

UPPER CHESAPEAKE WATERSHED TRIBUTARY ACTION TEAM POLLUTION CONTROL STRATEGY RECOMMENDATIONS

January 31, 2008

The purpose of the Upper Chesapeake Watershed Pollution Control Strategy recommendations is to achieve the reductions in nutrient and bacteria levels required in the Total Maximum Daily Load (TMDL) for the watershed in order to reduce the pollutants reaching the Chester and Choptank Rivers.

The specific goals of the Tributary Action Team were to reduce the pollutants to levels at or below the TMDL values specified in the regulation establishing the TMDLs for the Chesapeake Drainage Watersheds in Delaware¹, specifically, maintenance of the level of Nitrogen at or below the 2001-2003 level, a reduction in Phosphorus of 40% and a reduction in Bacteria of 75.6% and 87.8% (for the Chester and Choptank watersheds respectively). In addition, the Team considered additional reductions to contribute to meeting the Chesapeake Bay Agreement reductions of 47% for Nitrogen and 44% for Phosphorus.

Tributary Action Team Guidelines

The following guidelines were used by the Tributary Action Team in developing the recommendations for the Pollution Control Strategy:

- Community education is a high priority.
 - We will not change mindsets and behaviors unless we have an educated populace.
- Apply the “Fairness Principle”
 - Any regulations should apply to everyone, but add provisions to deal with costs for hardship cases.
- Recommendations should be “do-able”, with anticipated results in a reasonable period of time.
- Recommendations should be based on what makes sense given the topography, hydrology, available infrastructure services, utilities, and designated land use criteria.
- Recommendations should deal with the root source of the problem, not just the symptoms.
- Recommendations should be based on proven “good” science, not “politically correct” science.
- Take the regulations and land use changes in the Kent County Land Use Plan into consideration as recommendations are developed.
- Think “Long Term” in developing recommendations

¹ Secretary’s Order No. 2005-W-0050 Re: Adopting Final Regulations to Establish Total Maximum Daily Loads for the Chesapeake Drainage Watersheds in Delaware of the Chester River, the Choptank River, Marshyhope Creek and the Pocomoke River, Date of Issuance: December 15, 2005, Effective Date: January 11, 2006

Reduction Goals and Requirements

The Total Maximum Daily Loads (TMDLs) for the Chester and Choptank River Watersheds were adopted December 2005. The TMDLs were promulgated for Nitrogen, Phosphorus and Bacteria. The TMDL required reductions are shown in the table below. These are the reduction goals for the Pollution Control Strategy recommendations.

	Total Nitrogen	Total Phosphorus	Bacteria
Required Reduction from Baseline	Chester – Capped Choptank - Capped	Chester – 40% Choptank – 40%	Chester – 75.6% Choptank – 87.8%
Required Reduction in Average Pollutant Load	Chester – 0 lbs/day Choptank – 0 lbs/day	Chester – 12.3 lbs/day Choptank – 51.1 lbs/day	Chester – 1.44E+11 CFU/day Choptank–3.86E+11 CFU/day

CFU – Colony Forming Unit

In addition to the TMDLs, these watersheds are in the Chesapeake Bay Watershed. Delaware has signed onto the Chesapeake Bay Agreement which calls for nutrient reductions of 47% for Nitrogen and 44% for Phosphorus. These reductions are total for all watersheds in Delaware that drain into the Chesapeake Bay, and are not specific to any watershed. Therefore, these reduction numbers were considered to be goals by the Tributary Action Team, not requirements.

Overview of the Watersheds

The Chester and Choptank River Watersheds in Delaware share most of their characteristics, and thus were treated as one watershed by the Tributary Action Team for the purpose of developing the Pollution Control Strategy recommendations.

