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Delaware

NONPOINT SOURCE PROGRAM ANNUAL REPORT



2010

DELAWARE
DEPARTMENT OF
NATURAL RESOURCES
AND ENVIRONMENTAL
CONTROL

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The Delaware Nonpoint Source Program administers a competitive grant made possible through Section 319 of the Clean Water Act. The grant provides funding for projects designed to reduce nonpoint source (NPS) pollution in Delaware. NPS pollution may be defined as any pollution that originates from a diffuse source (such as an open field or a road) and is transported to surface or ground waters through leaching or runoff. Reduction of NPS pollution may often be achieved through incorporation of specific best management practices (BMPs) into project workplans. Projects may target any source of NPS pollution, but most frequently involve agriculture, silviculture, construction, marinas, septic systems, and hydromodification activities.

In addition to funding projects that achieve reductions in NPS pollution, the Delaware NPS Program is committed to addressing the issue through educational programs, publications, and partnerships with other organizations working to reduce NPS pollution in Delaware.

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I. The Delaware NPS Program

As part of the Delaware Department of Natural Resources and Environmental Control, the Delaware NPS Program is committed to addressing the issue of nonpoint sources pollution as it affects Delaware's numerous waterbodies. Efforts will include grant funding, education, outreach, and partnerships with other organizations working together to reduce nonpoint sources pollution in Delaware.

II. NPS Program Funding

Nonpoint Source (NPS) pollution constitutes the nation's largest source of water quality problems. Approximately 40 percent of the United States rivers, lakes, and estuaries surveyed to date are not clean enough to meet basic uses such as fishing or swimming due to NPS pollution.

To counter the ever expanding NPS problem, Congress established the NPS Pollution Management Program under Section 319 of the Clean Water Act (CWA) in 1987. This program provides states with grants to implement NPS pollution controls to achieve goals that are described in NPS pollution management program plans.

On August 4, 1988, Delaware's original (NPS) Program was approved by the Environmental Protection Agency (EPA) making it one of the first programs in the nation to comply with Section 319 of the CWA. Using CWA Section 319 funding, Delaware's NPS Program administers a competitive grant program. The grant provides funding for projects designed to reduce NPS pollution in Delaware's impaired waterbodies. Reduction of NPS pollution is most often achieved through incorporation of specific best management practices (BMPs) into project workplans. Whenever possible, funds are focused in sub-watersheds where NPS control activities are likely to have the greatest positive impact. Funded restoration activities are implemented using the most effective measures and practices available in order to achieve water quality improvements. Eligible types of management program implementation activities include the following:

- Non-regulatory NPS reduction programs
- Technical assistance
- Financial assistance
- Education
- Training
- Technology transfer
- Demonstration projects

Proposals are requested annually, reviewed, evaluated and prioritized, and those which are determined to meet specified requirements are eligible for funding. At least 40 percent of the overall project cost must be represented by non-federal matching funds.

III. Delaware NPS Issues

More than 90 percent of Delaware's waterways are considered impaired. The state's list of impaired waters, filed with the EPA, includes 377 bodies of water that suffer from 11 different impairments, the most common of which are NPS related pollutants including pathogens and nutrients (nitrogen and phosphorus). Most impairments come from nonpoint sources, which are harder to control. As Delaware is a groundwater driven state, removing NPS pollutants become an even harder problem to solve. Due to the rate of groundwater travel through the system, many NPS pollutants entering the systems up to 30 years ago are just now entering surface water bodies today. As such, the effectiveness of agricultural BMPs placed in 2009 will not be realized until much further in the future.

"Impaired waters" are polluted waters. More technically, they are waters that do not meet water-quality standards for their designated uses, such as recreation, fishing, or drinking. Impaired waters could be suffering from excess nutrients, low dissolved oxygen, toxins, bacteria, heat, or any combination of these problems.

Reduction of nonpoint sources of pollution is achieved through the incorporation or installation of specific best management practices (BMPs) addressing agriculture, silviculture, construction, septic systems, and hydromodification activities. To encourage and support the BMP installation, the NPS Program administers a competitive grant program currently made possible through Section 319 of the Clean Water Act. While this federal financial support has proven successful in complementing Delaware's NPS efforts, the NPS Program is currently seeking additional finances to expand our activities to more systematically address Delaware's NPS concerns.

Additional roles and responsibilities of the NPS Program include geospatial BMP tracking and reporting, management of the agricultural State Revolving Fund Program, support for developing Pollution Control Strategies, and watershed plan development and/or coordination.

IV. Vision and Mission

The Department of Natural Resources and Environmental Control envisions a Delaware that offers a healthy environment where people include a commitment to the protection, enhancement and enjoyment of the environment in their daily lives; where Delawareans' stewardship of natural resources ensures the sustainability of these resources for the appreciation and enjoyment of future generations; and where people recognize that a healthy environment and a strong economy support one another.

It's the mission of the Delaware Department of Natural Resources and Environmental Control to protect and manage the state's vital natural resources, protect public health and safety, provide quality outdoor recreation and to serve and educate the citizens of the First State about the wise use, conservation and enhancement of Delaware's Environment.

The Nonpoint Source Management Program is a dynamic and open-ended program intended to facilitate and promote statewide efforts to manage nonpoint source pollution. The following priorities will guide this program:

1. The NPS Program will support the identification and quantification of those problems that are caused specifically by nonpoint source pollution through assessment updates.
2. The NPS Program will be implemented and updated to realistically reduce nonpoint source pollution in a cost-effective manner.
3. The NPS Program will address nonpoint source pollution through a program that balances education, research, technical assistance, financial incentives, and regulation.
4. The NPS Program will follow a non-degradation policy in areas where surface and ground waters meet state water quality standards and a policy to realistically improve water quality in areas that do not meet these standards.
5. The NPS Program will continue to use the coordinated approach for implementation and maintain an open ended framework to incorporate new initiatives and support interactive approaches based on the effectiveness of existing policies and implementation mechanisms.
6. The NPS Program will support the development and implementation of Watershed Restoration Action Strategies (WRAS)/Pollution Control Strategies (PCS) for watersheds of identified impaired or threatened waters in accordance with the Unified Watershed Assessment List.

In Delaware, the lead agency for the development and implementation of the Nonpoint Source (NPS) 319 Program is the Department of Natural Resources and Environmental Control (DNREC), Division of Watershed Stewardship.

V. Executive Summary

This report documents the activities and highlights of the State of Delaware, Nonpoint Source (NPS) Program during the 2010 calendar year. The NPS Program administers a competitive grant made possible through Section 319 of the Clean Water Act. The grant provides funding for projects designed to reduce nonpoint source NPS pollution in Delaware. Reduction of NPS pollution is most often achieved through incorporation of specific best management practices (BMPs) into project workplans. Proposals are reviewed and evaluated, and those which are determined to meet specified requirements are eligible for funding. At least 40 percent of the overall project cost of all projects must be represented by non-federal matching funds.

Although Delaware's surface water quality may not have significantly changed over the past several years, through the Pollution Control Strategies development process, there have been many improvements made in watershed assessment and planning approaches and methodologies. Public support and involvement will prove the key in the successful implementation of any strategy that is developed. Delaware's Nonpoint Source Program will continue to work with our partners in 2010 and beyond to make progress towards meeting the State's water quality goals. Additionally, the NPS Program is evaluating measures to demonstrate success in lieu of improvements as steady state water quality certainly signifies levels of success in spite of an ever-changing Delaware setting.

In 2010, projects funded through the Delaware's NPS Program embarked on many water quality improvement activities including further support of the stream restoration projects, shoreline stabilization projects and agricultural BMP implementation projects.

Additionally, routine and ongoing projects made great strides during the year and proved, once again, successful NPS pollution reduction strategies. Examples of the routine funded activities include the Nutrient Relocation Program and the Kent and Sussex County Conservation District Planners.

Projects highlighted in the 2010 NPS Annual Report include the following:

- Sussex County Conservation District – Conservation Planners

During the 2010 Calendar year, Sussex County Conservation District Planners worked with area farmers to encourage the installation of agriculture best management practices and partnered with the USDA's Natural Resources Conservation Service in developing conservation plans, nutrient management plans and Environmental Quality Incentive Program (EQIP) contracts. During 2010, the District planners made 1,023 contacts and famers and landowners that resulted in an expenditure of over \$1.1 million in conservation cost-share funds throughout Sussex County

- Kent County Conservation District – Conservation Planners

Kent County Conservation District Planners worked with Kent County Farmers and provide nutrients management planning, conservation planning and encourage the installation and/or adoption of agricultural Best management practices. For the 2010, Conservation Planners in Kent County encouraged participation in the USDA EQIP Program in the amount of \$2,100,000 spent on the installation of agricultural BMPs.

- Nutrient Relocation Program

In 2010, the Nutrient Relocation Program accounted for the transportation of 4.9 million pounds of total nitrogen and 3.7 million pounds of phosphorus as phosphate out of Delaware's priority watersheds. If that tonnage had been applied to the source farm rather than relocated, significant nitrogen and phosphorus could have potentially entered Delaware's surface waters.

- SRF Agriculture Loan Program

In 2010, the State Revolving Loan fund assisted landowners in implementing BMPs by providing a low interest loan for the construction for certain conservation practices and BMP installation in the amount of \$37,640.

- Wetland and Stream Restoration Projects

In 2010, Wetland and Stream Restoration projects initiated and/or completed include the following:

- University Of Delaware – Wetland and Channel Restoration
 - Cart Branch Tax Ditch – Completion
 - Hodgson Vo-Tech School Wetland Restoration – Completion
 - Swartz/Aspendale – Planning and design initiated for this 2 acre wetland restoration
 - Hengst- Completion of channel restoration
 - DNERR- Wetland Restoration
 - Doug and Debbie Vanderwende- Wetland Restoration Project
- Stream & Corridor Enhancement Program

In 2010, Stream and Riparian Corridor Enhancement Program projects included the following:

- **Dover Silver Lake Park Stream Restoration Site** – Construct a regenerative stormwater conveyance system for the City of Dover’s Washington Street drainage area and to restore approximately 320 feet of stream bank along the St. Jones River below the spillway at Dover’s Silver Lake Park.
 - **Stella Ellis-** HEC-RAS modeling and channel realignment design plans have been completed.
 - **Ham Run Stream Restoration Site-** The Ham Run stream restoration project involves a 400–500 feet reach of Ham Run, a tributary to Red Clay Creek near the intersection of Duncan Road and Greenbank Road.
 - **Hickory Spring Road-** Construct a project where the homeowner would like to increase the depth of the pond by removing sediment that has accumulated behind a dam.
 - **DelCastle Technical High School-** Representatives from DNREC’s Division of Watershed Stewardship and the Natural Resources Conservation Service (NRCS) met with Delcastle Technical High School faculty members and discussed a potential stream and wetland habitat restoration project on the school property located along Hershey Run near Marshallton.
 - **Blackbird-**DNREC’s Division of Watershed Stewardship, plans to implement a stream restoration project along a tributary to Blackbird Creek in southern New Castle County, Delaware. Two (possibly three) severely eroded drainage gullies immediately adjacent to Blackbird Landing Road will be restored (approximately 250 – 450 linear feet) along with targeted trouble spots along a 500 foot span of the unnamed tributary to Blackbird Creek. This entire project will involve approximately 750 to 950 linear feet of channel restoration
 - **Upper Christina (West Branch)-** This site involves a 2,000 foot reach of degraded stream along the upper Christina River west of Newark, Delaware.
- Shoreline Stabilization Cost Share

During this period, two vegetative shoreline stabilization projects were approved and completed. One of the projects is located on Silver Lake in Rehoboth Beach, Delaware, and the other is located at the Salt Pond Community in the Salt Pond at Bethany Beach, Delaware. The project located on Silver Lake in Rehoboth Beach, stabilized 425 feet of eroding shoreline that was threatening to undermine a road. The project located in Salt Pond stabilized 135 linear feet of

eroding shoreline using coir logs and high and low salt marsh plantings including *Spartina alterniflora* and *patens*.

- Pollution Control Strategies – Project Implementation

In 2010, the PCS Project Implementation embarked on a wide array of water quality improvement projects. Many of the activities were targeted by the Tributary Action Teams (TAT) formed to draft and implement the Pollution Control Strategies being developed in response to the adopted total maximum daily loads. Funding of many *2010 Highlights* identified were made possible through NPS Program funding provided to DNREC's Watershed Assessment Section.

