	0
Retention Feature – Residential	Acres-Treated	0	389
Additional Measures			
Wildlife Control Actions	Program	1	0
Pilot Stormwater Management Program	Program	1	0
Retention Feature – Barren	Acres-Treated	0	273
Retention Feature – Forest	Acres-Treated	0	3,895

Table 11. Costs to implement different stages.

Impairment	Agricultural BMPs ($)	Residential BMPs ($)	Additional BMPs ($)	Technical Assistance ($)	Total Cost ($)
Stage I	51,500	1,506,250	0	300,000	1,857,750
Stage II	640,872	53,682	575,184	200,000	1,469,738
Total	**692,372**	**1,599,932**	**575,184**	**500,000**	**3,327,488**

Timeline

Based on meeting the above milestones, a twelve–year implementation plan timeline was formulated for the Occohannock Creek watershed that includes ten years of implementation followed by two years of further water quality monitoring and progress assessment (Figure 19 and Table 18). The timeline describes the needs for implementation in terms of completion of the agricultural, residential, and additional control measures. Table 18 shows the projected staged implementation costs for control measures and the cumulative progress toward meeting the TMDL goals for bacteria reductions.

Targeting

Even though control measures were divided into Stage I and Stage II, there is room for flexibility in terms of targeting specific areas. For example, in the first year of implementation, the Implementation Plan calls for installing 29 septic systems to replace failing septic systems. The water quality data collected during the three monitoring sweeps during 2007 will assist in targeting areas showing higher than average human contribution.

