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# Delaware

## NONPOINT SOURCE PROGRAM ANNUAL REPORT

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2009

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 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 Soil and Water Conservation.

## **V. Executive Summary**

This report documents the activities and highlights of the State of Delaware, Nonpoint Source (NPS) Program during the 2009 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 2009, 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 2009 NPS Annual Report include the following:

- Sussex County Conservation District – Conservation Planners

During the 2009 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 2009, the District planners made 1,228 contacts and famers and landowners that resulted in an expenditure of over \$1.477 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 2009, Conservation Planners in Kent County encouraged participation in the USDA EQIP Program in the amount of \$1,327,401 spent on the installation of agricultural BMPs.

- Nutrient Relocation Program

In 2009, the Nutrient Relocation Program accounted for the transportation of 4.9 million pounds of total nitrogen and 3.8 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 made their way to Delaware's surface waters.

- SRF Agriculture Loan Program

In 2009, 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 nearly \$130,000.

- Wetland and Stream Restoration Projects

In 2009, Wetland and Stream Restoration projects initiated and/or completed include the following:

- University Of Delaware – Phase II of a 1 acre wetland restoration project completed on the University’s Newark farm property.
  - Cart Branch Tax Ditch – design for a 1,000 foot channel restoration project
  - Hodgson Vo-Tech School Wetland Restoration – planning, design and layout complete for the 3 cell project
  - Swartz/Aspendale – planning and design initiated for this 5 acre wetland restoration
- Stream & Corridor Enhancement Program

In 2009, Stream and Riparian Corridor Enhancement Program projects included the following:

- **Delaplane Manor Stream Restoration Site** - This project is located along an unnamed tributary to White Clay Creek in northern New Castle County. The project restored approximately 150 feet of stream channel and adjacent banks
- **Middletown Silver Lake Park Stream Restoration Site** - In a cooperative effort with the Appoquinimink River Association, the Stream Restoration & Riparian Corridor Enhancement Program completed a stream restoration project adjacent to Silver Lake Park in Middletown in late September 2009. The project involved the stabilization of approximately 871 of stream channel (450 of an ephemeral drainage channel that drains stormwater and 421 feet of an intermittent channel).
- Shoreline Stabilization Cost Share

Completion of a restoration project to create a tidal transition wetland along Indian River at Sandy Beach in Dagsboro. The project includes features in excess of 1,000 feet of shoreline between the ends of Sandy Beach Drive and Pebble Drive located near Dagsboro. The shoreline is comprised of transition marsh including low and high marsh wetlands. The low marsh wetland is comprised of Smooth Cordgrass (*Spartina alterniflora*). The high marsh is comprised of a variety of brackish marsh plants such as Salt Marsh Hay (*Spartina patens*), Spike Grass (*Distichlis spicata*), Common Three-square (*Scirpus pungens*), Salt Marsh Bulrush (*Scirpus robustus*), Water Hemp (*Amaranthus cannabinus*), Seaside Goldenrod (*Solidago sempervirens*) and Groundsel Tree (*Baccharis halimifolia*). Several sections of the marsh were actively eroding and the erosion was threatening the long term viability of the marsh to provide ecological benefits as well as protect the shore of the community.

- Pollution Control Strategies – Project Implementation

In 2009, 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 *2009 Highlights* identified were made possible through NPS Program funding provided to DNREC's Watershed Assessment Section.

- Urban Stormwater Retrofit

Several state and local agencies within Delaware including the DNREC Sediment and Stormwater Program, the Kent Conservation District, the Office of Management and Budget's Division of Facilities Management, and the City of Dover joined together to retrofit a poorly functioning wet pond into a new bioretention facility. The new facility provides for increased treatment to stormwater entering from an expansive parking area directly into the Saint Jones River, which runs directly into the Delaware Bay.

## 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 2009, the District planners made 1,228 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 Soil and Water Conservation by providing important information about the conservation efforts throughout the county. Five of the staff members are funded through a Section 319 Nonpoint Source Pollution grant and through base funding with the state of Delaware.