The watersheds are located along the western boundary of Delaware, between the Sassafras River Watershed in the north and the Marshyhope Creek Watershed in the south. The bulk of the watersheds are in Kent County, but include sections in both New Castle and Sussex Counties. The main towns in the watersheds are Marydel and Hartly. The watersheds cross the border into Maryland, however the pollution control strategy recommendations only address the portion of the watersheds within Delaware.

The watersheds are predominantly agricultural, with wetlands and forests as the next largest land covers. New houses and housing developments, however, are being planned and built in the watershed.

Since there are no active point source discharges in the watershed, all nutrient sources are non-point sources and therefore, all recommended actions address reductions in non-point sources of pollution.

Land use loading rates for the Chester and Choptank watershed based upon TMDL data		
	TN (lbs/acre/yr)	TP (lbs/acre/yr)
Developed	12.0	1.3
Agriculture	15.5	0.4
Grasslands	0.8	0.26
Forests	3.5	0.1
Wetlands	0.0	0.0

Using the land use loading rates listed in the above table, the nutrient loads coming from nonpoint sources during the baseline period could be determined using the equation below.

$$\boxed{\text{Load for land-use type by reduction area (lbs/ day)}} = \boxed{\text{Acreage of specific land-use}} \times \boxed{\text{Loading rate for that land-use type (lbs/acre/yr) divided by 365 days}}$$

The daily nutrient load reductions needed from nonpoint sources in order to achieve the reductions outlined in the Chester and Choptank watersheds TMDL are calculated using the following equation.

$$\boxed{\text{Required TMDL Reduction (lb/day)}} = \boxed{\text{Total baseline period load for area (lb/day)}} \times \boxed{\text{Percent reduction as required in TMDL}}$$

Current Best Management Practices in the Watersheds

The Chester and Choptank watersheds have a considerable number of BMPs in practice which bring the watersheds close to compliance with the TMDLs. This section will present details on the BMPs in practice and their associated nutrient reductions. The following table summarizes the reductions from the BMPs and where that places the watersheds with regard to compliance with the TMDLs and the reductions for the Chesapeake Bay Program.

	Nitrogen Load Reduction (lb/day)	Percent of Required Reduction Achieved	Phosphorus Load Reduction (lb/day)	Percent of Required Reduction Achieved
Total for Existing BMPs	764.76		23.65	
Reduction Needed for TMDL	0	>100%	31.56	74.9%
Reduction need for Chesapeake Bay	956.81	79.9%	37.08	63.8%

Specific information regarding bacteria is not included in the above chart, nor in most of the recommendations, since the analysis of source tracking data is not yet available.

Wastewater BMPs

Individual septic systems with 3-year pump-outs: There are 6,239 septic systems in the watersheds. Load reductions from 3-year pump-outs are: 2.97 lbs/day TN, 1.19 Lbs/day TP.

The septic systems in Hartly will be eliminated through connection to the Kent County Wastewater Treatment Plant. This will result in a loadings reduction of 3.11 lbs/day TN, 1.23 lbs/day TP.

Stormwater BMPs²

Stormwater BMPs in use in the watersheds are Dry Extended Detention Ponds, Wet Ponds, and Infiltration Practices. The acreage treated and resultant nutrient reductions are shown below.

	Acreage Treated	TN Load Reduction	TP Load Reduction
Dry Extended Detention Ponds	192.65	.95 lbs/day	.17 lbs/day
Wet Ponds	2.00	.02 lbs/day	.00 lbs/day
Infiltration Practices	1.00	.02 lbs/day	.00 lbs/day
TOTAL		.99 lbs/day	.18 lbs/day

Agricultural BMPs

Agricultural BMPs are the most significant source of current nutrient reductions in the watersheds, accounting for over 99% of the nitrogen reductions and almost 94% of the phosphorus reductions. The following table summarizes the number of acres utilizing each BMP and the load reductions for that BMP³.