VI. Highlighted Efforts

i. Sussex County Conservation District - Conservation Planners

Five Conservation Planners working for the Sussex County Conservation District are funded through a Section 319 Nonpoint Source Pollution grant and through base funding with the state of Delaware. The agricultural conservation staff works with the farming community providing nutrient management planning, cost-share funding for agricultural best management practices, and partnering with the USDA's Natural Resources Conservation Service in developing conservation plans and Environmental Quality Incentive Program (EQIP) contracts. During 2010, the District planners made 1,023 contacts with farmers and landowners throughout Sussex County. Sussex County has a high concentration of poultry operations and the District is challenged with keeping our groundwater clean. The District's client base is diverse with a large influx of Hispanics, Indians, and Asians to the area, with many raising poultry and proving to be excellent cooperators. The District also partners with Delaware's Department of Natural Resources and Environmental Control's (DNREC) Division of Watershed Stewardship by providing important information about the conservation efforts throughout the county

2010 Highlights:

- In 2010, the SCD expended nearly \$1.1 million in conservation cost-share funds. This included payments for cover crops, 4 heavy use area protection pads, 1 poultry windbreak, 11 animal mortality, 2 vegetative shoreline stabilization projects, and 1 wildlife habitat pond.

Cover Crop

The Sussex Conservation District provides cost-share assistance to farmers to plant a winter cover crop. In 2010 the District paid \$40 per acre for cover crop that was planted before October 1, and \$30 an acre for cover crop that was planted before October 31. Farmers/Landowners can plant rye, wheat, barley, oats, annual rye grass, triticale, clover, vetch, or rape. Farmers/Landowners are not allowed to apply commercial or animal fertilizer on a field that is intended to receive a cover crop incentive payment. Cover crop payments are divided up into two payments; half a payment is made to the farmer after the crop has been planted, and the other half is paid after the crop has been destroyed.

Farmers/Landowners were allowed to harvest their cover crop. All restrictions for the regular program still apply. The farmer/landowner harvesting the crop will not receive a second payment on that acreage; however, they will not be required to repay the first payment.

Planting a cover crop has a very positive impact on the environment. The crop takes up excess nutrients, improves ground water, and helps prevent soil erosion.

2010 Highlights:

- Cover Crop sign-up this year was the biggest ever. The Sussex Conservation District enrolled over 144,000 acres requesting nearly \$1.7 million in cost-share assistance. Nearly 36,000 acres were planted which equals nearly \$1 million in cost-share. Actual acres planted increased by 3,816 acres - a 12% increase over the acres planted in 2009. This year SCD continued placing advertising signs in cover crop fields. The signs say "Delaware Cover Crop Participant, Protecting our Bays and Environment." The signs are placed in fields along well traveled roads and have received a lot of positive feedback.

Pre-sidedress Nitrogen Testing

The Sussex Conservation District provides pre-sidedress nitrogen tests (PSNTs) to local farmers free of charge. This test helps estimate the available nitrogen in the soil for manured soils. The estimate is used to make a nitrogen recommendation to the farmer for a realistic yield goal for his/her corn crop. PSNTs take into consideration many factors in determining the need for additional nitrogen. Some of the variables include yield goal, type, rate, and timing of manure application, prior fertilizer application, tillage method on the farm, and irrigation. With all of these factors combined it allows the grower to see how much additional nitrogen is needed to produce the targeted yield goal. In 2010, the Sussex Conservation District completed 185 tests on 8,620 acres.

In addition to PSNTs, the Sussex Conservation District also provides soil sampling to local farmers as an integral part of their nutrient management plan. Samples are taken every three years. The planners take 15 to 20 cores per sample and the samples are sent to AgroLab and the University of Delaware Soils Lab for analysis. The results are reviewed with the farmer along with recommendations for nitrogen, phosphorus, potash, and lime. The recommendations are based on soil capability, use of animal manures, and a realistic yield goal for the crop. Soil sampling helps the farmer maintain lime and nutrient levels which provides a more environmentally friendly method to farming.

2010 Highlights:

- SCD Conservation Planners tested 185 fields using pre-sidedress nitrogen tests, covering 8,620 acres in Sussex County. They also completed 24 nutrient management plans on 3,311 acres and 100 animal waste management plans.

BMP's	State	EQIP	Total
Manure Shed	0	23	23
Composter	0	15	15
Poultry Windbreak	1	8	9
Ag Waste System	0	0	0
Irrigation System	0	16	16
HUAP	4	398	402
Poultry Litter Amendment	0	60	60
Wildlife Ponds	1	0	1
Vegetative Shoreline	2	0	2

Activities	Total	Acres
Landowner Contacts	1,023	N/A
Conservation Plans	100	4,400
Nutrient Management Plans	24	3,312
Animal Waste Plans	100	N/A
FY09 Cover Crop Enrolled	216	144,007
FY09 Cover Crop Planted	N/A	35,723
Soil Samples	168	3,726
PSNT's	185	8,620
Manure Samples	38	N/A

Dollars Expended		
State	EQIP	Cover Crop
\$ 112,708	\$3,738,653	\$ 970,471

Outreach and Education

Every year, the Sussex Conservation District holds an event to honor those conservation minded individuals in the County. During odd years, they hold a dinner for our district cooperators. There have been as many as over 250 farmers, partners, and employees in attendance. During even years, they hold a tax ditch breakfast which brings together the officers of the tax ditch organizations to discuss issues that are important to them. There are well over 100 people in attendance for this event.

The Sussex Conservation District attends several events throughout the year to educate the public about conservation. Some of these events include the University of Delaware Coast Day, Delaware Solid Waste Authority Earth Day, Fall Festival at Ross Mansion, and the Tax Ditch Officers' Breakfast. The District in cooperation with the conservation partnership also has a display at the Delaware State Fair. Information about the District and their programs are distributed at these events.

Each year Sussex Conservation District staff assists with the Delaware Envirothon. The Envirothon provides students with an integrated approach to exploring five natural resource

categories. It tests their creativity, analytical thinking, and team building skills in a competitive format. The Envirothon is a “day-in-the-field” where teams visit testing stations for problem solving opportunities in aquatic ecology, forestry, oral presentation, soil/land use, wildlife, and a current environmental issue. The 2010 Delaware Envirothon was held at Camp Arrowhead in Sussex County. Wilmington Charter School Team 1 was the winner and went on to place second at the Canon National Envirothon in California.

2010 Highlights:

- On December 2, 2010 the SCD held the biannual Tax Ditch Breakfast at the Frankford Fire Hall. The breakfast was well attended with 109 people in attendance. Brooks Cahall of the Division of Watershed Stewardship, Drainage Section gave a presentation on standard plans for tax ditches and Michele Garner presented updates on the Division of Watershed Stewardship tax ditch administrative issues. Rob Mitchell and Craig Mills gave a presentation on the Sussex Conservation District’s Equipment Program and the services they can provide. Richard James was also recognized for his years of service to the tax ditch community.

ii. *Kent County Conservation District - Conservation Planners*

Two Conservation Planners operating at the Kent County Conservation District are funded through a Section 319 Nonpoint Source Pollution grant and through base funding with the state of Delaware. The Conservation Planners work with the farming community providing nutrient management planning, cost-share funding for agricultural best management practices, and partnering with the USDA’s Natural Resources Conservation Service in developing conservation plans and Environmental Quality Incentive Program (EQIP) contracts.

Introduction

The Kent Conservation District (KCD) is a governmental subdivision of the State of Delaware authorized by state legislation in Title 7 of the Delaware Code, Chapter 39 and responsible for conservation work within Kent County. In Delaware there is a conservation district in each county. KCD functions are to focus attention on land, water and related resource problems; develop programs to solve the problems; enlist and coordinate help from public and private sources to accomplish the District goals; and increase awareness of the relationship between human activities and the natural environment around us. It is the Board of Supervisors’ responsibility to plan and direct the District programs, coordinate the help of governmental agencies, assign priority to requests for conservation technical assistance from private landowners, and serve as a community clearinghouse for information services. The KCD Board of Supervisors meets monthly and all meetings are open to the public.

Much of the Districts’ effectiveness is due to their ability to work with local, state, and federal agencies to solve local environmental problems. KCD enters into agreements (memorandums of understanding) with cooperating agencies and organizations that outline the obligations of each party and the assistance available. KCD operations are supported by federal, state and local governments and private individuals. The USDA Natural Resources Conservation Service (NRCS) and the Delaware Department of Natural Resources and Environmental Control (DNREC) provide technical leadership to KCD. Additional cooperating agencies include: the

University of Delaware's Cooperative Extension Service, the USDA Farm Service Agency, the Delaware Department of Agriculture (DDA), and the First State Resource Conservation and Development Council.

KCD receives an annual allocation from the State of Delaware administered through DNREC, which is used to cost-share with landowners for environmentally sound improvements of their land. This funding also provides a portion for personnel and administrative costs to run the program. KCD also receives funding from the state and county government to address the needs of the tax ditch systems within Kent County. Additional funding is received through special conservation grants and equipment rental.

Employees within KCD provide technical, administrative, and clerical support to district programs. At times, Earth Team Volunteers assist with carrying out the District's conservation programs. KCD works directly with farmers, landowners, and municipalities on the following types of challenges: water quality protection; stormwater management; aquifer protection; land use planning; erosion and sediment control on land undergoing development, farmland, critical areas and public lands; flooding problems; wetlands protection; soil survey information; and sustainable agriculture.

Partnerships

The USDA's Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA) provided technical and financial assistance through a cost-sharing program to cooperating landowners for conservation practices. Cost-sharing through the Environmental Protection Agency (EPA) enabled the District to continue work toward the reduction of non-point source pollution. Funding from the State of Delaware and Kent County Levy Court allowed the continuation of the community drainage program and resource development. The Kent Conservation District is charged under state law with the responsibility to protect and enhance the soil and water resources of the State. It has been given broad authority, the most significant of which is to enlist the aid of state and federal agencies.

Districts were conceived as local bodies to bridge the gap between the landowner and the federal agency charged with protecting the nation's soil resources from erosion – the Natural Resources Conservation Service of the United States Department of Agriculture. The NRCS is a professional organization administering a number of federal soil conservation programs, some through the districts. The team of professionals reaches the landowner through district memorandums of understanding with the USDA and the NRCS. A working relationship has developed that is mutually effective. The presence of USDA-NRCS in Delaware was a result of an initial request by the Conservation Districts.

Much of the Districts' effectiveness is due to the ability to work with local, state, and federal agencies to solve local environmental problems. As previously discussed, Kent Conservation District enters into agreements (memorandums of understanding) with cooperating agencies and organizations that outline the obligations of each party and the assistance available. Kent Conservation District operations are supported by federal, state and local governments and private individuals. In addition to the USDA-NRCS, DNREC also provides technical leadership to Kent Conservation District.

Additional cooperating agencies include:

- The University of Delaware's Cooperative Extension Service
- The USDA Farm Service Agency
- The Delaware Department of Agriculture (DDA)
- The United States Fish & Wildlife Service
- The First State Resource Conservation and Development Council
- EPA Chesapeake Bay Program
- Delaware Nutrient Management Commission
- National Association of Conservation Districts

Conservation Cost Share Program

2010 Highlights:

- The State of Delaware General Assembly provided \$400,000 in cost share funds, which were utilized by different cooperating landowners. Projects implemented emphasized water quality, water management, and erosion/sediment control. Funds were allocated for the practices below:

BMP	Number	Unit
Poultry Heavy Use Area Protection	31	Pads
Poultry Manure Structures	1	Each
Manure Spreaders	1	Each
Front-end Loaders	1	Each
Cover Crops	17,644.39	Acres
Tile Drainage	3,013	Feet

The Conservationist Planners completed a total of 504 inspections of installed practices to ensure the practices are working properly and do not need any maintenance.

Conservation Reserve Enhancement Program

This money was used to install conservation practices on marginal cropland to improve water quality and enhance wildlife habitat. A total of 8 contracts were signed on 5 farms.