#### *2009 Highlights:*

- In 2009, the SCD expended nearly \$1.477 million in conservation cost-share funds. This included payments for cover crops, 4 poultry manure structures, 2 poultry composters, 31 heavy use area protection pads, 2 poultry windbreaks, 1 access road, 10 animal mortality, 1 feeding pad, 1 wildlife planting, 4 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 2009 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.

*2009 Highlights:*

- Cover Crop sign-up this year was our biggest ever. The Sussex Conservation District enrolled over 130,800 acres requesting nearly \$1.6 million in cost-share assistance. Nearly 32,000 acres were planted which equals over \$1.1 million in cost-share. Actual acres planted decreased by 4,220 acres - a 11.6% decrease over the acres planted in 2008. This decrease in acres planted was a direct result of extremely wet weather conditions in the fall. 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 on the signs.

*Presidedress Nitrogen Testing*

The Sussex Conservation District provides pre-side dress nitrogen tests 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 2009, the Sussex Conservation District completed 200 tests on 4,588 acres.

As well as 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 the University of Delaware Soils Lab. 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 his lime and nutrient levels which provides a more environmentally friendly method to farming.

*2009 Highlights:*

- SCD Conservation Planners tested 200 fields using pre-sidedress nitrogen tests, covering 4,588 acres in Sussex County. They also completed 64 nutrient management plans on 4,727 acres and 72 animal waste management plans.

<b>BMP's</b>	<b>State</b>	<b>EQIP</b>	<b>Total</b>
Manure Shed	4	14	<b>18</b>
Composter	2	8	<b>10</b>
Poultry Windbreak	2	17	<b>19</b>
Ag Waste System	0	0	<b>0</b>
Irrigation System	0	11	<b>11</b>
HUAP	31	102	<b>133</b>
Poultry Litter Amendment	0	60	<b>60</b>
Wildlife Ponds	1	0	<b>1</b>
Vegetative Shoreline	4	0	<b>4</b>

<b>Activities</b>	<b>Total</b>	<b>Acres</b>
Landowner Contacts	1,228	N/A
Conservation Plans	72	7,445
Nutrient Management Plans	64	4,727
Animal Waste Plans	72	N/A
FY09 Cover Crop Enrolled	194	130,840
FY09 Cover Crop Planted		31,907
Soil Samples	165	3,113
PSNT's	200	4,588
Manure Samples	55	N/A

<b>Dollars Expended</b>		
<b>State</b>	<b>EQIP</b>	<b>Cover Crop</b>
\$ 364,544	\$1,416,833	\$ 1,112,099

*Outreach and Education*

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

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, RiverFest, and the Cooperators' Dinner. The District in cooperation with the conservation partnership also has a display at the Delaware State Fair. Information about the District and our programs are distributed at these events.

Each year the Sussex Conservation District staff assists with the Delaware Envirothon. The Envirothon provides student 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 2009 Delaware Envirothon was held at the Big Oak Park in Kent County. Wilmington Charter Team A was the winner and went on to place fourth at the Cannon National Envirothon in North Carolina.

*2009 Highlights:*

- On December 3, the SCD held the biannual Cooperators’ Dinner at the Bridgeville Fire Hall. The dinner was well attended with 267 people in attendance. Pam Vanderwende, our Governor’s Conservation Award Winner and Ron Jester of the Delaware Agribility Program were the guest speakers.

*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 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 and Farm Service Agency 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 reach 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

*2009 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:

<b>BMP</b>	<b>Number</b>	<b>Unit</b>
Poultry Heavy Use Area Protection	51	Pads
Poultry Manure Structures	3	Each
Dead Bird Composters	3	Each
Manure Spreaders	4	Each
Front-end Loaders	2	Each
Cover Crops	12,058.9	Acres
Tile Drainage	757	Feet
Ditch Dipout	14,308	Feet
Rentar	4	Each
Roof Run Off System	1	Each
Dairy Ag Waste Roof System	1	Each

The Conservationist Planners completed a total of 354 inspections of installed practices (excluding drainage, which is every other year) 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 14 contracts were signed on 11 farms.