	Acres	Nitrogen Load Reduction (lbs/day)	Phosphorus Load Reduction (lbs/day)
Cover Crops	7,310.34	182.88	0.39
Water Control Structures	0	0	0
CRP Practices			
Ponds	83.80	3.55	0.09
Grassed Waterways	0	0	0
Grassed Filter Strips	55.50	1.21	0.02
Wildlife Habitat	107.90	2.36	0.04
CREP Practices			
Grass Buffers	114.90	6.99	0.18
Grassed Filter Strips	0	0	0
Forest Buffers	102.20	8.73	0.22
Riparian Buffers	0	0	0
Wetlands	67.40	6.40	0.17
Wildlife Plants	88.70	5.41	0.14
Hardwood Plants	0	0	0
Conservation Tillage	41,995.00		0.08
Manure Relocation/Alt. Use	718	8.12	0.06
Phytase	2,321.74		0.07
Nutrient Management Plans	41,995.00	535.00	20.71
TOTAL		760.65	22.17

² From the Kent Conservation District, May 2006

³ Data from Delaware Department of Agriculture, Nutrient Management Program, July 2006

Pollution Control Strategy Recommendations

The recommendations to reduce nutrients flowing into the Chester and Choptank Rivers can be grouped into five main categories:

- Recommendations reducing nutrients from existing development in the watersheds;
- Recommendations to minimize any increase in nutrients as land use changes from agriculture or forest to development;
- Recommendations specifically addressing tax ditches;
- Recommendations to provide incentives for additional nutrient reductions from agriculture;
- Education-based recommendations.

RECOMMENDATIONS RELATING TO EXISTING DEVELOPMENT

1. Identify areas where stormwater retrofits would effectively reduce sediment and nutrients

DNREC should conduct a stormwater inventory and identify areas where treatment is lacking and determine where benefits could be obtained through design and construction of effective stormwater BMPs.

Expected Reduction: Nutrient reductions are a function of the type of stormwater BMP installed. Runoff volumes could be reduced by over 90% with infiltration practices. Up to 70% reductions in TN and 65% in TP can be achieved if stormwater BMPs are constructed and managed properly.

2. DNREC and the New Castle and Kent County Conservation Districts should educate Home Owners' Associations (HOAs) regarding the Stormwater BMP maintenance and management requirements and enforce these requirements.

The education process should include providing workshops and written material (such as the detailed booklet developed by DNREC's Sediment and Stormwater Program) about the requirements on the HOAs and proper maintenance practices for stormwater structures. In addition, the educational process should address the aesthetic value of stormwater ponds and the negative impact of improper disposal of yard wastes, animal wastes, and trash that end up in the stormwater structures.

Expected Reduction: This action will help ensure that the reductions associated with specific stormwater management techniques are achieved through proper maintenance.

3. Onsite Wastewater Treatment and Disposal Systems:

a. Promote biennial pump outs of individual onsite wastewater treatment and disposal systems.

b. Require pump out contractors to report failed onsite wastewater treatment and disposal systems to the Department of Natural Resources and Environmental Control.

It is estimated that 20% of the septic systems in the watershed fail annually. Currently, septic system permits require that the systems be pumped out every three years or when the system contains 30 percent or more of solids. The State or New Castle/Kent County should create a “maintenance incentive” for systems to be pumped out every two years. This could take the form of a tax credit for mailing in pump out receipts.

Expected Reduction: Loadings to groundwater from nutrients contained within the sewage and effluent are reduced over 3 year required pump-outs – Nitrogen by 200%, Phosphorus by 112%.

The following two recommendations must be enacted state-wide in order to be feasibly implemented. The Upper Chesapeake Tributary Action Team supports state-wide implementation of recommendations 4 and 5:

4. Require stores to require a soil test for fertilizer purchases or ban phosphorus in residential fertilizer sold in Delaware.