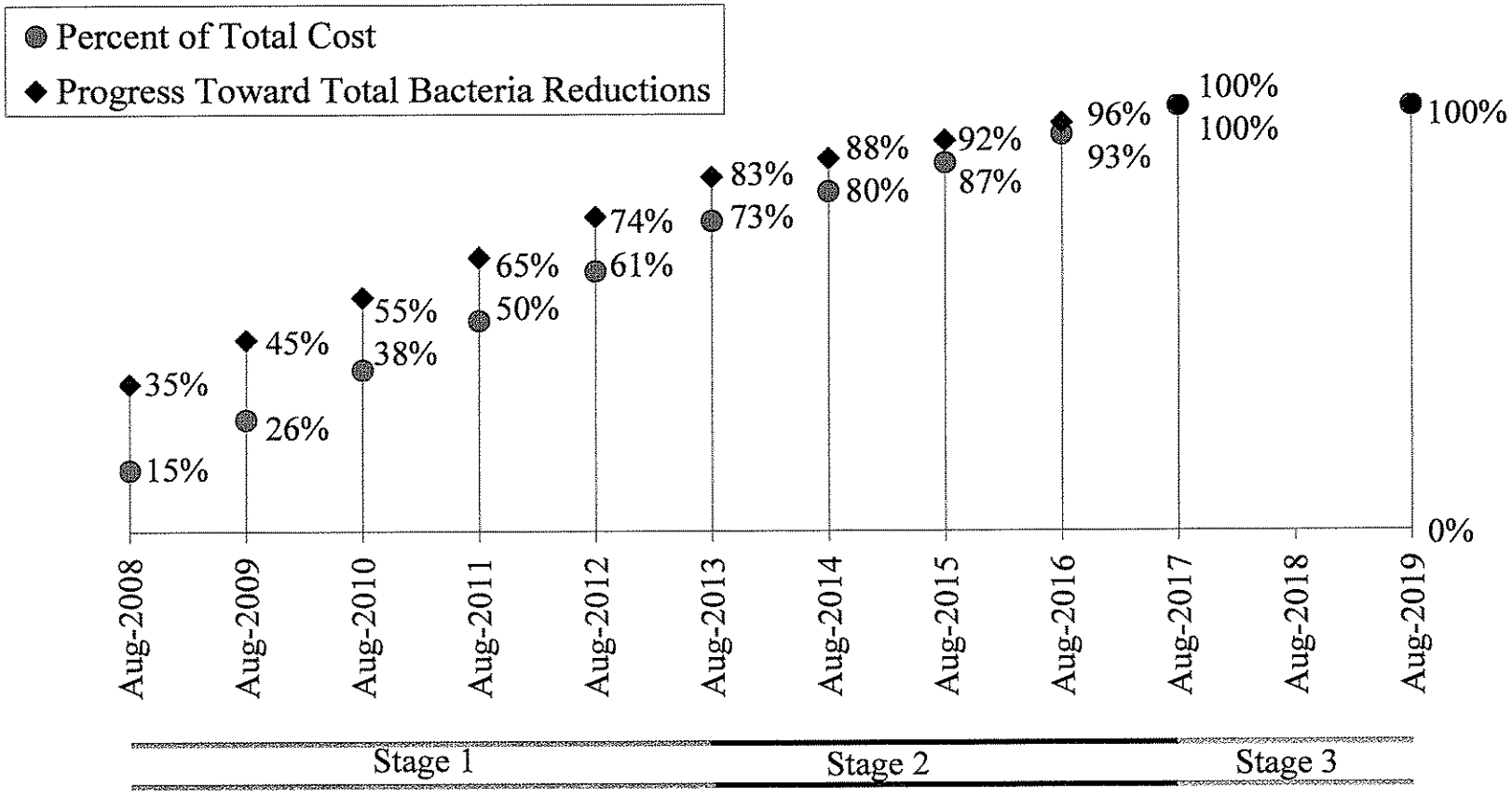

Figure 2. Implementation Timeline.

Table 12. Implementation Goals.

Control Measure Description	Existing (%)	Stage I: Year 1 (%)	Year 2 (%)	Year 3 (%)	Year 4 (%)	Year 5 (%)	Year 6 (%)	Stage II: Year 7 (%)	Year 8 (%)	Year 9 (%)	Year 10 (%)
Agricultural Measures											
Waste Storage Facility (WP–4) – Horse	0	100									
Waste Storage Facility (WP–4) – Hog	0	100									
Waste Storage Facility (WP–4) – Sheep	0	100									
Waste Storage Facility (WP–4) – Poultry	0	100									
Waste Storage Facility for composting – Horse	0	67	100								
Waste Storage Facility for composting – Poultry	0	100									
Pilot Stormwater Management Program	0	0	0	25	50	100					
Retention Feature(s) - Pasture	0	0	0	0	0	0	0	100			
Retention Feature(s) – Cropland	0	0	0	0	0	0	0	100			
Residential Measures											
Septic Systems Pump–out (RB–1)	0	17	34	51	68	84	100				
Septic System Repair (RB–3)	0	17	33	50	67	83	100				
Septic System Installation/Replacement (RB–4)	0	18	34	51	67	84	100				
Indoor-plumping plus Septic System Installation	0	21	37	52	68	84	100				
Pet Litter Education Program	0	100									
Pet Waste Composter	0	20	60	100							
Pilot Stormwater Management Program	0	0	0	25	50	100					
Retention Feature – Residential	0	0	0	0	0	0	0	100			
Additional Measures											
Wildlife Control Actions	0	0	0	100							
Pilot Stormwater Management Program	0	0	0	25	50	100					
Retention Feature – Barren	0	0	0	0	0	0	0	100			
Retention Feature – Forest	0	0	0	0	0	0	0	100			
Cumulative Bacteria Reduction (% of Total)	0	35	45	55	65	74	83	88	92	96	100
Cumulative Cost (% of Total)	0	15	26	38	50	61	73	80	87	93	100

8.0 STAKEHOLDERS ROLES AND RESPONSIBILITIES

The management actions described in this report will be implemented by federal, state, regional and local agencies and non-governmental organizations in a collaborative effort to achieve the primary goal of reducing fecal coliform. The following section describes he agencies involved in the development of this Implementation Plan.

8.1 Federal

8.1.1 United States Environmental Protection Agency (EPA)

Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for water bodies which are exceeding water quality standards. The EPA has the regulatory authority to approve TMDLs. Section 303(d) of the CWA and current EPA regulations do not require the development of implementation strategies. The EPA will review the TMDL Implementation Plan for completeness.

8.1.2 Army Corp of Engineers (ACOE)

ACOE has a Civil Works program that completes projects relating to coastal protection, flood protection, hydropower, navigable waters and ports, recreational opportunities and water supply. The ACOE also oversees several permits relating to water use and wetland areas.

8.1.3 National Resource Conservation Service (NRCS)

NRCS provides technical assistance and financial assistance to the agricultural community for many voluntary conservation activities. NRCS offers technical assistance in such areas as animal husbandry and clean water, ecological sciences, engineering, resource economics, and social sciences. NRCS also completes soil surveys for the National Resources Inventory, which assesses natural resource conditions and trends in the United States.

8.1.4 United States Department of Agriculture Rural Development (USDA Rural Development)

USDS Rural Development supports essential public facilities and services such as water and sewer systems, housing, health clinics, emergency service facilities and electric and telephone service. USDA Rural Development promotes economic development by supporting loans to businesses through banks and community-managed lending pools and offers technical assistance to agricultural and other cooperative start ups

8.2 State

8.2.1 Department of Environmental Quality (DEQ)

The State Water Control Law authorizes the State Water Control Board 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 swimming, fishing, shell fishing, aquatic

life, and drinking water uses. For many years the focus of DEQ'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 DEQ'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.