Cost-share funds in the amount of \$14,600 were obligated to cover the estimated costs for establishing the practices. The practices cover 133.7 acres and are broken down as follows:

<b>BMP</b>	<b>Number</b>	<b>Unit</b>
Hardwood Tree Planting	57.1	Acres
Wildlife Upland Habitat	26.3	Acres
Shallow Water Area for Wildlife	16.3	Acres
Filter Strips	30.7	Acres

Riparian Buffers	3.3	Acres
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Environmental Quality Incentive Program

The total amount of EQIP cost-share funds earned for the year was \$1,327,401. This money was used for the implementation of the water quality practices listed below:

BMP	Number	Unit
Composters	5	Each
Fencing	10,625	Feet
Heavy Use Area Protection	62	Pads
Irrigation Sprinkler Systems	513	Each
Nutrient Management	934	Acres
Pasture and Hay Planting	10	Acres
Pest Management	1,540	Acres
Waste Storage Facilities	5	Each
Windbreak / Shelterbelt	4,685	Feet

Nutrient Management

*2009 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 2009, a total of 163 samples were tested covering 6,796.95 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 - 6; poultry - 18; horse - 4; and beef - 3. The conservationists also completed 34 animal waste plans and 19 nutrient management plans covering 5,098.1 acres.

Education Initiatives & Awards

*2009 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:
  - Kent County 4-H: 4th Place overall – Wildlife, 1st Place – Oral Presentations 2<sup>nd</sup> Place

- Polytech High School Team A: 2<sup>nd</sup> Place overall – Aquatic Ecology, 1<sup>st</sup> Place – Biodiversity and Wildlife, 2<sup>nd</sup> Place – Forestry, 3<sup>rd</sup> Place

### 12th Annual Barn Dance

On Friday, October 2, 2009, over 300 guests filled the Dover Building at the Delaware State Fairgrounds for the KCD's 12th Annual Barn Dance. Participants raised a little over \$8,500 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 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; participated in the Science Alliance's "What in the World" career awareness program at five elementary schools; sponsored a conservation poster contest; provided presenters and guides for DNREC's Make-a-Splash Water Festival; gave a presentation about conservation and soils at Lake Forest East Elementary School; participated in North Dover Elementary School's Super Science Day by giving a presentation on conservation practices and soils; gave a presentation on soils to Brownie Troop 379 and Daisy Troop 959; 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 269 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.



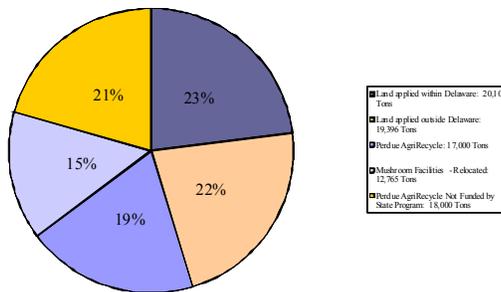
Application of poultry litter to these farms is regulated by limiting phosphorus applications to the amount that can satisfy crop needs, creating a surplus of poultry litter on those farms which must be disposed of. Many farmers who demonstrate insufficient land or high soil phosphorous levels must find 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 application process validates eligible senders, receivers, truckers, and alternative use projects. Excess litter continues to be transported for land application throughout Delaware as well as Maryland, New Jersey, and Virginia. Alternative use projects are also essential for managing excess poultry litter.

*2009 Highlights:*

- 96,435 tons of excess poultry litter were relocated, for a nine year total of over 655,000 tons. Over 50% of the excess litter goes to alternative use projects such as the Perdue AgriRecycle fertilizer plant in Blades DE. The plant processed over 35,000 tons in 2009, 17,000 tons being Delaware-generated. The 2009 relocated tons represents an estimated 4.9 million pounds of total nitrogen and 3.8 million pounds of phosphorus as phosphate. If that tonnage had been applied to the source farm rather than relocated, much 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!