Cost-share funds in the amount of \$15,000 were obligated to cover the estimated costs for establishing the practices. The practices cover 52.4 acres and are broken down as follows:

BMP	Number	Unit
Hardwood Tree Planting	4.6	Acres
Wildlife Upland Habitat	18.6	Acres
Shallow Water Area for Wildlife	6.0	Acres
Filter Strips	23.2	Acres

Environmental Quality Incentive Program

The total amount of EQIP cost-share funds earned for the year was \$2,100,000. This money was used for the implementation of the water quality practices listed below:

BMP	Number	Unit
Composters	6	Each
Fencing	15337	Feet
Heavy Use Area Protection	59	Pads
Irrigation Sprinkler Systems	798	Each
Micro-Irrigation Sprinkler Systems	21	Acres
Nutrient Management	2127	Acres
Pasture and Hay Planting	25.7	Acres
Pest Management	4247	Acres
Waste Storage Facilities	5	Each
Windbreak / Shelterbelt	7960	Feet

Nutrient Management

2010 Results:

- KCD, in cooperation with the University of Delaware Cooperative Extension Service, continued to provide pre-side dress soil nitrate tests (PSNT) to all interested corn growers in Kent County. Use of this test can result in economic savings and reduce the chance of groundwater contamination by nitrates. In 2010, a total of 182 samples were tested covering 7,820.09 acres. The District's conservationists also worked with cooperators in testing manure as well. Last year the following numbers of manure samples were tested: dairy – 3, and poultry – 29. The conservationists also completed 11 animal waste plans and 8 nutrient management plans covering 1,750.14 acres. 97 producers participated in the cover crop program planting a total of 17,644.39 acres.

Education Initiatives & Awards

2010 Highlights:

- The District again supported the Envirothon, a problem-solving, natural resource education program for high school students. The competitive nature of the program motivates students to expand their knowledge of natural resources and realize their responsibility as stewards of our natural resources. The students answer written questions and conduct hands-on investigations of environmental issues in five categories: aquatic ecology, soils/land use, forestry, wildlife, and a current environmental issue which was recreational impacts to natural resources. Thirteen teams competed in the competition. Kent County teams included Polytech High School Team A, Caesar Rodney High School and Kent County 4-H. Honors for the Kent County teams included the following:
 - Polytech High School Team A: 2nd Place overall – Aquatic Ecology, 1st Place – Forestry, 1st Place - Wildlife, 1st Place – Public Speaking, 1st Place – Protection of Groundwater, 2nd Place – Soils/Land Use, 3rd Place

- Kent County 4-H: Wildlife, 3rd Place – Protection of Groundwater, 3rd Place

13th Annual Barn Dance

On Friday, September 17, 2010, over 300 guests filled the Dover Building at the Delaware State Fairgrounds for the KCD's 13th Annual Barn Dance. Participants raised a little over \$9,200 in net proceeds to support the Delaware Envirothon.

The traditional Barn Dance meal of barbecue pork and chicken was again cooked by KCD Equipment Operator Ron Argo, his wife Kaye, and a few assistants. Other supporters of the Barn Dance prepared the delicious side dishes and desserts to round out the meal. Other events of the evening included a silent auction, a live auction by Bruce Betts and Herb Kenton, and dancing to Just Kidding Around Entertainment. Many volunteers helped to serve the meal and beverages, and assisted with photography, the auctions and cleanup. Without the support of the volunteers and community in making the event such a success, KCD would not be able to make such a generous donation to the Delaware Envirothon. The District sincerely appreciates the many volunteers; those who provided financial support; and those who donated auction items, food and other items to the event.

Funds raised will be used by the Delaware Envirothon, a competitive problem-solving, natural resource challenge for high school students, to provide training opportunities throughout the year, to host the state competition held in the spring, and to send the state winning team to the North American competition.

Outreach Efforts

District staff participated in the following outreach activities in our continuing effort to promote environmental awareness: distributed Soil and Water Stewardship Week materials to local churches, schools and libraries; staffed the Delaware Conservation Partnership display at the Delaware State Fair and Dairy Day at the Hartly Fire Co.; participated in the Science Alliance's "What in the World" career awareness program at six elementary schools; sponsored a conservation poster contest; supplied judges for the National Arbor Day Poster Contest; provided presenters and guides for DNREC's Make-a-Splash Water Festival; participated in North Dover Elementary School's Super Science Day by giving a presentation on conservation practices and soils; picked up trash twice along Honeysuckle Road (a little over four miles) as part of the Adopt-a-Highway program; and volunteered in various roles at the Delaware Envirothon.

iii. Nutrient Relocation Program

Broiler production continues to be a vital industry on the Delmarva Peninsula. Delaware annually produces approximately 232 million broilers, ranking tenth in the nation among broiler production.

Application of broiler litter to cropland in Delaware has been an important source of crop nutrients over the years, but has also contributed to elevated phosphorus levels in the soil. Application of poultry litter to these farms is regulated by limiting



phosphorus applications to the amount that can satisfy crop needs, creating a surplus of poultry litter on those farms that must be disposed of. Many farmers who demonstrate insufficient land or high soil phosphorous levels must find alternative uses for poultry litter. Many businesses have surfaced over the past few years to help manage excess litter. The Relocation Program is an effective

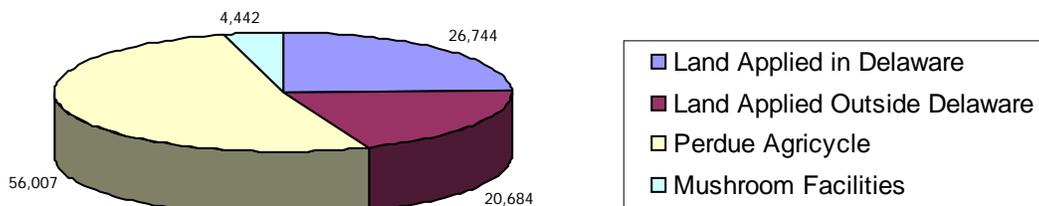
solution to excess litter generated in Delaware.

The Relocation Program provides financial reimbursement to farmers, brokers, and trucking businesses for the transportation cost of relocating litter from a Delaware farm to an alternative use project or another farm for land application. The Relocation Program approval process validates eligible senders, receivers, truckers, and alternative use projects. Excess litter continues to be transported for land application throughout Delaware as well as to Maryland, New Jersey, and Virginia. Alternative use projects are also essential for managing excess poultry litter.

2010 Highlights:

- 107,877 tons of excess poultry litter was relocated, for a ten year total of over 762,000 tons. Over 56% of the excess litter goes to alternative use projects such as the Perdue Agri-Recycle fertilizer plant in Blades, DE. The plant processed over 40,000 tons in 2010, 29,000 tons being Delaware-generated. The 2010 relocated tons represents an estimated 4.9 million pounds of total nitrogen and 3.7 million pounds of phosphorus as phosphate. If that tonnage had been applied to the source farm rather than relocated, a large percentage of these nutrients would have potentially made their way to Delaware's surface waters. This represents a significant load reduction and a bargain from a cost-benefit analysis perspective.

2010 Relocation and Alternate Use of Excess Poultry Manure 107,877 Tons

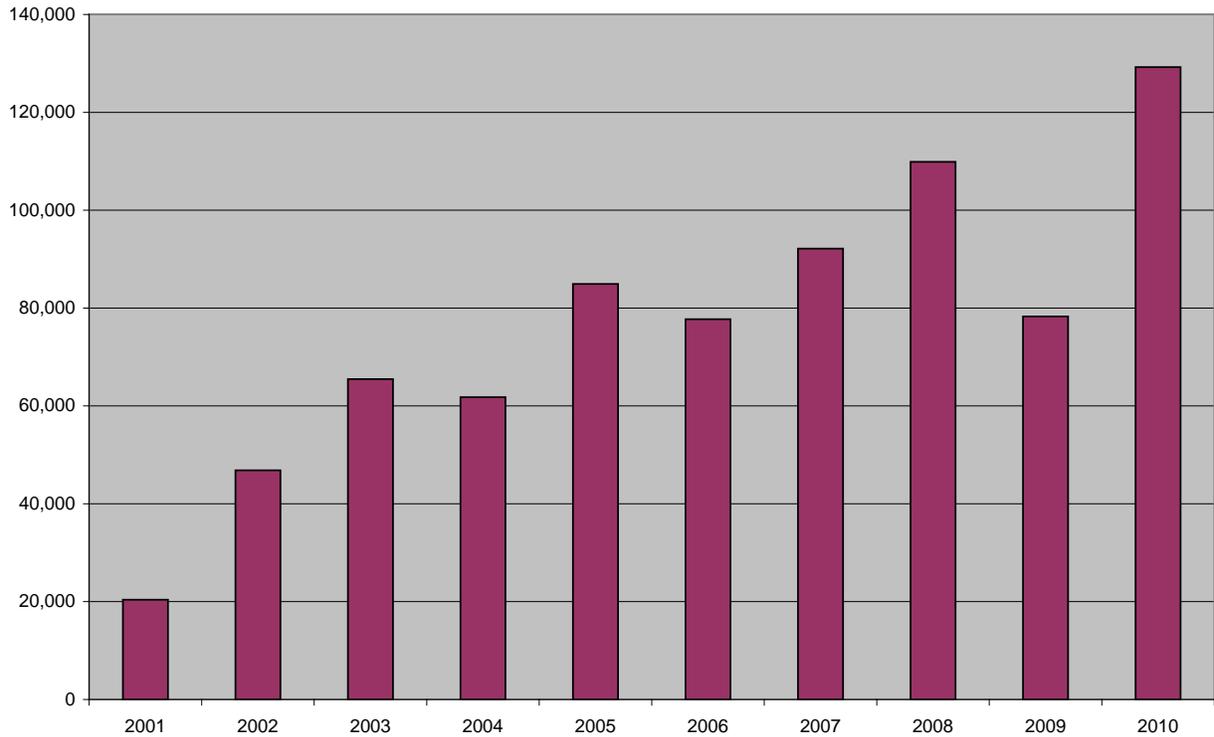


Nutrient Management Planning

A nutrient management plan is a farmer's "business plan" for nutrients. The more efficient fertilizers are used on the farm, the fewer nutrients escape to waterways. A plan is developed by a certified nutrient consultant and includes contents such as maps, soil analysis, manure analysis, crop yield goals and a budget for nutrients.

The NPS Program continues the partnership with Nutrient Management Commission and Conservation Districts in providing nutrient management plans to farmers. They depend on private and public nutrient consultants. In 2010, 158 farms, 2 nurseries and 2 golf courses representing 129,235 acres were reimbursed at a capped rate for a plan developed by a private consultant. During the same period, Kent and Sussex Conservation Districts assisted farmers statewide by writing nutrient management plans representing 7,554 acres. Also, 47 farms were assisted with an animal waste management plan. During 2010, a total of 319,279 acres were provided with nutrient management plans that are valid until 2011.

Relocation of Excess Poultry Manure (Tons)



Delaware Environmental Stewardship Program

The NPS Program assisted in a Commission partnership with three poultry integrators to select and recognize the 2009 environmental stewards. Allen’s Family Food Inc., Mountaire Farms Inc. and Perdue Farms, Inc. funded the 2009 stewardship program. The Environmental Stewardship program was established in 2001 to recognize farmers whose stewardship and general farm practices contribute to the conservation of the environment, water quality and farmland. The program recognized growers by evaluating nutrient management, best management practices, farm management, innovation, bio-diversity and wildlife management. The 2009 top award for Delaware Environmental Stewardship was awarded to Mary Bryant of Laurel. Ms. Bryant received a cash award of \$1,000, a plaque and a lane sign. Ray Tull and Matt Tull both of Seaford were also given awards. Each received \$500, a lane sign and a plaque.



iv. CREP Program Coordinator

Introduction

The Delaware Conservation Reserve Enhancement Program (CREP) is a State-Federal partnership that provides financial incentives to landowners willing to voluntarily implement conservation measures on marginal agricultural land rather than continue the land in agricultural production. The resulting stream buffers and restored wetlands reduce nutrient and sediment runoff, provide increased wildlife habitat, and help protect Delaware’s valuable waterbodies. The Delaware CREP Program was established in 1999 with the designated goals of improving water quality and enhancing wildlife habitat in the coastal plain geographic areas of the Delaware, Chesapeake, and Inland Bays watersheds. The program is voluntary and incentive-based and pays farmers and landowners attractive incentives for putting their least productive lands under a 10 or 15 year contract that requires the land to be put into the conservation practice the landowner chooses. Landowners can establish forest, native warm-season grasses, or cool season grasses. In return the landowner receives cost-share, annual rental payments, and generous bonus payments.