Over-application of nutrients by home owners occurs for two main reasons: lack of knowledge and the desire to use all the fertilizer that they purchased. Education will be necessary for homeowners regarding how to conduct a soil test. The education effort should include information on the environmental impact of fertilization and how lawn and plants take up and utilize the nutrients. Requiring a soil test will result in the sale of the correct amount of fertilizer for the specific lawn, reducing reason number two – over-purchase. As part of the soil test requirement, stores should be required to collect and report data on sales of residential fertilizer by zip code.

Expected Reduction: Although there will be nutrient reductions from this action, there is currently no information regarding the load reductions from this activity.

5. Enact legislation to ban the sale of detergents and soaps containing phosphates.

During the 1970s, the U.S. government recognized that laundry and dishwashing detergents were contributing to phosphorus pollution, which can cause massive algal blooms in waterways and destroy ecosystems by robbing the water and aquatic life of oxygen. Companies started to create alternative laundry detergents that did not contain phosphorus. By the 1990s, enough states had limited or restricted laundry detergent phosphates that detergent companies finally realized that, in order to appeal to their consumers, they would have to develop a phosphate-free detergent. Companies decided to voluntarily phase out all domestic formulations of detergents with phosphorus by the mid-1990s.

Dishwasher detergents on the other hand still contain harmful phosphates. The main reason for this is that the best alternative, enzymes, were neither common nor cheap even as late as the early '90s. There was also the influence of heavy lobbying by detergent makers to keep them in, so phosphates remain in many detergents at varying levels, even though they don't need to be there.

Expected Reduction: Although there will be nutrient reductions from this action, there is currently no information regarding the load reductions from this activity.

RECOMMENDATIONS RELATING TO CHANGES IN LAND USE

6. Require stormwater BMPs be designed to be “Green Technology BMPs” to reduce nutrients according to TMDLs; stormwater structures would be designed to reduce sediment, nutrients, and bacteria and would allow more infiltration, rather than water retention and detention.

Since 1991, stormwater runoff from new development has been regulated under the Delaware Sediment and Stormwater Regulations, administered by the DNREC Division of Soil & Water Conservation. As stormwater moves over land, it picks up natural and man-made pollutants from lawns, roads, and parking lots, eventually depositing them into the waters of the Chester and Choptank watersheds. Stormwater management is the primary way to control nonpoint source pollution from developed areas. A variety of methods can be used to control and treat runoff. “Green Technology BMPs” are those practices that achieve stormwater management objectives by applying the principles of filtration, infiltration and storage most often associated with natural vegetation and undisturbed soils while minimizing a reliance on structural components. These BMPs have been shown to be effective in nutrient reduction. Currently, the regulations prefer green technology BMPs, but do not require them.

Expected Reduction: Runoff volumes could be reduced by over 90% with infiltration practices. Up to 70% reductions in TN and 65% in TP can be achieved if stormwater BMPs are constructed and managed properly.

7. Require Low Impact Development (LID) in new construction and development.

LID is the integration of site ecological and environmental goals and requirements into all phases of urban planning and design, from the individual residential lot level to the entire watershed. LID varies from traditional stormwater practices; it reduces runoff volumes by attempting to recreate drainage patterns of the preconstruction state. LID practices include, but are not limited to: green roofs, permeable pavers, bioretention areas, grass swales, rain gardens and minimizing impervious area. These practices increase runoff infiltration, storage, filtering, evaporation and detention onsite. In addition, new homes should be required to be built without garbage disposals.

Expected Reduction: Not much research has been conducted on nutrient reductions associated with LID.

8. a. For septic systems for new construction, if the system fails due to design, the organization requiring the specific design for the system should be responsible for system replacement.

b. Provide “pilot/demonstration project” funding for new and proven on site waste-water systems, including RBD units, to replace failing septic systems.

Advanced engineered septic systems are required to be designed to meet specifications developed by the regulatory agency. When systems are installed properly to the regulatory specifications and the system does not function properly, currently, the homeowner is responsible for paying to have the system replaced or fixed.