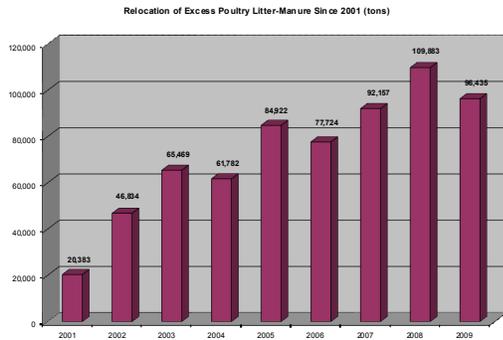
2009 Relocation & Alternative Use of Excess Poultry Litter-Manure  
Total 96,435 Tons



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 2009, 127 farms, 1 museum, and 2 golf courses



representing 76,828 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 11,944 acres. Also, 47 farms were assisted with an animal waste management plan. During 2009, a total of 423,531 acres were provided with nutrient management plans that are valid until 2011.

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 arm 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**

To assist in CREP program development and implementation, the NPS Program established and filled a State of Delaware CREP Program Coordinator. Currently, the position is filled by Dale Churchey. Dale’s keys roles and responsibility 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 over 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 - 3,000 acres
2. CP22 - Riparian Buffers - 1,000 acres
3. CP23 - Wetlands Restoration Floodplain - 500 acres
4. CP3A - Hardwood Tree Planting - 500 acres
5. CP4D - Permanent Wildlife Habitat - 1,000 acres

In 2006, a proposal was submitted to the US Department of Agriculture, Farm Service Agency to expand and enhance the Delaware CREP Program to increase the enrollment area from 6,000 to 10,000 acres and add the following to the list of eligible practices:

- CP9 - Shallow Water Areas for Wildlife
- CP23A - Wetlands Restoration, Non-Floodplain

The table below summarizes the CREP practices installed during the 2009 calendar year:

	CP21 Acres	CP22 Acres	CP23 Acres	CP4D Acres	CP3A Acres	CP9	CP23A	Total Acres
2009	6.5	4.6	0	8.9	81.0	44	0	101
To Date	1,292.6	77.6	921.2	683.8	2,773.9	61	8.6	5,822.7

Currently the USDA Farm Service Agency pays 50% of installation costs for CREP practice installation and the State of Delaware, through an established State Cost Share program, pays 37.5% of the costs of practice installation. On practices CP21, CP9 and CP4D FSA pays 64% of the incentive payments and Delaware pays 36%. On practices CP22, CP23, CP23A and CP3A FSA pays 73% and Delaware pays 27%.

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

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 a low 3% rate. 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.

*2009 Highlights:*

- The State Revolving Loan fund assisted landowners in implementing BMPs. Nearly \$130,000 in loans were processed in 2009 providing a low interest loan for the construction for certain conservation practices and BMP installation.

In 2009, producers received SRF funding for the following BMPs:

<b>Poultry BMPs</b>	<b>Number</b>	<b>Amount</b>
Manure Structures	9	\$ 83,841
Poultry Carcass Composters	4	\$ 7,858
Dead bird incinerators	0	0
Front-end loaders	2	\$ 14,760
Calibratable spinner manure spreaders	0	0
Heavy use area protection pads	7	\$ 21,040
<b>Dairy BMPs</b>		
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

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**

The Drainage program partnered with The Nature Conservancy, U.S. Fish and Wildlife Service and the Kent Conservation District in a Wetland Restoration and Reforestation Project in the Milford neck area. Nonpoint Source funds provided mulch (straw) for large trees as well as for organic matter in the wetland.

On October 22, 2009, a wetland planting was held at the University of Delaware's wetland restoration project where students and faculty planted trees, shrubs, and grasses.

**Education and Outreach**

The Educational Displays featuring Wetland and Channel Restoration were taken to the following events:

- Frontiers in Nutrient Management Conference – Rehoboth, Delaware – 1/28/09
- University of Delaware “Ag Day” – 4/25/09
- Delaware State Fair – 7/23/09 – 8/1/09
- The Delmarva Poultry Conference- Ocean City, Maryland – 8/26/09

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

- University of Delaware's Wildlife Ecology class
- Delaware's Nutrient Management Commission – an emphasis was placed on wetlands constructed downstream of Animal Production Areas
- Delmarva Poultry Industry's Grower Committee Meeting – This presentation resulted in a potential project on the farm of Martin O'Neal located southwest of Seaford. The investigation determined that Mr. Martin was very interested in constructing a wetland downstream of his Poultry Production Area; however the soils are too sandy and not suitable for a wetland project.