Coordinator Position

To assist in CREP program development and implementation, the NPS Program established and filled a State of Delaware CREP Program Coordinator position. Currently, the position is filled by Dale Churchey. Dale’s key roles and responsibilities include marketing, public outreach, contract development, BMP implementation and program follow-up for installed CREP Practices. Delaware initially set a goal of establishing 6,000 acres of selected practices to meet the goals of the CREP Program. To date nearly 6,000 acres have been installed under contracts of 10 and 15 year terms. Targeted acreage for the eligible practices, as defined under the Conservation Reserve Program, includes the following:

1. CP21 – Grassed Filter Strips
2. CP22 – Riparian Buffers
3. CP23 – Wetlands Restoration Floodplain
4. CP3A – Hardwood Tree Planting
5. CP4D – Permanent Wildlife Habitat
6. CP9 – Shallow Water Areas for Wildlife
7. CP23A – Wetlands Restoration, Non-Floodplain

The table below summarizes the CREP practices installed during the 2010 calendar year:

	CP21 Acres	CP22 Acres	CP23 Acres	CP4D Acres	CP3A Acres	CP9	CP23A	Total Acres
2010	16.7	0	0	25.9	51.4	29.4	0	123.4
To Date	1,309.9	77.6	921.2	709.7	2,825.3	90.6	8.6	5,923.7

CREP Program Progress

Due to the widespread areas of practice installation specific detailed monitoring is currently impractical. However, using calculations developed through the Inland Bays Pollution Control Strategy process an estimate of cumulative CREP reductions by watershed in nitrogen, phosphorous and sediment loads. Estimates are as follows:

<i>Pollutant</i>	<i>Reduction Units</i>
Nitrogen	185,209 Pounds/year
Phosphorus	8,263 Pounds/year
Sediment	33,071 Tons/year

These figures demonstrate the amount of each pollutant that will not reach surface and ground waters as a result of CREP practice installation. Load reductions have been incorporated into the TMDL process, both for loads credited as already reduced and for future reductions from additional implementation.

Program Challenges

Increasing grain prices are influencing many farmers to consider crop production as an alternative to CREP. If grain prices continue to rise and rental rates for crop production lands rise, CREP rental rates might have to increase to remain a viable alternative even on marginal agricultural lands.

Future of the Delaware CREP Program

CREP partners will continue to enhance out-reach and education efforts to reach farmland owners and operators. One new effort ongoing is working with Public Tax Ditch managers and their constituents to encourage the establishment of grassed filter strips. More grassed filter strips along the many miles of channels in cropland would reduce sediment loads, reduce maintenance costs and aid farmers in meeting their nutrient management and conservation objectives.

Two recent developments in the state should have a positive influence on CREP acres in the coming years. First, Delaware recently submitted a Chesapeake Bay Watershed Implementation Plan in response to Total Maximum Daily Loads (TMDLs) created by EPA to limit the extent of pollution that may enter the Bay. The Watershed Implementation Plan established a list of recommendations to meet these limitations. A major component of the recommendations is the establishment of stream or corridor buffers including many CREP practices. Second, Delaware recently adopted CAFO regulations that will affect the largest broiler production area in the world. Part of these regulations will include requirements to manage CAFO operations and associated field operations in an environmentally protective manner. Again, stream and corridor requirements are included.

In recent years and coming years expiring CRP and CREP contracts will have a positive effect on stabilizing and increasing CREP acres in Delaware. During the 2010 operating year a total of 15 expiring CRP and CREP contracts were enrolled in the Conservation Reserve Enhancement Program in Delaware totaling 96 acres. For the year 2011 there are 28 expiring CRP and CREP

contracts in Delaware for a total of 80 acres, providing an opportunity for renewal or addition to CREP acres.

v. **SRF Agriculture Loan Program**

The State Revolving Fund Loan Program provides 3% loan financing for poultry and dairy producers to implement Best Management Practices (BMPs) on their farms to aid in the reduction of Nonpoint Source Pollution. This program helps poultry and dairy farmers finance their portion of conservation best management practices. Normally, cost-share will fund approximately 75% of the cost of the practice, and the farmer can finance the remaining balance at 3% interest. These payments are taken directly out of their flock or milk checks. Since the inception of the program loans have totaled over \$ 6.4 million for poultry producers and \$ 900,739 for dairy producers.

2010 Highlights:

- The State Revolving Loan Fund assisted landowners in implementing BMPs. Nearly \$37,640 in loans were processed in 2010 providing a low interest loan for the construction of certain conservation practices and BMP installation.

In 2010, producers received SRF funding for the following BMPs:

Poultry BMPs	Number	Amount
Manure storage structures	1	\$ 6,020
Poultry carcass composters	0	0
Dead bird incinerators	0	0
Front-end loaders	3	\$ 31,620
Calibratable spinner manure spreaders	0	0
Heavy use area protection pads	0	0
Dairy BMPs		
Dairy waste management system	0	0

Eligible practices for poultry loans include:

- Manure storage structures
- Poultry carcass composters
- Dead bird incinerators (with permit)
- Front-end loaders and bucket attachments to facilitate dead bird composting
- Calibratable spinner manure spreaders
- Heavy use area protection pads
- Poultry Windbreaks

Eligible practices for dairy loans include:

- Dairy waste management systems
- Liquid manure application, transfer, and agitating equipment
- Front-end loaders

- Manure spreaders
- Irrigation equipment for spray irrigating animal waste

vi. **Wetland and Stream Restoration Projects**

Presentations focusing on Wetland and Channel Restoration and Tax Ditch BMPs were given at the following functions:

- Kent Conservation District's Tax Ditch Managers Breakfast –(assisting Bill Rohrer)
- Delaware Department of Transportation (for environmental, planning and engineering personnel)
- Delaware Wetland Conference
- University of Delaware's Ag (Agronomy/Soybean Day)
- University of Delaware's Poultry Production and Nutrient Management Continuing Education Program

Workshop

On May 21, 2010, Tom Barthelmeh held the Wetlands Restoration Construction Techniques Workshop at the Hodgson Vo-Tech School in Glasgow. The workshop included a hands-on session that gave participants the opportunity to apply and understand numerous wetlands construction techniques and best management practices through the construction of small scale models that simulated full-scale wetland restoration projects. The workshop was held for 20 students of the school's environmental science education class.

On March 17, 2010, staff from the Delaware National Estuarine Research Reserve's (DNERR) Coastal Training Program held the Wetlands Restoration Construction Techniques Workshop in partnership with the Drainage and Stormwater Section at the Reserve's Blackbird Stewardship Center. The workshop included a hand-on session that gave participants the opportunity to apply and understand numerous wetlands construction techniques and best management practices through the construction of small scale models that simulated full-scale wetland restoration projects. The workshop was attended by approximately 30 participants from non-profit organizations, state agencies, county government and private contracting companies. DNERR staffer Kelly Wolfe facilitated the workshop. The keynote presentation on wetlands restoration was given by Tom Barthelmeh, Drainage and Stormwater Section, with assistance from Al Rizzo, U.S. Fish and Wildlife Service.

2010 Highlights:

- University of Delaware –Wetland and Channel Restoration
This channel and wetland restoration project involved approximately 1800 feet of channel starting at Farm Lane, running 1200 feet upstream through an agricultural field, crossing Sincock Lane, and running thru a calf pasture for approximately 600 feet to Farm Lane near the Ag shop and silage bag storage area. Two 1/2 acre wetlands were constructed on both sides of Sincock Lane for water quality and wildlife benefits. Most of the channel restoration was constructed to replicate a natural stream with a flood plain and low flow sinuous channel. Approximately 80 feet of pipe was installed in the upper reaches for a crossing. Additionally, one catch basin, two in-line water control structures,

a ½ acre wetland in an agricultural field adjacent to the lower end of the project and a pipe under Sincock Lane were installed. The total size of the project is approximately 3 acres.

- **Cart Branch Tax Ditch Prong 13 Channel Restoration**

This channel restoration project (located northwest of Greenwood) involves the reconfiguration of Prong 13 of the Cart Branch Tax Ditch from station 1+00 to Station 12+00. The existing tax ditch has been abandoned and a new channel constructed across the agricultural field. The new channel project involved constructing a 30 foot wide floodplain with a sinuous low flow channel 4 feet wide and 1.25 feet deep. The purpose of this project is to restore the tax ditch channel to replicate a natural stream system. This project complements many other conservation practices on the Johnson Farm which includes: grass buffers, shallow water for wildlife, and tax ditch elimination and restoration (3100 feet). These conservation practices were completed with the following partners: Natural Resources Conservation Service, U.S. Fish and Wildlife Service, Ducks Unlimited, Sussex Conservation District, private contractors and the Department of Natural Resources and Environmental Control.
- **Hodgson Vo-Tech Wetland Restoration**

The Hodgson wetland restoration project involves the construction of a 1½ acre project adjacent to and east of the athletic fields. The restoration will involve converting idle, poorly drained unused land into two wetland cells to be used as an outdoor classroom for environmental education. On October 21, 2010, Hodgson Vo-tech's Environmental class planted approximately 50 potted trees and shrubs in the wetland project. Additionally, the following week the students planted over 1,100 (2" x 2" plugs) shrubs, sedges and grasses.
- **Swartz/Aspendale**

This project involves constructing a 2 acre wetland in a marginal agricultural field located on a National Historic Landmark called Aspendale. Construction is planned for this spring or summer.
- **Hengst**

The construction of this project was started in late August and was completed in early December. It involves channel restoration and the reconfiguration of approximately 7,200 feet of channel and includes 9 in-channel water control structures on the 150 acre farm. Additionally, approximately 9 acres of wetland restoration in the agricultural fields were constructed. Grassed buffers were installed along all channels and wetland areas. A tile line was added at one water control structure to divert water into a wetland which will then outlet upstream of another water control structure thereby adding increased water filtration.
- **DNERR-Blackbird**

This project involves wetland restoration around the field edges to protect steep slopes flowing into the valley channels as well as one area in a flat field on the northwest corner of the property. A survey has been completed and the project is in the design phase. Construction is expected this summer.



- Webber

This project involves constructing a one acre wetland downstream of a poultry production area. The project is in the final design phase with construction expected this spring or summer.

Delaware stream restoration projects and other successful initiatives that can guide conservation planning in the Chesapeake Watershed are featured in a new publication just released by The Conservation Fund, [A Sustainable Chesapeake – Better Models for Conservation](#). The book highlights 31 case studies that address critical land and water conservation issues and demonstrate innovative solutions for a more sustainable future for the region.

According to Tom Barthelmeh, DNREC environmental program manager and co-author/editor of Delaware’s case study, the concepts and techniques featured in the book will become valuable tools for improving, not only the Chesapeake, but other watersheds in the region.

“Each case study provides a comprehensive approach to protect and restore our environment that others can adopt and apply to their local conservation initiatives,” said Barthelmeh. “Delaware’s case study – ‘Converting Drainage Ditches and Nonproductive Farmland into Functioning Streams and Wetlands’ – includes some of the state’s best examples of channel and wetland restoration projects that enhance water quality and wildlife habitat while maintaining farm productivity.”

Almost 35 percent of Delaware lies within the Chesapeake Bay Watershed and includes land in each county. Almost one-half of Sussex County, about one-third of Kent County and a small portion of New Castle County drain into the creeks and agricultural ditches that run into the headwaters of the Nanticoke, Pocomoke, Wicomico, Chester, Choptank and Sassafras Rivers, which drain into the Chesapeake Bay.

Five Delaware restoration projects are featured in the book, including the Carl Solberg project in Kent County – unique because the entire tax-ditch right-of-way was eliminated and a portion of the access-way restored to create a new wetland. The Heron Drain Tax Ditch project, completed in 2008, represents Delaware’s first use of a constructed wetland to reduce nutrients and sediment flowing through a ditch system. In Sussex County, the Smith Wetland Project restored a marginal agricultural field to a productive wetland. The Haines Stream and Wetland Project restored a tax ditch channel into a functioning stream and wetland ecosystem, and the Battista Wetland Project in Kent County restored a portion of a residential lawn to a backyard habitat.

The book is intricately designed with photos, diagrams, tables, facts and concepts that illustrate solutions to natural resource challenges. Topic areas are organized into six chapters: climate change solutions; stream restoration; green infrastructure; incentive driven conservation; watershed protection; and stewardship. Each chapter includes case studies that serve as models for more sustainable natural resource management. A link to the book and Delaware restoration projects can be found on DNREC’s [Division of Watershed Stewardship website](#). Hard copies of the book are available on a limited basis by contacting The Conservation Fund through its website, www.conservationfund.org/sustainable-chesapeake. The website also offers the option to download individual case studies and chapters, or the entire publication as a pdf file.

