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TITLE: Implementing at the local level: Cost effective Best Management Practices that will reduce nutrients loads and bacteria levels in three Delaware TMDL watersheds.

A National Environmental Performance Track Program and State Performance –Based Environmental Leadership Program to test innovative incentives and approaches to expedite their acceptance and use.

APPLICANT: Delaware Department of Natural Resources and Environmental Control, Division of Water Resources, Watershed Assessment Section

Partners: City of Dover, Silver Lake Commission, Camden, Wyoming, Milton, Lewes, Middletown, Townsend, Odessa, and Appoquinimink River Association

PROJECT MANAGER: Lyle Jones

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TOTAL PROJECT COSTS:	$451,132
Requested From EPA:	$350,000
Leveraged, Non-Federally Funded Staff Time:	$101,132

PROJECT PERIOD: October 1, 2009 - September 30, 2010

PROJECT ABSTRACT

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The St. Jones TMDL requires a 40 percent reduction in nutrients and a 90% reduction in bacteria level which is one the highest bacteria reductions in the State. The Broadkill has also has a 40% reduction in nutrient loads and a 75% reduction in bacteria levels. Both Dover in the St Jones and Milton in the Broadkill watersheds have recognized the need to address their un-permitted and untreated stormwater discharges. Implementation of watershed practices is still needed in the Appoquinimink, St Jones and Broadkill watersheds in Delaware to meet required TMDL load reductions. The State of Delaware Department of Natural Resources and Environmental Control (DNREC) wants to continue the use prioritized projects from watershed implementation plans as a basis to test innovative approaches and expedite their acceptance and use. These plans provide the State with a prioritized list of pollution control opportunities within a watershed based on an extensive screening process specific to the watershed. In addition, the Appoquinimink watershed implementation plan met the 319 NPS program (a) through (i) criteria for watershed planning and will help segments of stream to be de-listed for certain 305(b) impairments. The major objective of this project is to continue with the implementation of priority practices in the Appoquinimink Watershed and to begin implementing priority proactive or retrofitting projects in the St Jones and Broadkill watersheds. This will develop competence within small towns and cities to manage their own stormwater and other nonpoint source pollutants. Another objective of this project is to provide additional over-sight over the selected projects and a single point of contact, The final objective of this project is to build environmental compliance and stewardship within communities by understanding what incentives beside financial will encourage communities to become more environmentally proactive and protective. This project will establish partnerships with City of Dover, Silver Lake Commission, Camden, Wyoming, Milton, Lewes, Middletown, Townsend, Odessa, and continue the partnership with Appoquinimink River Association. First and foremost the Department hopes to construct several best management practices within each watershed that will improve water quality. Through discussions with the partnering community, other non-structural proactive projects will be undertaken such as educating local business on how to reduce stormwater runoff as well as reducing their pollutant load through better on-site housing keeping and site maintenance practices including practices like enforcing pet waste pick and removal. Each project implemented will have being acreage treated by the best management practice, pollutant removed and its impact on the nutrient load reduction to the TMDL watershed.

PROJECT DESCRIPTION

The State of Delaware has completed watershed assessments studies in three watersheds (Appoquinimink, Broadkill and St Jones) within the State. These studies were done to develop plans to reduce pollutants in each watershed to the Total Maximum Daily Loads (TMDLs) established by the State of Delaware Department of Natural Resources and Environmental Control (DNREC) and/or the Environmental Protection Agency (EPA). DNREC wants to continue the use prioritized projects from watershed implementation plans as a basis to test innovative approaches and expedite their acceptance and use.

The Appoquinimink Watershed was the first plan to be completed in the state. By late 2008 the St Jones and Broadkill watersheds will have their plans completed. These watershed plans are comprised of three components. The first component is a baseline assessment which identifies and describes the watershed, sources and types of impairments, and locations of water quality degradation. All of the baseline assessments indicate that impairments could worsen with projected growth pressures if pollution control measures, both proactive and retrofit are not

undertaken. The second component is an inventory of potential pollution control opportunities targeted at the identified impairments. Duffield Associates (a local engineering firm) along with the Center for Watershed Protection produced a detailed implementation strategy based upon these targeted opportunities. The third component is the implementation strategy which combines the data from the first two components and then prioritizes the watershed management methods to ultimately reduce pollution entering the watershed. Thus, the purpose of the watershed assessment plan is to identify pollutant sources and outline methods to reduce pollutant loads to the established TMDLs.