**Field Tour**

Tom Barthelmeh led a tour of a wetland constructed in a dairy pasture at the University of Delaware. This site was one stop in conjunction with a full day tour for NRCS's National Hispanic Conference in Philadelphia, Pennsylvania. The participants also saw the University of Delaware's Phase II Project which is a Channel and Wetland Restoration Project.

**Workshop**

On May 8, 2009, Tom Barthelmeh conducted an interactive training workshop on wetland restoration construction techniques for the Peach Blossom 4-H Club (located southwest of Farmington). The workshop was attended by approximately twenty 4-H members (ages 5-16) and eight parents. This 3-hour workshop focused on numerous aspects of restoration ranging from planning and project agreements, to various on the ground construction techniques, including the establishment of micro-topography and the introduction of organic matter and

coarse woody debris. Following a 45-minute presentation, the participants were asked to apply what they learned in the “classroom setting” by constructing a wetland and stream system in an agricultural complex. They simulated a model farm and ecosystem utilizing a three foot by four foot sandbox. All the material necessary to construct a wetland complex (e.g., soil, clay, woody debris, organic matter, trees/shrubs, livestock, seed, construction equipment, etc.) was provided. Participants had to utilize Best Management Practices to ensure that pastures, crop fields and livestock areas drained into wetlands via structures, streams, and ditches. All participants were fully engaged in the presentation and intensely constructed and explained their wetland, stream and farm ecosystem.

*2009 Highlights:*

- University of Delaware – Phase II Wetland and Channel Restoration  
This University of Delaware design is complete. Construction is anticipated for this spring. This project involves restoring a small channel in a dairy pasture which will flow into two restored wetland cells. The runoff will then flow through another restored channel before outleting under Farm Lane. Additionally, the Phase III project at the University of Delaware has begun with planning and permitting.
- Cart Branch Tax Ditch Prong 13 Channel Restoration  
This design for 1000’ of channel restoration on the property of Joe Johnson is complete. The Sussex Conservation District has been selected as the contractor as a result of letter bids solicited in 11/09. A contract with the Sussex Conservation District has been signed and construction is expected this spring.
- Hodgson Vo-Tech Wetland Restoration  
This project involves constructing 3 wetland cells adjacent to soccer and baseball fields. The planning, design and layout are almost complete. Construction is expected this spring or summer.
- Swartz/Aspendale  
The Swartz Wetland Project involves the restoration of 4 or 5 areas (approximately 6 acres) within the agricultural fields of “Aspendale” (a National Historical Landmark) located 1 mile west of Kenton. Project planning is complete and design is 80% complete. The project is in review from the Department of Interior to assure that no negative impacts will take place to this historical property. Construction is expected this summer.
- Hengst  
This project (located in northwest Kent County) involves the installation of 3 water control structures in the channel which bisects the farm. It also involves approximately 2 to 3 acres of wetland restoration, farm channel restoration and surface inlet stabilization.
- 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 fall.

The Division of Soil and Water Conservation and the Delaware Department of Agriculture (Nutrient Management Program) have partnered in an initiative to construct wetland treatment facilities located downstream of Poultry Production Areas to improve water quality. The regulatory oversight for farm runoff from poultry production areas is greater than ever and includes the implementation of the State Nutrient regulations, Federal Concentrated Animal Feeding Operation (CAFO) regulations and more. The storm water runoff and treatment of such runoff appears to be the focal point for many farms operating around tax ditches and drainage ditches found throughout Delaware. We have identified three farms in which the owners are interested in constructing these treatment facilities. The landowners are Doug Vanderwende (Bridgeville), William Webber (Kenton) and Bryan Melvin (Hazletville). The Vanderwende project has been surveyed - needs pipes sized and then construction this spring. The Webber project will soon be surveyed with construction anticipated this spring or summer. The Bryan Melvin project is in the site investigation/planning stage with construction expected this spring or summer. An additional site (Nau Farm) will be investigated this spring.