The DEQ is the lead agency in the TMDL process. The Code of Virginia directs DEQ to develop a list of impaired waters (303 (d) list), develop TMDLs for these waters, and develop Implementation Plans for the TMDLs. DEQ administers the TMDL process including the public participation component and formally submits the TMDLs to EPA and the State Water Control Board for review and approval.

Additionally, the §303(e) of the Clean Water Act and EPA's water quality management regulation 40 CFR 130.5 requires the States to develop Water Quality Management Plans (WQMP) for the major watersheds. The purpose of the WQMPs is to present the processes to be used in the watershed for attaining and maintaining water quality standards. Also, the WQMPs serve as the repository for all TMDLs and TMDL Implementation Plans developed within the watershed. DEQ, with the assistance of DCR, the Department of Mines, Minerals and Energy (DMME), and VDH plans to update the State's 303(e) WQMPs concurrently with the TMDL development effort.

8.2.2 Department of Conservation and Recreation (DCR)

DCR is authorized to administer Virginia's nonpoint source pollution reduction programs in accordance with §10.1-104.1 of the Code of Virginia and §319 of the Clean Water Act. EPA is requiring that much of the §319 grant monies be used for the development of TMDLs.

Because of the magnitude of the nonpoint source component in the TMDL process, DCR is a major participant in the TMDL process. DEQ and DCR have signed a Memorandum of Understanding agreeing to a cooperative effort in the TMDL process including Implementation Plan development. Specifically, DCR agreed to assume responsibility for the nonpoint source component of all TMDLs including the final allocations, with the exception of mineral extraction. This includes those TMDLs contracted by DEQ. Also, DCR agreed to present the nonpoint source component of the TMDLs in the public forums. Another major role DCR has in the TMDL process is the awarding and managing of the contractual services for the development of TMDLs related to nonpoint sources.

8.2.3 Virginia Department of Health (VDH)

The VDH is responsible for classifying shellfish growing waters and monitoring the waters for fecal coliform bacteria. Also, the VDH conducts shoreline surveys to determine potential sources of contamination. This information is evaluated by the VDH to determine areas that are open or restricted for shellfish harvesting for direct marketing. DEQ places the restricted areas on the 303(d) List for TMDL development.

8.2.4 Department of Game and Inland Fisheries (DGIF)

DGIF's mission is to manage Virginia's wildlife and inland fish to maintain optimum populations of all species to serve the needs of the Commonwealth; provide opportunity for all to enjoy wildlife, inland fish, boating and related outdoor recreation; and promote safety for persons and property in connection with boating, hunting and fishing.

8.2.5 Virginia Marine Resources Commission (VMRC)

VMRC was established in 1875 as the Virginia Fish Commission and is one of the oldest agencies in Virginia State Government. VMRC is responsible for managing and leasing the State bottom for the planting and propagation of shellfish. VMRC is also responsible for the 1972 Virginia Wetlands Act and the 1980 Coastal Primary Sand Dune Protection Act.

8.2.6 Virginia Cooperative Extension (VCE)

VCE 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. Local Cooperative Extensions in Accomack and Northampton Counties assist the agricultural community and also offer educational programs to all residents of the Eastern Shore as well as maintaining the 4-H programs.

8.2.7 Virginia Department of Transportation (VDOT)

VDOT is responsible for building, maintaining and operating all roads and bridges in Accomack and Northampton Counties. Through the Commonwealth Transportation Board, VDOT provides funding for airports, seaports, rail and public transportation. VDOT also is responsible for maintaining the roadway ditches. The Eastern Shore is overseen by the Accomac Residency.

8.3 Regional

8.3.1 Accomack-Northampton Planning District Commission

Planning District Commissions are voluntary associations that were created in 1969 pursuant to the Virginia Area Development Act and a regionally executed Charter Agreement. The purpose of planning district commissions, as set out in the Code of Virginia, Section 15.2-4207 is "...to encourage and facilitate local government cooperation and state-local cooperation in addressing on a regional basis problems of greater than local significance."

The Accomack-Northampton Planning District Commission (A-NPDC), one of 21 Planning District Commissions in the Commonwealth of Virginia, is a regional organization comprised of three local governments. The A-NPDC serves as a resource of technical expertise to its member local governments. It provides assistance on local and

regional issues pertaining to Environmental Planning, and Transportation. As a Virginia Planning District, the A-NPDC is also the Affiliate Data Center for the region, providing economic, environmental, transportation, census, and other relevant information to businesses, organizations and citizens. The A-NPDC was contracted by the Virginia DCR to develop this implementation plan for the bacteria TMDL for shellfish waters of Occohannock Creek.