Potential Projects for Wetland and Channel Restoration

- Bryan Melvin - Hazletville - Poultry production area
- Delaware Forestry Service - Redden - Reconnect tax ditch to floodplain
- Jeff Lynch - Selbyville - Poultry production area
- Jay Bonk - Laurel - Poultry production area
- Webber - Kenton - Poultry production area
- Perdue - Milford - Poultry production area (with Ed Jewell and Bill Brown)
- DNREC - R&R Building wetland creation
- John Kohout - Hartly - Wetland and channel restoration
- Allen’s Farm - Bridgeville - Poultry production area
- R.C. Willin - Seaford - Channel/wetland restoration
- Rose Littleton - Delmar - Poultry production area
- Division of Fish and Wildlife – Midlands Tract
- Rifle Range Club - Bridgeville



vii. *Stream & Riparian Corridor Enhancement Program*

Completed Projects

The following section briefly describes restoration projects that have been completed in 2010 by the Division of Watershed Stewardship Stream Restoration Program. Restoration activities have included stream restoration, wetland restoration, shoreline stabilization, the planting of warm- and cool-season grasses, reforestation, riparian corridor planting, and invasive species control. These projects were primarily funded by the Nonpoint Source Program.

• **Dover Silver Lake Park Stream Restoration Site (NPS Funds: FY '07 and FY'08)**

Design consultant services were secured from Biohabitats, Inc. to prepare plans for a regenerative stormwater conveyance system for the City of Dover's Washington Street drainage area and to restore approximately 320 feet of stream bank along the St. Jones River below the spillway at Dover's Silver Lake Park. Biohabitats submitted the 100% draft design plans and cost estimate and the permitting process was initiated to secure an Army Corps of Engineers Nationwide Permit #13 and a DNREC Subaqueous Lands Permit. In accordance with the Regional Conditions preconstruction notification process, letters were sent to the U.S. Fish and Wildlife Service, the National Marine Fisheries, the State Historic Preservation Office, the State Heritage Program, the State Subaqueous Lands Section, and the State Coastal Management

Program. Following receipt of comments from these agencies, permit applications were submitted.

Upon reviewing the permit application, the Army Corps requested on-site meetings to discuss certain aspects of the proposed design plans. As a result of the on-site meetings, Biohabitats was requested to make revisions to the design plans. The 100% design plans were received in late December from Biohabitats and were forwarded to the permitting agencies (DNREC and the Army Corps of Engineers).

It is anticipated that construction will take place in the first quarter of 2011.

- **Stella Ellis (NPS Funds: FY '10)**

An environmental engineer with the Division of Watershed Stewardship has completed the HEC-RAS modeling and channel realignment design plans. These plans are undergoing a peer review by a senior environmental engineer within the Division of Watershed Stewardship.

- **Ham Run Stream Restoration Site (NPS Funds: FY '10)**

The Ham Run stream restoration project involves a 400 – 500 feet reach of Ham Run, a tributary to Red Clay Creek near the intersection of Duncan Road and Greenbank Road. The tributary presents several challenges (e.g., constricted channel, trash and construction debris, numerous outfall pipes, invasive plants, very unsightly) which, if corrected, could improve the overall aesthetics, health and stability of the stream. This is a joint project between the Historic Village of Marshallton Civic Association, DelDOT's Bridge Design Section, DelDOT's Transportation Enhancement Program, DelDOT's Stormwater Management Program, and DNREC.

JMT Environmental prepared and submitted 100% draft final design plans for the Ham Run in December. The plans are undergoing a final review by DNREC. Representatives from the Historic Village of Marshallton Civic Association will then be afforded an opportunity to make their final review of the plans. Once the design plans are deemed complete, the permitting process will be initiated. It is anticipated that construction of this will occur in the fall 2011.

This project is being funded by DNREC's Community Involvement Advisory Council, DelDOT and the EPA Nonpoint Source Program.

- **Hickory Spring Road (NPS Funds: FY '07)**

A site meeting was held to discuss an existing in-line pond (i.e., a stream that has been dammed to create a pond) project where the homeowner would like to increase the depth of the pond by removing sediment that has accumulated behind a dam. The property owner was informed that the Department does not promote in-line ponds and ideally would like to eliminate the pond and restore the functionality of the stream channel located along a tributary to Red Clay Creek. An alternative solution was proposed where an earthen berm would be constructed that would separate the pond from the historic stream channel. Even though the pond would become smaller, the property owner understood the Department's position.

A site survey has been done and 90% design plans have been prepared and submitted along with permit applications to the U.S. Army Corps of Engineers and DNREC's Subaqueous Lands

Section. The Army Corps has requested that additional information be included on the design plans. Additionally, the Army Corps has requested an on-site meeting to determine if any wetlands exist on the property.

Construction of this projected is scheduled for the spring of 2011.

- **DelCastle Technical High School (NPS Funds: FY '07)**

Representatives from DNREC's Division of Watershed Stewardship and the Natural Resources Conservation Service (NRCS) met with Delcastle Technical High School faculty members and discussed a potential stream and wetland habitat restoration project on the school property located along Hershey Run near Marshallton. The school personnel expressed an interest in ways to enhance the quality of the habitat in the area and promote Green Technology. DNREC and the NRCS made several recommendations and agreed to assist with the following: site survey; invasive species plant control; creating a buffer (50 feet?) on each side of the stream and plant with native trees; shrubs and warm-season grasses; possible creation of a small wetland cell; classroom pavilion with solar panels. The goal is to have the students work on as much of the project as possible (e.g., developing the design plans, controlling invasive species, planting of trees and shrubs, signage, etc.).

- **Blackbird (NPS Funds: FY '10 and FY'11)**

DNREC's Division of Watershed Stewardship plans to implement a stream restoration project along a tributary to Blackbird Creek in southern New Castle County, Delaware. Two (possibly three) severely eroded drainage gullies immediately adjacent to Blackbird Landing Road will be restored (approximately 250 – 450 linear feet) along with targeted trouble spots along a 500 foot span of the unnamed tributary to Blackbird Creek. This entire project will involve approximately 750 to 950 linear feet of channel restoration.

Additionally, an *innovative restoration technique* is being proposed at the Blackbird Reserve (a component of the Delaware National Estuarine Research Reserve) in an area where drainage from a field passes over the dirt/gravel road that leads to the DNERR facility (causing roadbed to wash out), eventually making its way to the unnamed tributary. A *regenerative stormwater conveyance system* would be put in place in this area. The stormwater that collects in the upland field would be detained in a mini-wetland with an outlet pipe. This outlet would drain into a conveyance system comprised of sandstone boulders, silica cobbles, sand, gravel and raw wood (approximately 20%). This type of system is designed to convert stormwater to groundwater while at the same time allowing denitrification to occur as the groundwater comes in contact with the woody material. Overland flow may still occur; the energy would be dissipated through a series of seepage reservoirs. The seepage reservoirs divert the surface water back into groundwater. The length of this system is approximately 200 feet.

An on-site survey has been completed. Biohabitats, Inc. has submitted a cost estimate for preparing restoration design plans.

- **Upper Christina (West Branch) (NPS Funds: FY '10 and FY'11)**

This site involves a 2,000 feet reach of degraded stream along the upper Christina River west of Newark, Delaware. This project is in the conceptual design phase. A design contractor is being

selected and public outreach plans are being developed with the City of Newark and the University of Delaware. It is anticipated that design plans will be completed by the fall 2011 and construction is slated for spring 2012.

viii. Shoreline Stabilization Cost Share

Projects Completed

During 2010, two vegetative shoreline stabilization projects were approved and completed. One of the projects is located on Silver Lake in Rehoboth Beach, Delaware, and the other is located at the Salt Pond Community in the Salt Pond at Bethany Beach, Delaware. The project located on Silver Lake in Rehoboth Beach, stabilized 425 feet of eroding shoreline that was threatening to undermine a road. The project involved dredging sediment from the lake and creating a marsh sill along the shoreline. The dredged material was contained with coir logs and the material stabilized with 3,400 plugs of mixed common three square (*Scirpus pungens*) and pickerel weed (*Pontederia cordata*). Silver Lake is a fresh water lake next to the Atlantic Ocean. The combination of dredging the lake and creating the marsh should benefit the lake both ecologically and aesthetically. The finished project also serves to protect an existing public road.

The project located in Salt Pond stabilized 135 linear feet of eroding shoreline using coir logs and high and low salt marsh plantings including *Spartina alterniflora* and *patens*. The project is located in a common area used by the Salt Pond Community. The project is located close to another cost share project completed by Robert and Mary Ellen Williams at 432 Canal Way East, The Salt Pond, Bethany Beach, DE in 2007.

Descriptions and locations, including the recipients of the grant fund, for the aforementioned completed project are as follows:

City of Rehoboth Beach, DE – Create a marsh sill using dredge material, coir logs and 3,400 plugs of mixed common three square (*Scirpus pungens*) and pickerel weed (*Pontederia cordata*) to stabilize 425 linear feet of the shoreline along Silver Lake next to E. Lake Drive. Project completed. Lat. 38°42'25.109"N, Long. 75°4'34.951"W

Salt Pond Homeowners Association, Inc. – Install 60 linear feet of coir log at the mean low water line and plant the coir log and the area channelward of the coir log with *Spartina alterniflora* and install 75 linear feet of coir log at the mean high water line and 75 linear feet of coir log at the mean low water line and plant the area between the rows of coir logs with *Spartina alterniflora* and *Spartina patens* at the East Canal Way, Bethany Beach. Project Completed. Lat. 38°32'44.345"N, Long. 75°4'16.768"W

Pending Projects

Currently, there are two pending projects awaiting funding. One project has been approved and permitted to construct a 100 linear feet of stone sill and plant a 2,500 square foot salt marsh in the intertidal area behind the sill on Dirickson Creek. This project is expected to be completed this spring.

The other project proposes to stabilize 389 linear feet of eroding shoreline with coir logs and plantings along Williams Pond near Seaford, Delaware. This project is currently in the permitting phase and is expected to be completed this spring.

ix. **Pollution Control Strategies – 2010 Project Implementation**

This section details the activities that occurred in the prioritized watersheds of Delaware during the 2010 calendar year. Many of the activities were targeted by the Tributary Action Teams (TAT) formed to draft and implement the Pollution Control Strategies (PCS) being developed in response to the adopted total maximum daily loads. Funding of many *2010 Highlights* below is „made possible through NPS Program funding provided to DNRECs Watershed Assessment Section.

PCS History

A 1997 federal court case required Delaware to set pollution limits, or Total Maximum Daily Loads (TMDLs) for our waterways. Setting pollution limits is just the first step toward improving water quality. The next important step is the development of pollution control or reduction strategies. To develop these strategies, Delaware formed Tributary Action Teams (TATs) and tasked them with the specific responsibility of drafting formal documents titled, *Pollution Control Strategies*, which are watershed specific and include numerous ways to reduce pollution levels. The Pollution Control Strategy (PCS) includes a combination of more than one pollution-reducing method. The PCS objectives are to:

- Assist implementation of structural Best Management Practices (BMPs) in TMDL watersheds based on preliminary findings and recommendations of the Whole Basin Teams assigned by the Department of Natural Resources and Environmental Control (DNREC) for agricultural and urban activities;
- Implement projects to support the development of TMDLs and accomplish objectives and milestones in Delaware’s NPS §319 Management Plan; and
- Determine watershed appropriate pollution control strategies for TMDL implementation.

Inland Bays Watershed

Pollution Control Strategy Implementation

To insure implementation of the Inland Bays Pollution Control Strategy, staff from DNREC’s Divisions of Water Resources and Watershed Stewardship, as well as the Sussex Conservation District, routinely hold pre-application meetings for newly proposed development projects to discuss new stormwater management and buffer requirements. In addition, if proposed projects use onsite wastewater treatment and disposal systems, applicants are informed of new PCS requirements that may apply to those systems as well. Since the PCS regulation went into effect, six proposed projects were discussed at these pre-application meetings. These projects only cover 377 acres due to the economic downturn.

Buffers

If land is developed, the PCS requires buffers along primary and secondary water features. Buffers are NOT required on existing developed lands or lands used for agriculture. Buffers must be 100 feet wide on primary waters and 60 feet wide on secondary waters. Buffer width can be reduced if combined with other pollution reduction actions. Buffers will exist in community open space and will be managed by homeowners' associations. The PCS encourages planting buffers with trees and other native plants.