In addition, each of the three watersheds that have watershed implementation plans have a tributary action team (TAT). A TAT is a group of interested citizens, government officials, business owners, developers, and farmers meeting to build agreement between all stakeholders for detailed plan of action to improve water quality within their watershed in agriculture, stormwater and wastewater. Each TAT developed a pollution control strategy with recommendations for either regulatory or voluntary actions to help reduce pollutant loads to the TMDLs levels. Their recommendations are submitted to the Department of Natural Resources and Environmental Control in order to promulgate regulations that will meet water quality standards. Thus, the watershed assessments plans and TATs go hand-in-hand to allow citizens and local governments to implement cost effective best management practices that would improve water quality based upon the plans recommendations

These plans are not just sitting on a shelf somewhere gathering dust. They are being implemented throughout the watersheds of Delaware. For example, the Appoquinimink River Association (a non-profit organization engaged in activities to preserve, protect and enhance rivers and related natural resources) has been working with the Center for Watershed Protection's Appoquinimink Watershed Implementation Plan prioritized implementation list with great success. The Association accomplished numerous projects on the list by working directly with the local municipalities and communities. Some of the projects accomplished include the conversion of a stormwater dry retention pond into a bioretention facility, the restoration of a stream corridor below Silver Lake in Middletown, DE, the reforestation of a track of land adjacent to Noxontown Pond, and the development of a riparian buffer ordinance for Middletown which could be used in other municipalities within the watershed. In fact, the Appoquinimink River Association was awarded the Leadership in Low Impact Development Award by Region 3 EPA and the Low Impact Development Center for the use of low impact development practices to mitigate harmful stormwater flows and reduction in of nonpoint source pollutants to the Appoquinimink River.

Implementation of watershed practices is still needed in the St Jones and Broadkill watersheds. The St. Jones TMDL requires a 40 percent reduction in nutrients and a 90% reduction in bacteria level which is one the highest bacteria reductions in the State. The Broadkill has also has a 40% reduction in nutrient loads and a 75% reduction in bacteria levels. Through the TAT process both Dover in the St Jones and Milton in the Broadkill watersheds have recognized the need to address their un-permitted and untreated stormwater discharges. Even though Dover has an MS4 permit, they have just begun to require newly constructed stormwater best management practices to reduce their nutrient loads and have not required stormwater retrofits in areas lacking any stormwater quality treatment. Thus, this project would help demonstrate that low cost stormwater treatments improvements could result in significant bacteria reductions and nutrient loads. This would allow the city of Dover to see the benefits to their community, become more proactive and start other retrofitting projects in other areas within Dover that lack stormwater management. Like Dover, Milton has many direct stormwater discharges into the Broadkill River. By working with Milton,

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several prioritized projects would be funded that would demonstrate significant pollutant reductions at low to moderate costs. This would build some capacity with this small town to manage its stormwater and would serve as model for other municipalities within the watershed.

OBJECTIVES

The major objective of this project is to continue with the implementation of priority practices in the Appoquinimink Watershed and to begin implementing priority proactive or retrofitting projects in the St Jones and Broadkill watersheds. This will develop competence within small towns and cities to manage their own stormwater and other nonpoint source pollutants.

This objective specifically meets requirements of the Clean Water Act, Section 104 (b) (3 U.S.C.§ 1254 (b) (3)]) since this project will help Delaware meet required TMDL reductions for nitrogen, phosphorus and bacteria. It also meets the goals of EPA's Strategic Plan Goal 2 (Clean and Safe Water), Goal 4 (Healthy Communities and Ecosystems) and Goal 5 (Compliance and Environmental Stewardship). All parts of Goal 2 are met by this project by preventing, reducing or eliminating water pollution by constructing best management practices to mitigate impacts from untreated stormwater from entering segments either of the Appoquinimink, Broadkill or St Jones Rivers. All three rivers have TMDL mandated bacteria reduction. By installing best management practices in areas with previously untreated stormwater, bacteria numbers and pollutant levels will decrease. In addition, Goal 4 is met by improving water quality of the streams that pass through Dover, Middletown and Milton, Delaware which will make them more useable for swimming, fishing and boating by residents of the community. A major component of this project is to help communities develop more environmental stewardship within their boundaries by presenting them with a process by which their nonpoint source pollutants can be reduced and demonstrate the benefits of projects to the community. Thus, Goal 5 will be a major aspect of this proposed project.