The A-NPDC also houses the offices of the Accomack-Northampton Regional Housing Authority and the Eastern Shore of Virginia Housing Alliance (formerly known as the Accomack-Northampton Housing Redevelopment Corporation). These two entities are very involved in housing redevelopment in Northampton and Accomack Counties.

8.3.2 Eastern Shore Soil and Water Conservation District (S&WCD)

The Eastern Shore S&WCD is one of 47 districts in Virginia. Districts are subdivisions of state government that coordinate local natural resource protection programs (section 10.1-50 of the code of VA, 1950, as amended). The Eastern Shore S&WCD provides local leadership in conservation of soil, water, and related natural resources in the counties of Accomack and Northampton. Some programs available through the district include: cost-share assistance to agricultural producers who install conservation practices on their farms as well as a wide variety of educational programs that cater to school children and local organizations.

8.3.3 Accomack County

Accomack County holds land use control over a substantial section of Occohanncock Creek watershed. In addition to zoning, building controls, and erosion and sediment controls, the County also operates a ditch drainage program. The County also enforces the septic pump out requirement as part of the efforts to clean up the Chesapeake Bay.

8.3.4 Northampton County

Northampton County holds land use control over a substantial section of Occohanncock Creek watershed. The watershed is regulated by the county through zoning, building controls, and erosion and sediment controls. The County also enforces the septic pump out requirement as part of the efforts to clean up the Chesapeake Bay.

8.4 Private Sector, Non-governmental, and Citizen Groups

The Eastern Shore Shorekeeper has been involved in TMDL public participation efforts and has assisted in identifying locations where water quality samples should be taken. The organization is involved in monitoring conditions of the creek. The Chesapeake Bay Foundation also monitors environmental conditions in the Chesapeake Bay. Other organizations such as Eastern Shore Area on Aging and SERCAP work with local residents on housing issues. The Working Watermen's Association also is active in this area.

8.5 Control Measure Responsibilities

No one agency has the authority to complete all control measures. Lead agencies can guide the process but some individual control measures will be undertaken by different entities.

Table 13. Control Measure Responsibilities.

Control Measures	Agency (Lead Agency in Bold)
Agricultural	**Eastern Shore Soil and Water Conservation District,** Virginia Department of Conservation and Recreation, Eastern Shore Shorekeeper, Virginia Marine Resources Commission
Residential	**Accomack-Northampton Planning District Commission,** Accomack-Northampton Regional Housing Authority, Eastern Shore of Virginia Housing Alliance, Accomack County, Northampton County, Virginia Department of Health, Virginia Department of Environmental Quality, Chesapeake Bay Foundation
Other	**Eastern Shore Soil and Water Conservation District,** Virginia Department of Game and Inland Fisheries, Virginia Department of Conservation and Recreation, Department of Transportation

9.0 POTENTIAL FUNDING SOURCES

The following practices are identified as vital to attaining the goals of the Occohannock Creek IP: WP–4 (Animal Waste Control Facility), Retention Ponds, RB–1 (Septic Tank Pump–Out), RB–3 (Septic System Repair), RB–4 (Septic Tank System Installation/Replacement), RB–5 (Alternative On–site Waste Treatment System), Pet Litter Education, and Pet Waste Composters. Potential funding sources available during implementation were identified during IP development. A brief description of the programs and their requirements is provided in this chapter. (Detailed descriptions can be obtained from the SWCD, VADCR, NRCS, and VCE). Each of the funding sources has specific requirements and benefits that will vary in applicability to specific circumstances. It is recommended that participants discuss funding options with experienced personnel at their local SWCD in order to choose the best option. Information on program description and requirements was provided from fact sheets prepared by Virginia State Technical Advisory Committee, VADEQ, VADCR, and Accomack-Northampton County Planning District (A-NPDC).

Federal Clean Water Act 319 Incremental Funds

Through Section 319 of the Federal Clean Water Act, Virginia is awarded grant funds to implement the nonpoint source programs. 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 EPA on the progress made in nonpoint source pollution prevention and control. A 319

application will be written upon completion of the IP to request funding for the technical assistance required (FTEs).

Virginia Agricultural Best Management Practices Cost–Share Program

The cost–share program is funded with state and federal monies through local SWCDs. SWCDs administer the program to encourage farmers and landowners to use BMPs on their land to better control 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. The Virginia Water Quality Improvement Fund (WQIF) provides funding for this program which is dependent upon a percentage of state surpluses.