Wastewater

The PCS regulation prohibits cesspools and seepage pits, which are simple disposal systems, that discharge untreated wastewater into ground waters. In addition, properties being sold that use a septic system must have it pumped out and inspected prior to completion of sale in order to indicate whether the system is in working order. All septic systems must reduce their nitrogen content of the effluent. This requirement went into effect 60 days after the regulations were finalized in November 2008 for sites within 1000 feet of tidal waters of the Inland Bays and will become effective in all septic systems in the rest of the watershed by 2015. As of the middle of December 2010, 47 small septic systems have permits with nitrogen reducing devices which will reduce nitrogen concentration in the wastewater by 50%.

Appoquinimink Watershed

Pollution Control Strategy

On October 4, 2010, after ten years of deliberation, public discussion, and education, the Appoquinimink River Association submitted the Appoquinimink Pollution Control Strategy (PCS) for final approval from the Department of Natural Resources and Environmental Control (DNREC). From working with DNREC over the past years, the Association believes that the document achieves the 2003 Total Maximum Daily Load required nonpoint source nutrient load reductions for the Appoquinimink River and its tributaries. The Appoquinimink River Association has been implementing these strategies for years. The PCS was modified so that it more clearly shows how the PCS meets EPA 319 Non-Point Source (NPS) A through I criteria for achieving TMDL load reductions. Full implementation of its elements within the PCS should lead to the achievement of the TMDLs for Total Nitrogen (TN) and Total Phosphorus (TP). Because of the lag time between seeing improvements in ground and surface water quality, estimated to be up to 30 years, improved water quality conditions will not be realized immediately. The Department will continue to monitor water quality, as will many citizen volunteers. The Department is committed to revisit this Pollution Control Strategy in 10 years to ensure that water quality is improving with implementation of the regulations and voluntary practices called for within this document.

Analysis using a basic land use loading rate model shows that as of November 2010, nonpoint sources of TN and TP have been reduced by 109% and 111%, respectively (Figure 1 and 2). Thus, voluntary programs for installation of agricultural best management practices have been extremely successful as well as the County's and local governments' efforts to protect open space and riparian buffers. Implementation of the Sediment and Stormwater Law has also led to decreases in nutrient loading, however, the full impact is not shown here because some sediment

and stormwater practices, known to be in place, are not yet captured in a database and therefore, not considered in these calculations.

Broadkill Watershed

An important partner working toward increased water quality in the Broadkill Watershed is the Milton Community Foundation. Established in 2006, the Foundation is a charitable/educational tax-exempt 501(c)3 community based organization that works in partnership with other organizations and the Town of Milton to promote public/private partnerships, provide community based solutions and improvements and good governance, and enhanced civic services and economic development. One of the Foundation's specific goals is to support the improvement of the water quality of the Broadkill River, and protect its shoreline so the Broadkill River becomes fishable and swimmable, and to support other efforts that protect the volume and quality of groundwater in the Broadkill River watershed.

Using the Broadkill Watershed Assessment and Plan, the Milton Community Foundation and the Town of Milton submitted a grant request in January 2010 to the State of Delaware to address the much needed unpermitted and untreated stormwater discharges documented in the Milton area. The projects chosen would install rain gardens, install bioretention facilities, and buffer some areas of the Broadkill River in the Town Park.

Due to one potential retrofit site in Milton not wanting to be part of the grant, the potential projects had to be re-assessment for financial feasibility and practicality of doing the remaining site, some momentum was lost with the town and proposed partners. Two project sites were thought to be doable with the funds requested from Clean Water Council Community grants H.O. Brittingham Elementary School (H.O.B. and Milton Public Library (county owned) were chosen because both are excellent locations for community outreach, publicly accessible demonstration sites, and support from the Milton community for maintenance.

After meeting with personnel, the Cape Henlopen School Board unanimously supported the H.O.B. project and County Engineering and Head Librarian for Milton Library also support the project.

Since Duffield Associates, Inc has well regarded engineering/design expertise and Environmental Concern, Inc has strong experience with developing schoolyard habitats and involving students and maintains a native plant nursery, the two firms decided to combined their expertise and submit one project proposal. A follow up meeting at Duffield Georgetown office with two potential contractors developed an agreement in principal. Duffield Associates, with input from ECI and Sussex Conservation District, gave presentation with detailed conceptual design, at Milton Community Foundation January 2011 meeting. Milton Community Foundation Board unanimously approved the combined proposal to do H.O.B. (Two areas – circle and in front by the school sign) and Milton Library (two areas – on side of bldg. and grass area adjacent Broadkill River). Duffield proposed to do a design/build and serve as project manager with ECI and Sussex Conservation District as subcontractors. Duffield Associates wants to have the project built and planted by mid- spring 2011.

In addition, Guided Path Design is designing and planning a riparian buffer around the Town Park in Milton.

Christina Watershed

The Christina Pollution Control Strategy was submitted into the Department in November 2007. The Christina PCS was written to meet EPA's 319 NPS program "A through I" criteria. Presently, the PCS is being updated to include new agricultural acreage numbers, as well as incorporating new habitat TMDL information for the Christina watershed.

Delaware's Piedmont Basin includes 58 segments that are identified as Category 5 (i.e., the 303(d) list) waters of the state's 2008 Integrated Report as impaired for habitat and/or biology. The impaired segments, originally listed in 1998, are located throughout the Christina River, Brandywine Creek, Red Clay Creek, White Clay Creek, Naamans Creek and Shellpot Creek watersheds.

Tetra Tech, Inc., through an agreement with DNREC and EPA Region 3, developed a project with the goals to review, compile, and evaluate available information on current impairments in Delaware's Piedmont Basin to determine appropriate options, including restoration activities for addressing the listed habitat/biology impairments within the Basin. The first task focused on identifying restoration activities that have been implemented within these watersheds, and the second task focused on reviewing information on restoration activities to evaluate their potential to restore impaired water bodies and attain water quality standards. Much of the work directly supports several habitat recommendations within the PCS, including:

- Increase Urban Tree Canopy
- Protect Existing Wooded/Vegetated Open Space Areas
- Reforest Watersheds and Headwaters

In July 2010, Tetra tech, Inc. submitted the report "Assessment of Biology and habitat Impairments in Delaware's Piedmont Basin." The report's findings are being incorporated into the updated PCS.

Mispyllion and Cedar Creek Watershed

On June 23, 2010 the Mispyllion Tributary Action Team (TAT) completed their pollution control strategy recommendations for the Greater Mispyllion Watershed (Mispyllion River and Cedar Creek). After some minor editing, the TAT submitted their recommendations to the DNREC Secretary in early August 2010. The TAT believes their pollution control strategy recommendations will achieve the nutrient and bacteria reductions needed to meet the Mispyllion River and Cedar Creek Total Maximum Daily Loads (TMDLs) as set by EPA. Their recommendations to reduce nutrients flowing into the Greater Mispyllion Watershed can be grouped into three main categories:

- Reducing nutrients from developed land (existing and future)

- Provide incentives for additional nutrient reductions from agriculture;
- Education

Recommendations which received an average priority ranking of 4 or greater on a scale of 1 to 5 by the TAT are identified as High Priority within the recommendations. In addition, the TAT recommended the creation of a watershed association to maintain and increase public participation in improving the quality of the watershed. They want the watershed association to be a non-profit organization engaged in activities to preserve, protect and enhance rivers and related natural resources. The team believes that with a strong identification of the community with the river, that there would be a significant interest in participation in a watershed association. An established association would be beneficial in publicizing and conducting educational programs that raise awareness and help improve water quality in the Greater Mispillion watershed. To date no progress has been made on the Greater Mispillion pollution control strategy nor the development of a watershed association.

Murderkill Watershed

The Pollution Control Strategy for the Murderkill is drafted and has incorporated new buffer recommendations based on a recent analysis. The document is edited and is being reviewed for compliance with EPA's "A through I" criteria. Cost estimates need to be finalized in the PCS as well as revising the agricultural BMP numbers with 2010 data.

St. Jones Watershed

St Jones Restoration

The St Jones PCS is written, it addressed EPA's "A through I" criteria and incorporates the results of a new buffer analysis and the City of Dover's recently updated riparian buffer ordinance. The PCS also needs to finalize the financial analysis and revised Dover Silver Lake Park Stream Restoration Site (NPS Funds: FY '07 and FY'08) Design consultant services were secured from Biohabitats, Inc. to prepare plans for a regenerative stormwater conveyance system for the City of Dover's Washington Street drainage area and to restore approximately 320 feet of stream bank along the St. Jones River below the spillway at Dover's Silver Lake Park. Biohabitats submitted the 100% draft design plans and cost estimate and the permitting process was initiated to secure an Army Corps of Engineers Nationwide Permit #13 and a DNREC Subaqueous Lands Permit. In accordance with the Regional Conditions preconstruction notification process, letters were sent to the U.S. Fish and Wildlife Service, the National Marine Fisheries, the State Historic Preservation Office, the State Heritage Program, the State Subaqueous Lands Section, and the State Coastal Management Program. Following receipt of comments from these agencies, permit applications were submitted.

School's Environmental Science Education program. Floating wetlands were also launched into the pond to reduce excess nutrients through root uptake. Results from water quality sampling pre- and post- wetlands launch will help determine the effectiveness of the floating wetlands. This project was the first of its kind in Delaware.

- b. Coordinated the design, landscape, and construction of two rain gardens to capture roof runoff from the main educational building and the conversion of a dry pond to bioretention facility that will capture parking lot runoff in addition to a curb-cut that will allow highway runoff to enter the facility.
 - c. We intend to use the additional funds to expand our water quality improvement projects on the property to include a Biosock filter placed at the entrance of a stormwater inlet that leads to the stormwater pond and exclusion fencing to keep Canada geese from degrading the property and contributing to the pollution load. We will also create educational signage for the projects as the Delaware Agricultural Museum where more than 500,000 visitors have toured the facility since its opening.
3. Sub-watershed Implementation Strategy: Starting the process to develop a sub-watershed strategy, in conjunction with the City of Dover and the Silver Lake Commission, to serve as a resource of priority projects to improve water quality in the St Jones watershed.
 4. Attended design and planning meetings for phase two of the Silver Lake Revitalization Plan with DNREC staff, Army Corps of Engineers, and Biohabitats Inc. and kept the City of Dover and Silver Lake Commission abreast on new developments of this project.
 5. Facilitated meetings between DNREC and the City of Dover to address a failing low-head dam structure in the St Jones River. Coordinating with the City, DNREC, and Silver Lake Commission to have the structure removed.
 6. Dover Fun Ride and Stride on National Trails Day (June 5, 2010)—this event was a platform to raise awareness about the public trails in the Dover area that are underutilized by nearby residents. This was the first year for the event that coincided with National Trails Day and generated dozens of participants and publicity about local trails.
 7. Dover High School stormwater improvements are moving forward with the approval from the Principal and cooperation from Grounds and Maintenance staff and science education teachers. Teachers are interested in propagating rain garden plants and using the future rain gardens as education tools.
 8. Participation in the City of Dover's Environmental Ordinance revisions and the Development Advisory Committee.

9. Education and outreach: Participated in the Delaware State Fair, Delaware Coast Day, and conducted an interview with WBOC-TV 16 that aired on September 22 and promoted the rain gardens at the Agricultural Museum, the Rain Gardens for the Bays campaign, and environmental stewardship in regard to stormwater pollution. Provided educational presentations to children at the Dover public library, active environmental stewards of the Delaware chapter of the Sierra Club, and nursery and landscape professionals and companies at the annual Summer Expo hosted by the Delaware Nursery and Landscape Association.
10. Received training for certification as a Rain Garden Specialist and Trainer by Rutgers University and training in the use of Social Media.
11. Gained valuable experience in coordinating the creation of a rain garden at East Coast Garden Center in Millsboro, DE.

x. Delaware Rain Barrel Program

The Nonpoint Source Program has implemented a very successful statewide rain barrel program. Since the inception of the program in 2008, approximately 1,500 barrels have been distributed statewide. The program was unique in that the barrels retailed for \$120 but were purchased at a bulk discount price of \$66.00 and sold to residents for the same price. The program did not cost the state any money but provided water quality and conservation benefits while providing a substantial savings to Delaware residents.