During the past year, Tom Barthelmeh has been involved with the production of two publications “Wetland Restoration in Delaware: A Landowners Guide” and “Sustainable Chesapeake: Better Models for Conservation”. “Wetland Restoration in Delaware” is a publication produced by DNREC’s Watershed Assessment Section and the Delaware Aquatic Resources Education Center. Tom co-authored several of the “Restoration Stories” (Part I) and edited portions of Part II – “Resources for Restoration”. This publication is available to Delaware landowners as well as public and private agencies and organizations. The mission of the “Better Models for Conservation” project is to “develop a coalition of motivated public and private partners in the Chesapeake Bay Watershed to address critical land and water conservation issues and demonstrate innovative solutions with the greatest return in conserving and restoring significant natural resources”. Chapter two of the models project is titled “Stream Restoration: Converting Drainage Ditches and Nonproductive Farmland into Functioning Streams and Wetlands, A Model for Improving Water Quality and Wildlife Habitat in Delaware”. This chapter focuses on Delaware’s best examples of Channel and Wetland restoration projects. Tom co-authored and edited this chapter which is part of a larger document intended for use to showcase models for conservation throughout the entire Chesapeake Bay Watershed. The “Models” project should be available this spring.

***vii. Stream & Riparian Corridor Enhancement Program***

*Completed Projects*

The following section briefly describes restoration projects that have been completed in 2009 by the Division of Soil and Water Conservation’s 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.

- Delaplane Manor Stream Restoration Site

This project is located along an unnamed tributary to White Clay Creek in northern New Castle County. The project restored approximately 150 feet of stream channel and adjacent banks using a variety of fluvial geomorphological restoration techniques. The site is located approximately 2/10th of a mile east of the intersection of Route 72 and Route 2 (Capitol Trail) in the Delaplane Manor. Construction work began in August 2009 and the project was completed in November 2009 which included the planting of native trees and shrubs. This project was funded by the Natural Resources Conservation Service Wildlife Habitat Incentive Program and the U.S. EPA Nonpoint Source Program.

Mill Creek Stream Restoration and Wetland Protection & Enhancement (Romanelli Site) The Mill Creek (Romanelli Site) stream restoration project, which began in early September, was completed on December 9, 2009. The project restored 570 feet of stream channel and riparian corridor along Mill Creek. The project involved the relocation of the stream channel away from landowner's home and reconnection of the channel with the floodplain. The habitat adjacent to the channel was enhanced with the planting of several hundred native trees and shrubs to create a better buffer area between the stream and some sensitive habitat areas. This restoration effort will help to reduce sediment loading and improve water quality and in-stream habitat. Pre-restoration macro-invertebrate sampling was conducted and will be compared to post-restoration results. The site is located within the White Clay Creek Wild and Scenic River Watershed and is a source-water stream for public drinking water. Grants from the Environmental Protection Agency (i.e., Non-regulatory Wetland and Nonpoint Source Program) funded this project.

- Middletown Silver Lake Park Stream Restoration Site

In a cooperative effort with the Appoquinimink River Association, the Stream Restoration & Riparian Corridor Enhancement Program completed a stream restoration project adjacent to Silver Lake Park in Middletown in late September 2009. The project involved the stabilization of approximately 871 of stream channel (450 of an ephemeral drainage channel that drains stormwater and 421 feet of an intermittent channel). In early October 2009 approximately 700 native trees and shrubs will be planted by volunteers adjacent to the stream channel and in the upland areas. The channel flows into Silver Lake, part of the Delaware Bay & Estuary drainage system. This project was funded by the U.S. EPA Nonpoint Source Program.

Post-restoration efforts have resulted in elevated channel bottom restoring connection to floodplain area and the placement of grade-control structures to eliminate down-cutting of channel.

### ***viii. Shoreline Stabilization Cost Share***

#### *2009 Highlight:*

- Completion of a restoration project to create a tidal transition wetland along Indian River at Sandy Beach in Dagsboro.