Another objective of this project is to provide additional over-sight over the selected projects and a single point of contact. Within the Department, staff and contractual employees hired through the Kent Conservation District will work in each watershed to reach goals and work with the perspective partners. This model of having a watershed advocate with the watershed has been highly successful in the Appoquinimink River watershed as described above.

The final objective of this project is to build environmental compliance and stewardship within communities by understanding what incentives beside financial will encourage communities to become more environmentally proactive and protective.

METHODOLOGY

As stated above, the Department Natural Resources and Environmental Control wants to continue the use of prioritized projects from watershed implementation plans as the basis to improve water quality from unregulated nonpoint sources. These plans provide the State of Delaware with a prioritized list of pollution control opportunities within a watershed based on an extensive screening process specific to the watershed. In addition, the Appoquinimink watershed implementation plan met the 319 NPS program (a) through (i) criteria for watershed planning and will help segments of stream to be de-listed for certain 305(b) impairments.

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In order to create a functional and defensible list of pollution control opportunities, the following objectives were identified for the watershed plan:

- Identifying appropriate technologies that are accepted approaches used to improve water quality;
- Develop scoring criteria to be used to evaluate selected sites relative to the identified technologies;
- Develop scoring values that are properly weighted to measure the value and feasibility of the sites;
- Obtain sufficient desktop information to allow each site to be evaluated;
- Perform a site reconnaissance for each site to gain additional site-specific insight and verify desktop assumptions; and
- Present the findings in a useable format allowing the end user to quickly identify appropriate pollution control sites when funding is available.

PROJECT TASKS

Hire a watershed coordinator to interact with local partners. We will hire coordinators through a cooperative agreement with the Kent Conservation District. Because of budget limitations in the State of Delaware, we are unable to hire full-time staff through State Personnel. However, DNREC has an established relationship with the Kent Conservation District (KCD) to hire employees to support work that falls under their mission.

Develop a partnership with local partners. The watershed coordinator will meet with perspective partners to discuss the watershed implementation plan and it potential impact on them. Initial discussions will take place on selecting projects for their area. Hopefully, through this partnership the Department will better understand the factors that encourage communities to become better environmental managers within their boundaries.

Projects will be selected from a priority list and implementation will begin. A plan will be developed for implementing the project(s), and if necessary, outside expertise will be hired to assist with the project(s). Additional funding sources will be sought for implementing the project if funds from this grant are not adequate.

Publicity will occur on completed project(s) as well as tours of the project(s) for education and outreach purposes. These outreach activities will serve as teaching tool to show other municipalities and communities what can we accomplished through cooperative efforts and at relatively low costs.

OUTCOMES AND MEASURES

Environmental Outputs: First and foremost the Department hopes to construct several best management practices within each watershed that will improve water quality. There will be a series of workshops and meetings with the partnering communities, as well as a community meeting emphasizing the constructed best management practice to the community at-large and its impact to the community. Neighboring communities will also be invited to the pubic workshop to spread the education to others. Through discussions with the partnering community, other non-structural proactive projects will be undertaken such as educating local business on how to reduce stormwater runoff as well as reducing their

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pollutant load through better on-site housing keeping and site maintenance practices including practices like enforcing pet waste pick and removal.

Environmental Outcomes: Through the partnering, interaction with the watershed coordinator and accomplishment of a prioritized project, communities will begin to build some capacity to become more environmentally proactive within their boundaries. The Department will gain insight as to what incentives cause communities to be come more environmentally proactive. The community meetings will help demonstrate the benefits of implementing practices that will improve water quality. As demonstrated in Appoquinimink Watershed with conversion of a stormwater dry retention pond into a bioretention facility, each project implemented will have acreage treated, pollutant removed and its impact on the nutrient load reduction.