In 2010, the NPS program implemented its third annual statewide rain barrel distribution. One hundred barrels were earmarked for each of the three counties and the distribution was scheduled from 10 a.m.-7 p.m. The program was so successful that all 300 barrels were sold out in only two hours. A fourth rain barrel distribution is scheduled for May 2011.

xi. Community Water Quality Improvement Grant Program

The purpose of the Community Water Quality Improvement Grant Program (CWQIGP) is to provide financial assistance to eligible entities to facilitate projects that will support water quality improvement in impaired Delaware watersheds. The CWQIGP is administered by DNREC, Division of Water Resources and managed by the Nonpoint Source Program. The goals of the program are to support projects that focus on the developed landscape that will help to improve water quality and address one or more of the following goals:

- Provide benefits to water quality within an impaired watershed

- Implement non-regulatory projects in a watershed management plan
- Installation of community stormwater management improvements in existing developments and municipalities
- Collection of federally acceptable quality controlled water quality data by volunteers
- Restoration of water quality benefits

In December 2009, the program solicited requests for proposals and nineteen were received; however, due to limited funding a ranking committee was established and the following seven projects were funded:

Milton Community Foundation The watershed plan is 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. The second component is an inventory of potential pollution control opportunities targeted at the identified impairments. 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. The main objective of this project is to implement pollution prevention and mitigation stormwater practices within the Broadkill watershed and to develop competence within the Town of Milton to manage their own stormwater and other nonpoint source pollutants. The following projects will be completed:

- Retrofit a dry pond into a rain garden and schoolyard habitat to support curricula at the H.O. Brittingham Elementary School in Milton.
- Create several rain gardens near the Milton Public library to treat rooftop runoff.

Partnership for the Delaware Estuary- Stormwater runoff is a growing concern in Delaware. With much of the state's open lands being developed, more storm water is running off impervious surfaces and into our waterways than ever before. This storm water runoff carries pollutants from impervious surfaces into our streams. In response, the Partnership for the Delaware Estuary (PDE) will install 3 rain gardens at locations in the St. Jones Watershed, and in Delaware's capital city of Dover.

Project sites will include the Natural Resource Conservation Service (NRCS) office park, the North Dover Elementary School, and a third school-site location to be determined. The installation of these rain gardens will improve water quality in the St. Jones, an impaired watershed within the Delaware Estuary.

Delaware Agricultural Museum-Dover's Silver Lake- (See Project Highlight Below)

The Puncheon Run Floodplain/ Kent Conservation District- The Puncheon Run is a tributary of the St. Jones River that drains approximately 2,200 acres from the west and south sides of the City of Dover. The stream has been negatively impacted by past urban development. The

natural floodplain has been eliminated because of the historical grading and filling on the south side of the stream near Lynnhaven Drive and Governors Avenue and has introduced numerous sharp bends, restricting flow. The result is increased water elevations upstream due to the channel restrictions and loss of the natural stream bank.

The following objectives will be accomplished:

- Restoration of Impacted floodplain
- Water quality treatment of urban runoff

This project proposes to restore a portion of the lost floodplain west of South Governor's Avenue and to provide for water quality treatment of stormwater from 3 existing communities .It is proposed to restore the portion of the floodplain at the corner of Governors Avenue and Lynnhaven Drive by creating a broad overflow area with a meandering channel on the north side of the stream. The project will intercept an existing ditch draining the older community of Woodbrook. The flow from Woodbrook will be filtered through a constructed stormwater wetland within the overflow area. Water quality features are also proposed for the communities of Crossgates and Mayfair by excavating an existing drainage pipe and installing open bio-filtration water quality features.

Rosetree Hunt Storm water Pond Renovation/NC Conservation District- As part of the New Castle County Office (NCC) of Community Governing Storm water Amnesty Program the Rosetree Hunt Maintenance Association (RHMA) was included in the voluntary NCC program that provided much needed financial and technical assistance with major storm water pond repairs. These repairs and improvements will bring the RHMA storm water pond into compliance with DNREC's Sediment and Storm water Regulations and DNREC's NPDES permit for storm water that was issued to New Castle County. Funding for facilities covered by the NCC Amnesty Program was provided to New Castle County by the State of Delaware.

The following objectives will be accomplished:

- Upgrade the Rosetree Hunt stormwater management pond so that it exceeds the requirements of the DNREC's Sediment and Stormwater Regulations and DNREC's pending NPDES permit for stormwater management in New Castle County.
- Removing excess sediments that have accumulated in the forebays, low-flow channel, and in front of the inlet pipe(s).
- Repairing and restoring the eroding embankment that surrounds the pond;
- Replacing the existing outlet structure and existing inlet pipes;

- Re-establishing and reconstructing the low-flow channel to the design depth to increase retention time and contact area;
- Replacing and repairing riprap as needed;
- Removing dead and volunteer vegetation from the emergency spillway;
- Designing and constructing water quality improvement practices to reduce sediments, nutrients, and/or bacteria. Practices being considered include, but are not limited to:
 - Redesigning and constructing forebay(s) to control sediments;
 - Reconfiguring the low-flow channel by constructing micro-pools, bioretention areas and/or shallow pools to enhance nutrient removal and reduce bacteria levels due to microbial growth; and
 - Planting wetland vegetation to uptake water soluble nutrients.
- Depending on available funding, NCCD will work with the DNREC to contract with a qualified contractor or NGO to collect and analyze wet-weather water quality data that meets DNREC's data quality requirements.

Anchorage Canal Drainage Area Storm water Retrofit Project /Center for the Inland Bays- The Little Assawoman Bay (LAB) is impaired by excess nutrients and regularly violates primary contact recreation and instantaneous dissolved oxygen criteria. The excess nutrients have resulted in murky waters that prohibit growth of submerged aquatic grasses, and low dissolved oxygen levels have further degraded habitat for fish and benthic animals. In 2008, the Inland Bays Pollution Control Strategy (PCS) was promulgated to guide the reduction of nitrogen and phosphorus loads by the 40% necessary to meet the watershed's 2004 TMDL. The PCS has as one of its actions the voluntary "[Creation] of storm water management facilities and source reduction strategies for 4,500 acres of urban and residential lands developed pre-1990," which is to be implemented by DNREC, DELDOT, Sussex County, and the Sussex Conservation District.

The project will implement the following strategies:

- Retrofit an existing ditch within the DelDOT right of way adjacent to the Sea Colony high-rise complex.
- Convert an existing ditch to a wet swale with a sediment control forebay, check dams, and vegetated filter strips to incrementally improve treatment of runoff from residences, businesses, roads, and a large area of the Sea Colony parking lot. The Town of South Bethany's monitoring committee will measure anticipated changes in nutrients and dissolved oxygen concentrations within the Canal by continuing its program of continuous and spot-sample data collection. This data meets federal standards for citizen

monitoring through EPA approved QA plans through the CIB and the University of Delaware Citizen's Monitoring Program.

- Achieve significant public outreach and have continued community cooperation and informal education on stormwater impacts and treatment.

Cool Run Watershed/ White Clay Cree/UD- White Clay Creek and its tributaries are listed by the US EPA as impaired waters for nutrients, dissolved oxygen, bacteria, and sediments. Cool Run, a tributary of White Clay Creek with headwaters on the University of Delaware's main campus in Newark, has long been impacted by nonpoint source pollution from urban, industrial, and agricultural sources (Fig. 1a). Two tributaries of Cool Run draining the University's main campus and some residential areas, and another tributary draining the University's Newark Farm converge at a pond behind a storm water weir on the farm. Downstream of the pond, another tributary enters Cool Run from a residential area that was a historical industrial site. Cool Run discharges into White Clay Creek 2.5 miles downstream of University lands. The Cool Run is in the White Clay Creek Wild and Scenic Watershed, the first wild and scenic river in the USA designated on a watershed basis rather than a river segment basis. The University campus is one of only two land grant institutions in the U.S. that have a wild and scenic river flowing through them. White Clay Creek discharges to the Christina River; projects identified in this proposal will meet the recommendations of the Christina Basin Pollution Control Strategy required by the EPA Clean Water Act TMDL.

The UD WATER project team, after discussion of pollutant loads from different land uses in the 9 sub-watersheds, developed the following preliminary recommendations to reduce total pollutant loads to the Cool Run tributaries of the White Clay Creek:

- 1) Increase the number and acreage of bio-retention ponds, grassed swales, and wetlands throughout the watershed, targeting them to areas of greatest TSS and nutrient loading
- 2) Install filter strips, vegetated buffers and other BMPs along streets and parking lots
- 3) Minimize stream bank erosion by targeted stream restoration projects focused on the Cool Run tributaries passing through the agricultural land on the UD Newark farm
- 4) Conduct stream monitoring to evaluate the impact of installed BMPs and verify USEPA event mean concentration values used to calculate loads from different land use categories
- 5) Conduct a UD and City of Newark educational program that promotes wider implementation of BMPs by the University, commercial operations, and residents in the watershed

Subsequent funding is planned for the implementation of additional water quality projects for 2011.

2010 Highlight - Delaware Agricultural Museum:

The Delaware Agricultural Museum received \$35,000 in funding from a Community Water Quality Improvement Grant (CWQIG) administered by DNREC, Division of Water Resources and managed by the Nonpoint Source Program.

Primary Objectives of the Project

- Assist in the implementation of structural Best Management Practices (BMPs) in TMDL watersheds based upon the St Jones River Implementation Plan, February 2009 and recommendations of the Silver Lake Commission.
- Carry out projects to support the implementation of TMDLs and accomplish objectives and milestones in Delaware's NPS §319 Management Plan.
- Determine watershed appropriate pollution control strategies for TMDL implementation through facilitated Tributary Actions Teams.
- Implement Best Management practices within specific watersheds for the purpose of delisting impairment segments from the 303 (d) List.

The project funded the installation of several water quality best management practices in an effort to reduce the amount of nonpoint source pollutants that reach the St. Jones Watershed. The following best management practices were installed on the Agricultural Museum's property:

Mill Pond Vegetative Native Buffer

The mill pond located behind the Museum's main building offers many opportunities for water quality enhancements. First, a vegetated native buffer was planted around the severely eroded and nutrient and bacteria laden pond. Plant selection and design work was completed by Lorene Athey a licensed architect with Guided Path Planning and Garden Design. Plantings were installed with the help of students from Polytech High School's Environmental Science Education Program and DNREC staff.

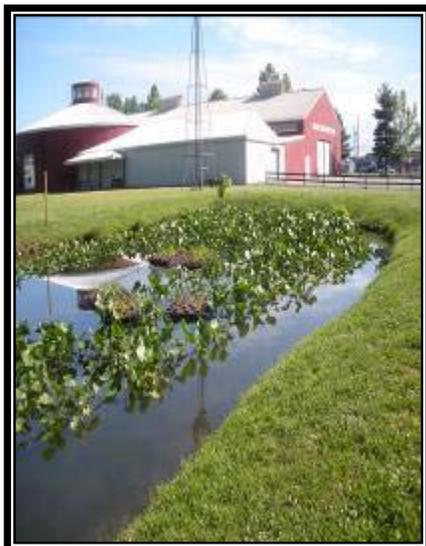


Figure: 1 before pond buffer planting



FFigure: 2 After pond buffer planting

Floating Wetlands

Four 4' x 5' floating vegetated wetland rafts were installed in the pond to reduce excess nutrients through root uptake. Floating wetlands are innovative floating mats that can be planted with native plants and launched into a stormwater pond. The rafts aid in water filtration much like a wetland does. Not only does the raft provide a pollutant removal pathway for the uptake of nutrients and heavy metals but it also prevents light penetration into the water column, aiding in algae growth suppression. Also, like a wetland, the rafts promote wildlife habitat for fish, waterfowl, butterflies and more. Floating wetland rafts have proven to be extremely effective in the filtration of nutrients such as nitrogen and phosphorous as well as total suspended sediments.

The rafts are constructed of hardy, buoyant closed cell polyethylene foam, the structure allows for plastic pots to be arranged in the foam, thus securing the pot and the plant it will carry. The foam raft is durable and can be used multiple times by annually planting fresh vegetation in the pots in May or June. A planting medium that retains proper bounciness and actually attracts and removes nutrients from the water is placed in the pot.

Before the rafts were launched into the pond, chemical water quality testing was done to establish a baseline measurement of the pond's water quality. Once the rafts were placed in the pond testing was performed twice a month during the growing season to evaluate the effectiveness of this practice of removing nutrients for water quality benefits and the potential of using this technology in other impaired water bodies. This project was the first of its kind in Delaware.



Figure: 1 Floating wetland raft



Figure: 2 Floating wetland raft

Following are nutrient reduction results for the floating wetlands (outdoor pond):

- Nitrate = 759 mg/(ft²*day)
- Phosphate = 106 mg/(ft²*day)
- Ammonia = 759 mg/(ft²*day)
- TSS below detection limits (<10mg/L)
- DOC by 1177 mg/(ft²*day)
- BOD = 547 mg/(ft²*day)

Rain Garden Planting

Two rain gardens were constructed in front of the Agricultural Museum and planted with native plants to capture runoff from the main educational building.