Specific site conditions and homeowner financial constraints may preclude traditional septic system replacements. Pilot project funding opportunities should be explored in order to provide viable information relative to their expanded use within the Upper Chesapeake Watershed.

Expected Reduction: This action will ensure that regulatory agencies have appropriate incentives for designing advanced systems that function properly, thereby not causing additional loading of nutrients.

9. When land changes from agriculture to developed land, to reduce or eliminate nonpoint source pollution for lots abutting waters in the watersheds, require vegetated buffers of 20 feet beyond the end of the tax ditch maintenance right-of-way.

Buffers help to filter nutrients and slow overland stormwater flow. Kent County has issued several ordinances related to development and buffers, however, County setbacks are not required to be vegetated. Vegetation of the buffer will slow water flow and increase nutrient uptake.

Expected Reduction: Nutrient reduction is a function of buffer type (grassed, forested or combination) and the width of the buffer; nitrogen reductions can range from 2.5 to 70%. Reductions in Phosphorus reduction can range from 3.6 to 66%

RECOMMENDATIONS AFFECTING BOTH EXISTING DEVELOPMENT AND LAND USE CHANGES

10. Require a Nutrient Management Plan for any open space within a development

Open space within developments is often simply mowed and fertilized fields. Open space can have many valuable functions and should include natural areas. Open space should be developed with appropriate native vegetation and protected through easements. Nutrient management plans have been successful in improving the efficiency and effectiveness of nutrient applications for farm operations. Nutrient management plans should have similar impacts on the effectiveness of fertilizer use on open space within developments.

Expected Reduction: 10-15% reduction in nitrogen and phosphorous.

11. Prioritize areas where failing individual, large, and community wastewater treatment and disposal systems can be eliminated by connecting to the Kent County Waste Water Treatment Plant.

In the Chester and Choptank watersheds, surface and ground water are directly connected. Consequently, impacts on groundwater will impact the quality of the surface water. Nutrients and bacteria from onsite wastewater treatment and disposal systems will reach the surface water through the groundwater. There are 6239 septic systems in the two watersheds. An individual functioning onsite wastewater treatment and disposal system may contribute 5.8 lbs per year of phosphorous and 22 pounds per year of nitrogen. A failing system can contribute a

significant increase in nutrients and bacteria. The prioritization should be used as one of the determining factors for locating sewer line extensions.

When new sewer systems are installed, they should be sized for planned 15 to 20 years of growth.

Expected Reduction: 100% nutrient reduction from elimination of the septic systems due to wastewater being treated in a different watershed (Murderkill).

RECOMMENDATIONS SPECIFIC TO TAX DITCHES

12. Installation and maintenance of sediment traps – institute studies to determine effectiveness of tax ditches in removing nutrients.

Sediment traps are effective at sediment control in tax ditches. The studies will evaluate the effectiveness of sediment traps in removing nutrients from the water flowing from tax ditches to the Chester and Choptank Rivers.

Expected Reduction: A reduction value cannot be assigned to this recommendation; the studies themselves do not have a direct reduction.

13. The State or County should provide the funding to install and maintain sediment traps.

This recommendation should be implemented if the results of the studies undertaken in recommendation 12 show that sediment traps are an effective nutrient reduction tool. Selection of locations for sediment traps should be at the discretion of the tax ditch organizations based on engineer recommendations. The State or County should, in addition, cover the additional costs for dipouts and mowing.

Expected Reduction: A reduction value cannot be assigned to this recommendation until the studies are completed.

14. Notify and include Tax Ditch organizations in decision making processes on land adjacent to the tax ditch.

The State, New Castle and Kent County need to recognize the local authority of each tax ditch incorporated entity and involve them in decisions affecting tax ditch management and the right-of-ways. This can be accomplished effectively through linking the tax ditch organizations into the Preliminary Land Use Service (PLUS) process. The PLUS process involves reviews by all applicable state agencies at the start of the land development process, adding value and knowledge to the process. Land use change proposals are submitted to state agencies through the Office of State Planning Coordination and are the subject of monthly PLUS meetings, at which applicants meet with state agency resource experts to discuss their plans and identify possible problems, and solutions. The tax ditch organizations should be included in the review process along with the state agencies.