Partnerships: Partnerships will be established with Camden, Dover, Lewes, Milton and Wyoming, Delaware as well as governmental organizations in watersheds (such as Silver Lake Commission, St Jones Greenway Commission). Tributary Action Teams in the Appoquinimink, Broadkill and St. Jones watersheds will be encouraged to become more active in their perspective watersheds by holding workshops on the watershed implementation plans with the partnering communities. We will also collaborate with the Appoquinimink River Association to help develop projects with Townsend and Odessa as well Middletown boundaries. Additionally, we will aim to disseminate information compiled as part of this grant to local and state government officials and other key decision makers.

Public Involvement: Public involvement as described in outreach has been part of the watershed implementation plans since their inception. Citizens actually took part in the watershed assessment as part of the data collecting within the watershed. They walked various areas of their watersheds and reported their findings, digital photographs and data forms back to the Center for Watershed Protection and Duffield Associates for incorporation into the assessment. Tributary Actions Teams as stated above are groups of interested citizens, government officials, business owners, developers, and farmers meeting to build agreement between all stakeholders for detailed plan of action group to improve water quality within their watershed. We hope to build more involvement by adding the partnering communities into the public involvement.

PROGRAMATIC AND ENVIRONMENTAL PAST PERFORMANCE

Development of an inventory and multi-level assessment method for mid-Atlantic tidal wetlands. Co-investigator with VIMS and MD DNR. Delaware portion ($48,398). Awarded by EPA WPD104(b)(3) September 2005. Collected data on reference wetlands in 3 watersheds in the Mid-Atlantic region to develop a preliminary assessment method for tidal fringe wetlands. Delaware was responsible for leading all of the field efforts and developing the draft assessment protocol. We completed this task and produced the Mid-Atlantic Tidal Fringe Assessment. We have been documenting all of our accomplishments and providing summaries of data and protocol refinements to VIMS to include in their semi-annual progress reports to EPA.

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Improving Delaware's Wetland Resources through Monitoring and Assessment, Education, and Restoration ($779,982) Awarded by EPA Environmental Outcome Wetland Demonstration Pilot September 2005. This project is currently being conducted with the goal of integrating wetland programs in the State of Delaware to improve wetland resources. We have been documenting all of our accomplishments in our semi-annual progress reports to EPA which have all been submitted on time. These reports clearly document how we are progressing towards meeting our outputs and outcomes. Additionally, we have submitted an annual report specifically to assist EPA with documenting the improvements to wetlands due to the demonstration grants.

In December 2006, we satisfied the conditions of a Federal Consent Decree which contained an extremely ambitious schedule for establishing Total Maximum Daily Loads (TMDLS) for most of Delaware waterways. Throughout this ten-year effort, there were many contentious discussions with point source discharges and other affected parties, scores of evening workshops and hearing, appeals and threatened appeals, two TMDLs that were settled and one TMDL that was promulgated in 2001 and amended in 2005. TMDLs were successfully promulgated for Delaware Waters and we worked with EPA, Delaware River Basin Commission and the states of New Jersey, Pennsylvania and Maryland to establish TMDLS in shared water bodies.

STAFFING AND FUNDING SOURCES

The Delaware Department of Natural Resources and Environmental Control (DNREC) are committed to improve water quality in order to meet its promulgated TMDLs. Funding for this project will be used to support the Department existing efforts to improve water quality through implementation and outreach.

Principal Investigator: Lyle Jones is a Program Manager for the Division of Water Resources, in the Watershed Assessment Section and works on soils and wetlands issues for the State. He received his B. S. and M. S .in Soil Science from The Ohio State University. Lyle mapped soils in Ohio prior to attending University of Arkansas to work on his PH. D. In 1985, he was hired by the Department of Natural Resources and Environmental Control to conduct soil based site evaluation for their new on-site wastewater disposal systems regulations. Since 1998, he has worked with TMDLs and pollution control strategies as part of this duty. He has been involved with 8 tributary action teams in their development of pollution control strategies for 9 different watersheds in Delaware. He has implemented many on the ground project best management projects with both state and federal funding.