Rain gardens are much like bioswales, they are depressions that can hold water for a number of hours, even days. By holding the water, the rain garden is allowing the water to be absorbed into the ground. Like bioswales, rain gardens are planted with native plants, and can add an aesthetic element to any property they are used on. The proposed project would take in the Museum's roof water runoff; this runoff would normally flow into nearby storm drains and subsequently Silver Lake.



Figure: 1 Before rain garden planting



Figure: 2 After Rain Garden Planting

Dry Pond Conversion to a Bioswale

An existing dry pond was converted to a bioswale (also referred to as bioretention) to capture runoff from the Agricultural Museum's parking lot. In addition, with permission from Delaware's Department of Transportation a curb-cut will be installed along busy Rt. 13 to allow highway runoff to enter the bioswale for treatment prior to entering Silver Lake.

Bioretention is a newer type of best management practice (BMP) that removes more pollutants than traditional approaches to stormwater management. While the use of stormwater ponds is still an acceptable and widely-used method of treating and managing stormwater, this newer technology not only removes more pollutants, but also provides for less runoff while blending into the landscape.

In fact, bioretention facilities are oftentimes mistaken for landscape islands, as they are planted with small shrubs, grasses, and sometimes even colorful flowers. The stormwater is directed to the bioretention facility, a depression filled with a special soil media. The soil mixture comprised of triple-shredded hardwood mulch, concrete sand, and sphagnum peat moss acts to remove

pollutants and infiltrate water, resulting in less runoff into our streams. Ultimately, bioretention is designed to mimic natural hydrology.

To provide cost savings for the project engineering for the bioretention facility and the rain gardens were completed by staff from DNREC's Sediment and Stormwater Program and construction was performed by the Kent Conservation District equipment program.



Figure: 1 Drypond



Figure: 2 After bioswale conversion with plantings

Additional water quality improvements scheduled to be completed on the property include: A biosock filter placed at the entrance of a stormwater inlet that leads to the stormwater pond and exclusion fencing to keep Canada geese from degrading the property and contributing to the pollution load. Educational signage will be installed for the projects as the Delaware Agricultural Museum has had more than 500,000 visitors tour the facility since its opening.

xii. Rain Gardens for the Bays



Rain Garden sign at the Senior Center in Middletown

Through the combined efforts of the Center for the Inland Bays and EPA Region III, an initiative to create rain gardens throughout the Delaware Bay Estuary was realized. To reach and involve as many people as possible, various estuary programs and environmental partners are working together to educate residents about the benefits of having a rain garden. Through a series of meetings with staff from the Center for the Inland Bays, Maryland Coastal Bays Program, Delaware Nature Society, Delaware Sea Grant Program, University of Delaware Cooperative Extension, URS, Inc., local Conservation Districts, and staff from various DNREC programs, the “Rain Gardens for the Bays” program was developed. The program allows each partner to have its own local campaign, but utilize a centralized message and distribute similar marketing materials at various events throughout the Estuary. The goal of the program is to use marketing tools to move rain gardens from demonstration modes to ‘common practice.’

As part of the marketing campaign, a central website to house all the general information and appropriate links related to rain gardens was developed and managed by EPA. Citizens who wish to participate in the program may register their rain garden on the website and receive signage indicating that their rain garden is a part of the Rain Gardens for the Bays campaign. A list of potential rain garden sites was developed using input from the program partners. The potential sites were screened by conducting soil borings and soil permeability tests. The group decided to fund 10 rain gardens within the region as demonstration sites (see Table A). In addition, funds from DNREC’s Community Water Quality Improvement Grant allowed five additional sites to be added to the demonstration list. To date, six demonstration sites from the list have been constructed and planted.



What is a Rain Garden?

A rain garden is a shallow depression vegetated with native grasses and plants.

Stormwater runs off from downspouts, driveways and roads, and flows into the garden, where it can soak into the ground and filter through the soil!

Create a Rain Garden!

- Improve Water Quality
- Help Reduce Ponding
- Boost Curb Appeal
- Lower Landscape Maintenance
- Attract Native Birds and Butterflies

Find Out More!



Call 302-739-9939 or visit www.raingardensforthebays.org

Postcard developed by the marketing team of the Rain Gardens for the Bays committee.



Rain Garden North of Museum Entrance



Students from Fairview elementary school with Governor Markell, DNREC Secretary Collin O'Mara, EPA Region III Deputy Administrator Bill Early, Director of the Partnership for the Delaware Estuary Jennifer Adkins

The Rain Gardens for the Bays campaign officially launched on September 15, 2010 with an event at the Delaware Agricultural Museum and Village in Dover. EPA worked with DNREC Public Affairs staff to develop the event agenda, press release, talking points for the guest speakers, outreach materials, and event logistics. Guest speakers included Delaware Governor Markell, DNREC Secretary Collin O'Mara, EPA Region III Deputy Administrator Bill Early, Director of the Partnership for the Delaware Estuary Jennifer Adkins, Director of the Center for the Inland Bays Ed Lewandowski, and Clean Water Advisory Council Vice Chairman Jeffrey Bross.



University of Delaware’s Rain Garden for the Bays rain garden at Lewes prior to planting and after completion

VII. Load Reductions

In 2009, load reductions were calculated for many of the projects completed. Load reductions are calculated using guidance established during the Inland Bays Tributary Action Teams’ development of the Inland Bays Pollution Control Strategy.

2009 Project Load Reductions by Project

Project	Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
Conservation Reserve Enhancement Program	758	22	148
Ecological Restoration	776	720	111
Kent Conservation District Planners	271,816	533	NA
Nutrient Management Relocation	4.9 million	3.7 million	NA
Sussex Conservation District Planners	551,482	1059	NA
Total	5,724,832	3,702,334	259

VIII. Future Changes and Challenges

Programmatic Changes

From 1989 to 1997, the NPS Program relied on the development and implementation of Best Management Practices, identification of key partners, establishing agreements for interagency cooperation and funding many successful education, protection and restoration projects. This early period of NPS management in Delaware served to foster a keen understanding of the value of collaboration, consensus and community involvement in water quality management.

From 1997 to the present, efforts were made to fund implementation programs or activities that address the priority NPS contaminant sources such as agriculture, forestry, urban runoff, hydro modification, land disposal and various other miscellaneous sources. Examples of past activities include funding Kent and Sussex County Conservation District planner positions, stream restoration, and septic system pump-out, repair and/or replacement. These activities were prioritized based upon contaminate category and tended to establish BMP implementation on a

geographic wide scale throughout Delaware. This broad approach served to successfully educate various sectors of the positive outcomes from BMP implementation and fostered a high rate of acceptance within each of the respective implementation groups.

While these and similar projects are expected to continue, a prioritized approach will be established to assure NPS activities are focused in stream reach drainages with the highest potential for contaminant delisting and/or re-establishing designated uses. In short, Delaware's NPS focus will center on impaired waters of the state when applicable.

Using geospatial data coverage, areas of Delaware will be identified as high priority for NPS activities. This delineation will assist the NPS Program during the review and ranking of submitted annual 319 grant project proposals. Highest priority will be designated in impaired water drainages or sub-drainages that have the highest rate of NPS control BMPs, activities or projects. As EPA has mandated 319 Grant expenditures should be focused on impaired waters with an approved Watershed Plan and/or a defined Pollution Control Strategy, assessment and establishment of priority drainages are scheduled first these areas or Delaware first.

Land Use Changes

Ed Ratledge, Director of the Center for Applied Demography and Survey Research at the University of Delaware says the number of acres of farmland is decreasing. Delaware had around 900,000 acres of farmland in 1920. Now we have about 580,000 acres in the state. Farmland acres are projected to continue to decrease until we reach about 380,000 acres by 2030.

The NPS program must address land use changes and trends for the next five years and beyond. As water runs over the landscape it picks up pollutants. These pollutants are either discharged into surface waters through runoff or seep through the soils into groundwater. The polluted groundwater eventually gets into the surface waters. As the landscape changes, so too does the funding demands of the NPS Program. Because of this fact, looking at land use will give the NPS Program goals, objectives and funding needs in which to focus the various resources the NPS Program receives. Agriculture BMPs, historically, have given the NPS Program the biggest return of nutrient uptake per dollar spent.

Land Use Challenges

The trend of land use from agriculture to urban in the future could also mean a trend for the NPS program to spend more money on technologies and initiatives to reduce non-point source pollution. When land is developed nutrient loadings come from multiple sources, such as yard maintenance, wastewater disposal, stormwater runoff, soil erosion, and increases in impervious cover. Delaware is the 9th fastest growing state according to the U.S. Census Bureau. The fast rate of growth in Delaware means an increase in urban/residential areas. An increase in urban/residential areas nutrient loads from these land uses must be dealt with without relinquishing our efforts in agriculture.

IX. List of Partner Organizations/Committee Members

The hard work and many hours of agency staff members, organization members and private individuals who have partnered with the NPS Program in 2010 to address, reduce, identify and/or measure NPS pollution in Delaware is greatly appreciated. This NPS pollution control and prevention program has been very active, well received and effective. It is a credit to our partners as they have cooperated in the face of many conflicts to make this program what it is today.

Al Rizzo	U.S. Fish and Wildlife Service	Jim Cassidy	DNREC/Groundwater Discharges
Alan Jones	Governor's Council on Forestry	Jim Chaconas	DNREC/Wetlands & Subaqueous Lands
Ann Marie Townshend	Kent County Planning Office	Jim Short	DNREC/Solid Waste
Austin Short	Delaware Department of Agriculture/Forestry	Joe Farrell	University of Delaware, Sea Grant
Betsy Frey	DNREC/Air & Waste	Kathy Bunting-Howarth	DNREC/Water Resources
Bill Rohrer	Delaware Nutrient Management Program	Kim Finch	DNREC/Small Businesses Ombudsman
Bob Coleman	Delaware Nutrient Management Program	Kimberly Cole	DNREC/Delaware Coastal Program
Bob Moore	Delaware Department of Agriculture	Kip Foskey	Sussex Conservation District
Bonnie Willis	DNREC/Delaware Coastal Program	Laurie Janeka	New Castle Conservation District
Brenda Zeiters	DNREC/NPS Program	Lyle Jones	DNREC/Watershed Assessment
Brian Hall	State of Delaware Planning Office	Lynn Mangus	Farm Service Agency (State Office)
Bud Malone	University of Delaware, Cooperative Extension	Marianne Walch	DE Department of Transportation
Carl Solberg	Kent County	Mark Biddle	DNREC/Watershed Assessment
Chuck Williams	DNREC/Shoreline	Mark Hogan	DNREC/NPS Program
Dale Churchey	Delaware CREP Program	Mike Brown	DNREC/ District Operations
Dave Chapman	University of Delaware, Sea Grant	Jamie Rutherford	DNREC/Sediment & Stormwater
Dave Hansen	University of Delaware, Cooperative Extension	Randy Cole	DE Department of Transportation
Dave Schepens	DNREC/Groundwater Discharges	Ric Kautz	County Planning Offices
Derby Walker	University of Delaware, Cooperative Extension	Robert Baldwin	DNREC/Soil & Water Conservation
E.J. Chalavala	Center for the Inland Bays	Robert Palmer	DNREC/NPS Program
Ed Lewandoski	CIB Center for the Inland Bays	Rodney Morehart	Kent Conservation District
Eric Beuhl	Center for the Inland Bays	Sally Kepfer	NRCS (State Office)
Frank Piorko	DNREC/Sediment & Stormwater	Sam Myoda	DNREC/Watershed Assessment
Glenn Gladders	Delaware Department of Agriculture/Forestry	Sara Wosniak	Appoquinimink Watershed Coordinator
Gordon Johnson	University of Delaware, Cooperative Extension	Scott Blaier	DE Department of Agriculture
Greg Moore	DNREC/Fish&Wildlife	Sharon Webb	DNREC/ NPS Program
Jen Walls	DNREC/Office of the Secretary	Shelley Tovell	DNREC/Fish&Wildlife
Jen Gochenauer	Delaware Nature Society	Steve Ditmer	Glatfelter Pulp Wood Company
Jen Nelson	DNREC/NPS Program	Steve Williams	DNREC/Soil & Water Conservation
Jerry Kauffman	Water Resources Agency	Tim Garrahan	NRCS State Office
Jessica Watson	Sussex Conservation District	Tim Riley	Kent Conservation District