Expected Reduction: A reduction value cannot be assigned to this recommendation.

15. Require property owner to install fencing for animals outside of the tax ditch right-of-way

Require adjacent property owners to install suitable permanent structures to act as a barrier between pasture land and ditches, with the purpose of excluding livestock from the ditch, reducing both nutrient and bacteria loadings to the water.

Expected Reduction: Fencing of animals to keep them out of waterways is estimated to produce a reduction of 25% for Nitrogen and 40% for Phosphorus.

16. Provide data on the non-point impact that septic disposal systems have on the water quality in adjacent tax ditches.

As land use changes continue to evolve within the Upper Chesapeake Watershed, water quality within the existing tax ditch waterway systems will continue to be impacted. Increasing the number and frequency of water quality monitoring sites now will provide additional base line data that will be useful in aiding the future decision making process for all stakeholders.

Expected Reduction: A reduction value cannot be assigned to this recommendation.

RECOMMENDATIONS PROVIDING INCENTIVES FOR ADDITIONAL AGRICULTURAL PRACTICES

Note – Recommendations 16-18 are highest priority of the agricultural recommendations

17. Increase the funding for cost shares to allow an increase in the number of acres that can be planted in cover crops.

Cover crops are planted to provide protection to soils when row crops are not being grown. Some are effective at scavenging Nitrogen and slowly releasing it back to the soil so that the next row crop can utilize it. Currently, the number of acres that can be covered by cost share is limited by the funding available. The funding should be increased so that if a farmer wants to plant a cover crop, they should be able to receive cost share. Allow the cover crop to be cut for sale to facilitate removal of the nutrients from the watershed. The use of fertilizer on cover crops should be examined as long as it results in a net reduction in nutrients.

Expected Reduction: Nitrogen ~59%, but varies depending on species used; Phosphorous 4.9%

18. Increase awareness of availability of cost share for water control structures.

Water control structures are devices that convey water, control the direction or rate of flow, and maintain a desired water surface elevation. They are typically used to control the depth and

discharge of water in open channels, ponds, and wetlands. Water control structures are also useful in reducing nitrogen, therefore, more information regarding the availability of cost share for water control structures should be made available to relevant property owners.

It should be noted that, in designing and installing water control structures, care needs to be taken to ensure that there are no adverse impacts on upstream farms. In addition, water control structures need to be properly maintained in order to remain effective.

Expected Reduction: Nitrogen 33%

19. Manure sheds:

- a. Increase the allowable manure shed size.**
- b. Increase the amount of cost share available for manure sheds.**

Currently, the amount of cost share only allows for sheds that are sized for poultry house crust outs; the cost share should be increased to allow for sheds large enough to handle poultry house cleanouts.

Expected Reduction: Although there will be nutrient reductions from this action, there is currently no information regarding the load reductions from this activity.

20. Increase the cost share for grassed filter strips and allow the grass to be cut for hay.

Grassed filter strips are areas of vegetation between cropland and other land uses such as grazing land, disturbed lands, forests, pasture and environmentally sensitive areas. They are designed to trap sediments in surface runoff and take up excess nutrients. Increasing the number of grassed filter strips is advantageous, and increasing the cost share would provide incentives to create more strips. Similarly, allowing the grass to be cut for hay increases incentives for grassed filter strips.

In addition, switch grass can be considered for growth in the filter strips and then harvested as an energy crop.

Expected Reduction: Bacteria 43-57%; Nitrogen 46%, and Phosphorus 54%

21. Increase the cost share for grassed waterways and allow the grass to be cut for hay.

Grassed waterways are natural or constructed swales, shaped or graded, and established in vegetation for safe conveyance of runoff. They transport surface runoff away from cropland without causing erosion or flooding and protect and improve water quality. Increasing the cost share and allowing the grass to be cut for hay would provide more incentives to create grassed waterways.