Virginia Agricultural Best Management Practices Tax Credit Program

For all taxable years, any individual or corporation engaged in agricultural production for market, who has in place a soil conservation plan approved by the local SWCD, shall be allowed a credit against the tax imposed by Section 58.1–320 of an amount equaling 25% of the first $70,000 expended for agricultural best management practices by the individual. "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 stakeholder's portion of BMP costs. It is also approved for use in supplementing the cost of repairs to streamside fencing.

Virginia Agricultural Best Management Practices Loan Program

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

Virginia Small Business Environmental Assistance Fund Loan Program

The Fund, administered through VADEQ, is used to make loans or to guarantee loans to small businesses for the purchase and installation of environmental pollution control

equipment, equipment to implement voluntary pollution prevention measures, or equipment and structures to implement agricultural BMPs. The equipment must be needed by the small business to comply with the federal Clean Air Act, or it will allow the small business to implement voluntary pollution prevention measures. The loans are available in amounts up to $50,000 and will carry an interest rate of 3%, with favorable repayment terms based on the borrower's ability to repay and the useful life of the equipment being purchased or the life of the BMP being implemented. There is a $30 non–refundable application processing fee. The Fund 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.

Virginia Water Quality Improvement Fund

This is a permanent, non–reverting fund established by the Commonwealth of Virginia in order to assist local stakeholders in reducing point and nonpoint nutrient loads to surface waters. Eligible recipients include local governments, Soil and Water Conservation Districts, 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. Successful applications are listed as draft/public–noticed agreements, and are subject to a public review period of at least 30 days.

Community Development Block Grant Program

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

Conservation Reserve Program (CRP)

Offers are accepted and processed during fixed signup periods that are announced by FSA. All eligible (cropland) offers are ranked using a national ranking process. If accepted, contracts are developed for a minimum of 10 and not more than 15 years. Payments are based on a per–acre soil rental rate. Cost–share assistance is available to establish the conservation cover of tree or herbaceous vegetation. The per–acre rental rate may not exceed the Commodity Credit Corporation's maximum payment amount, but producers may elect to receive an amount less than the maximum payment rate, which can increase the ranking score. To be eligible for consideration, the following criteria must be met: 1) cropland was planted or considered planted in an agricultural commodity for two of the five most recent crop years, and 2) cropland is classified as "highly–erodible" by NRCS. Eligible practices include planting these areas to trees and/or herbaceous vegetation. Application evaluation points can be increased if certain tree species, spacing, and seeding mixtures that maximize wildlife habitats are selected. Land

must have been owned or operated by the applicant for at least 12 months prior to the close of the signup period. The payment to the participant is up to 50% of the cost for establishing ground cover. Incentive payments for wetlands hydrology restoration equal 25% of the cost of restoration.

Conservation Reserve Enhancement Program (CREP)

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

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

Environmental Quality Incentives Program (EQIP)

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

priority area. Eligibility is limited to persons who are engaged in livestock or agricultural production. Eligible land includes cropland, pasture, and other agricultural land in priority areas, or land that has an environmental need that matches one of the statewide concerns.

Wildlife Habitat Incentive Program (WHIP)

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

Wetland Reserve Program (WRP)

This program is a voluntary program to restore and protect wetlands on private property. 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. Sign–up is on a continuous basis. Landowners who choose to participate in WRP may receive payments for a conservation easement or cost–share assistance for a wetland restoration agreement. The landowner will retain ownership but voluntarily limits future use of the land. The program offers landowners three options: permanent easements, 30–year easements, and restoration cost–share agreements of a minimum 10–year duration. 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.

National Fish and Wildlife Foundation

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

Clean Water State Revolving Fund

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

9.1 Requirements for Section 319 Fund Eligibility

EPA develops guidelines that describe the process and criteria to be used to award CWA Section 319 nonpoint source grants to States. The most recent guidance, "Nonpoint Source Program and Grants Guidelines for States and Territories," was effective as of October 23, 2003, and identifies the following nine elements that must be included in the IP to meet the 319 requirements:

1. Identify the causes and sources or 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 that is reasonably expeditious;

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

REFERENCES

Total Maximum Daily Load (TMDL) Report for Shellfish Areas Listed Due to Bacterial Contamination – Occohannock Creek, January 2006, Department of Environmental Quality

Occohannock Creek Growing Area #084 Shoreline Sanitary Survey, Department of Health - Shellfish Sanitation, May 2007

TMDL Implementation Plan Technical Support for Occohannock Creek, January 2008, MapTech, Inc, Blacksburg, Virginia