Planner IV: Sara Wozniak is the Watershed Coordinator that has represented the Appoquinimink River Association (ARA) for the past 4 ½ years. The ARA is a group that formed to preserve, protect, and enhance the rivers and related natural resources of southern New Castle County. In this position, Sara has run the organization financially through grant writing and management, fundraising, annual membership appeal production and management, bookkeeping and budget creation. Also, Sara has implemented structural and nonstructural strategies to meet EPA Total Maximum Daily Load (TMDL) requirements such as bioretention facilities; riparian buffer restoration and ordinance creation; and stream restoration projects. Sara has produced education and outreach opportunities surrounding water pollution by creating presentations, educational materials, newsletters and children's activities. In addition she has established partnerships with state and local groups such as governments, civic associations,

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homeowners associations, schools, senior citizens groups, Girl and Boy Scout troops and other nonprofit organizations.

Sara graduated *magna cum laude* from the University of Delaware in 2002 with a Bachelor of Arts Degree in Biology and Political Science and again in 2004 with a Master of Energy and Environmental Policy with a specialization in Water Policy and Management. While working towards her Master's degree, Sara was able to work for the Institute for Public Administration's Water Resources Agency and with the Center for Energy and Environmental Policy. This allowed her to participate in many projects and with many groups including the Governor's Drought Advisory Committee, Water Supply Coordinating Council, Delaware Source Water Protection Program and other countries such as Germany and South Korea.

Environmental Scientist IV: Jennifer Volk: Jennifer, a life-long Delawarean, received her undergraduate and graduate degrees from the University of Delaware. In 2000, she earned a Bachelor of Science with a Major in Chemistry, Minor in Biology, and a Concentration in the Environment. In 2003, she earned a Master's Degree in Marine Studies with a concentration in Oceanography. Her thesis research project titled, "The Role of Land Use and Land Cover in the Delivery of Nutrients to Delaware's Inland Bays," concerned the relationships between nutrient discharges with rainfall and surface water discharge patterns and the surrounding land uses of the watershed. A portion of this research was published in the Journal of Environmental Quality. Jennifer was hired into the Delaware Department of Natural Resources and Environmental Control's Watershed Assessment Section in the summer of 2003 as an Environmental Scientist, where she has continued to work on water quality issues. Jennifer has assisted with the development of Total Maximum Daily Loads for nitrogen and phosphorus in several watersheds and works with Tributary Action Teams to develop Pollution Control Strategies to reduce nonpoint source pollution. As part of this process, Department staff and stakeholders have identified potential best management practices to reduce nutrient loadings from agriculture, stormwater, and onsite wastewater treatment and disposal systems (OWTDSs). Actions to reduce inputs of nitrogen and phosphorus into ground and surface waters from OWTDSs include routine pump-out and inspections of systems, limiting the placement of systems in environmentally sensitive areas, and use of advanced treatment technologies.

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Budget Narrative

		Year 1	Year 2	Total Federal	State Match
Personnel					
[Confidential Budgetary Information Withheld by U.S. EPA]					$ 101,132.00
Travel	Attending professional meetings	$ 1,200.00	$ 1,200.00	$ 2,400.00	
Estimated cost to attend a conference is $1,200 per person including $34-45 per diem for meals, hotel, registration, and use of State vehicle from motor pool or airfare depending on location					
Supplies					
Field		$ 200.00	$ 200.00	$ 400.00	
Outreach materials		$ 500.00	$ 500.00	$ 1,000.00	
Subtotal Supplies				$ 1,400.00	
Contractual					
Personnel [1)]	Planner II	$ 36,000.00	$ 36,000.00	$ 72,000.00	
BMP Implementation in three Watersheds [2)]		$137,100.00	$137,100.00	$ 274,200.00	
Subtotal contractual				$ 346,200.00	
Total				$ 350,000.00	

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1) hired through a cooperative agreement with the Kent Conservation District and because of budget limitations in the State of Delaware, we are unable to hire full-time staff through State Personnel. However, DNREC has an established relationship with the Kent Conservation District (KCD) to hire employees to support work that falls under their mission.

2) contracting with groups with specific expertise in wetland mapping and ecosystem services to provide products that are not feasible for us to perform.