In addition, switch grass can be considered for growth in the grassed waterways and then harvested as an energy crop.

Expected Reduction: Bacteria 43-57%; Nitrogen 46%, and Phosphorus 54%

22. Increase the cost share to encourage an increase in the number of acres enrolled in CREP for Grassed Waterways and Grassed Buffers

Grassed waterways and Grassed buffers are areas of vegetation between water and cropland, grazing land, or disturbed lands, including forestland and environmentally sensitive areas. They are designed to trap sediments in surface runoff and utilize excess nutrients. They reduce nutrient losses from upland acres and sediment bound P from entering waterways. In addition, there are some habitat benefits.

In addition, switch grass can be considered for growth in the filter strips and then harvested as an energy crop.

Expected Reduction: Nitrogen 46%, Phosphorus 54%, Bacteria 43-57%, in addition to the change from cropland to grassland.

EDUCATION RECOMMENDATIONS

23. Conduct tax ditch right-of-way education

Provide residents with educational information, including signage, on what the tax ditch right of way is, its purpose, and what is and is not allowed to be done in the right of way. For example, that 4-wheelers and horses are not allowed in the right of way. In addition, the education should encourage best management practices regarding tax ditches for residents of the watersheds; these include such things as not dumping grass clippings in ditch.

Expected Reduction: A reduction value cannot be assigned to this recommendation.

24. Develop and implement a comprehensive homeowner education program for management of open spaces, yards, wastewater and stormwater.

Changes in homeowner behavior resulting from effective education efforts can result in a reduction in the amount of nutrients ending up in the Chester and Choptank Rivers. Education should include things such as the following:

- ✦ Identification of values which are affecting residential activities and target those that will effect behavior change.
- ✦ Education regarding the use of soil tests to the urban/suburban homeowner.
 - Work with the University of Delaware to revise their soil test results sheet for homeowners to make it easier to be understood and provide specific fertilizer application recommendations based upon existing fertilizer blends found within the State.
- ✦ Education regarding the negative impact of garbage disposals on septic systems.
- ✦ Educating homeowners and homeowner associations on storm water BMPs that can be used around the home to reduce impact on water quality.
- ✦ Integrating education into various (state and local) permitting processes and public information campaigns should be based upon goal of behavior change.
- ✦ Water conservation measures, such as the ones listed below, to help reduce the amount of nutrients leaving individual properties.

Upper Chesapeake Watershed Pollution Control Strategy Recommendations

- Rain collection systems such as rain barrels and rain gardens,
- Directing stormwater runoff from roofs and impervious surfaces onto grassy areas,
- The use of water saving devices in and around the home, in addition to
- The overall reduction of water usage in households and on lawns
- ✦ In conjunction with the Delaware Nutrient Management Commission and the Master Gardeners, provide education and programs for homeowner's on lawn and garden best management practices., such as:
 - Proper mowing practices,
 - Leaving lawn clippings on the lawn;
 - Encourage proper lawn care maintenance-leave a buffer along stream edge;
 - Water conservation measures and stormwater BMPs for the lawn and garden;
 - Encourage use of native species and noninvasive species;
 - Discourage ideas that lawns need chemicals to be green;
 - Proper use of lawn and garden chemicals (including natural fertilizers and compost)
 - Use of compost rather than chemicals as a means of reducing synthetic chemical fertilizers.
 - Smartyard program for homeowners
 - A demonstration project/workshop for homeowners on application of fertilizers and composting methods

Expected Reduction: A precise reduction value cannot be assigned to this recommendation

Recommendation Summary

	Nitrogen Load Reduction (lbs/day)	Phosphorus Load Reduction (lbs/day)
1. Identify areas where stormwater retrofits would effectively reduce sediment and nutrients	Up to 70%	Up to 65%
2. DNREC and the New Castle and Kent County Conservation Districts should educate Home Owners' Associations (HOAs) regarding the Stormwater BMP maintenance and management requirements and enforce these requirements.	Help ensure reductions associated with specific BMP	Help ensure reductions associated with specific BMP
3. Onsite Wastewater Treatment and Disposal Systems: a. Promote biennial pump outs of individual onsite wastewater treatment and disposal systems. b. Require pump out contractors to report failed onsite wastewater treatment and disposal systems to the Department of Natural Resources and Environmental Control.	200% increase over 3-year pump-out	112% increase over 3-year pump-out
4. Require stores to require a soil test for fertilizer purchases or ban phosphorus in residential fertilizer sold in Delaware.	Currently No Info	Currently No Info
5. Enact legislation to ban the sale of detergents and soaps containing phosphates.	Currently No Info	Currently No Info
6. Require stormwater BMPs be designed to be "Green Technology BMPs" to reduce nutrients according to TMDLs; stormwater structures would be designed to reduce sediment, nutrients, and bacteria and would allow more infiltration, rather than water retention and detention.	Up to 70%	Up to 65%
7. Require Low Impact Development (LID) in new construction and development.	Currently No Info	Currently No Info
8. a. For new septic systems, if the system fails due to design, the organization designing the regulations for the system should be responsible for system replacement. b. Provide "pilot/demonstration project" funding for new and proven on site waste-water systems, including RBD units, to replace failing septic systems.	No additional loadings	No additional loadings
9. When change from agriculture to developed land, require vegetated buffers of adequate and proper widths sufficient to reduce or eliminate nonpoint source pollution for lots abutting waters in the watersheds, with a recommendation being 20 feet beyond the end of the Right-of-Way.	2.5 to 70% depending on type and amount of existing vegetative cover	3.6 to 66% depending on type and amount of existing vegetative cover
10. Require a Nutrient Management Plan for any open space within a development.	10-15%	10-15%
11. Prioritize areas where failing individual, large, and community wastewater treatment and disposal systems can be eliminated by connecting to the Kent County Waste Water Treatment Plant.	100%	100%
12. Installation and maintenance of sediment traps – institute studies to determine effectiveness of tax ditches in removing nutrients.	Studies needed	Studies needed
13. The State or County should provide the funding to install and maintain sediment traps.	Studies needed	Studies needed
14. Notify and include Tax Ditch organizations in decision making processes on land adjacent to the tax ditch.	N/A	N/A
15. Require property owner to install fencing for animals outside of the tax ditch right-of-way.	25%	40%
16. Provide data on the non-point impact that septic disposal	N/A	N/A

Upper Chesapeake Watershed Pollution Control Strategy Recommendations

systems have on the water quality in adjacent tax ditches.		
17. Increase the funding for cost shares to allow an increase in the number of acres that can be planted in cover crops.	~59%	4.9%
18. Increase awareness of availability of cost share for water control structures.	33%	
19. Manure sheds: a. Increase manure shed size. b. Increase cost share available for manure sheds.	Currently No Info	Currently No Info
20. Increase the cost share for grassed filter strips and allow the grass to be cut for hay. ⁴	46%	54%
21. Increase the cost share for grassed waterways and allow the grass to be cut for hay. ⁵	46%	54%
22. Increase the cost share to encourage in increase in the number of acres enrolled in CREP for Grassed Waterways and Grassed Buffers. ⁶	46%	54%
23. Conduct tax ditch right-of-way education.	N/A	N/A
24. Develop and implement a comprehensive homeowner education program for management of open spaces, yards, wastewater and stormwater.	N/A	N/A

⁴ Bacteria reduction of 43-57%.

⁵ Bacteria reduction of 43-57%.

⁶ Bacteria reduction of 43-57%.