### Project Description

The Sandy Beach Community fronts on the Indian River and features in excess of 1,000 feet of shoreline between the ends of Sandy Beach Drive and Pebble Drive located near Dagsboro. The shoreline is comprised of transition marsh including low and high marsh wetlands. The low marsh wetland is comprised of Smooth Cordgrass (*Spartina alterniflora*). The high marsh is comprised of a variety of brackish marsh plants such as Salt Marsh Hay (*Spartina patens*), Spike Grass (*Distichlis spicata*), Common Three-square (*Scirpus pungens*), Salt Marsh Bulrush (*Scirpus robustus*), Water Hemp (*Amaranthus cannabinus*), Seaside Goldenrod (*Solidago sempervirens*) and Groundsel Tree (*Baccharis halimifolia*). Several sections of the marsh were actively eroding and the erosion was threatening the long term viability of the marsh to provide ecological benefits as well as protect the shore of the community. In 2006 the community invested in the installation of biologs and additional vegetation plantings along the most highly eroded portions of the shoreline in an attempt to protect the marsh and shoreline. Due largely to the high degree of fetch (the site faces north-northwest along a section of the Indian River that is over 1,000 feet in width) the biologs and much of the planted vegetation failed.

To control the erosion problem, preserve the transition marsh and provide an innovative shoreline protection demonstration project, a marsh toe sill was proposed for construction at this site. Funding for the project was provided via grants from the Delaware Department of Natural Resources and Environmental Control (DNREC) Non-Point Source Pollution Program and the Delaware Center for the Inland Bays.



Because funds would cover the construction of about 250 feet of rock sill or 25% of the shoreline at this site, the sections of shoreline that were most severely eroded were targeted for sill protection. The most actively eroding portions of the shoreline were concentrated close to the mid-point of the shoreline at a river bend and the adjacent northwest facing shoreline. Both of these sections of shoreline are subject to the erosive wind driven waves generated by the prevailing wintertime north-

northeasterly winds. To some extent the shoreline and marsh were eroding from the mid-point out. The placement of the rock toe sill is designed to break the wave energy and protect the vegetation behind it. Adjacent wetland areas along this shoreline are likely to receive some degree of protection from the marsh toe sill installation because of the dissipation of wave energy attributable to the rock sill.

In all, 250 linear feet of rock toe sill was constructed and 2,300 *Spartina* plants were planted. The *Spartina* plantings were comprised of 1,150 *Spartina alterniflora* plants, planted in the intertidal zone and 1,150 *Spartina patens* plants planted within the upper intertidal zone and lower backshore zone. The plants were planted on one foot centers in the most severely eroded areas of the shoreline.

The rock sill was also designed to provide openings (see photos below) allowing for fish, turtle and biomass exchange between the Indian River and the marsh. Additionally, the rock sill was designed to minimize the rock footprint of the structure as much as possible. Typically, engineering design calls for sloping the face (water side) and back (landward side) at a 2H to 1V slope. By reducing the slope, the width of the structure can be reduced, reducing the amount of rock needed for the project and the footprint of the structure. This sill was designed with a 1.5H to 1V slope on the face and 1H to 1V slope on the back. This sill will provide an excellent demonstration to show engineers how the footprint of a rock sill structure can be reduced and vegetation can be incorporated into the design to provide a more environmentally friendly method of shoreline protection.

The Sandy Beach shoreline stabilization project was completed in mid-July. The Lat-Long Coordinate location for this project is Lat. 38°34'55.47"N, Long. 75°15'14.339"W.

#### Project Objectives and Goals

This project proposed to restore and provide long term protection to an eroding transition marsh. These types of marshes are becoming less common in the Inland Bays. The restoration involved restoring the ecological function and the physical integrity of the pre-existing marsh, as well as providing protection for an eroding shoreline. The project also provides an educational opportunity for the residents of the Sandy Beach Community. Additionally, the project offers an innovative shoreline



protection demonstration project that will provide a valuable tool to help educate people in the shoreline erosion protection business about a more environmentally sustainable method to control erosion. In turn, this will help DNREC in its efforts to promote more environmentally sustainable methods of shoreline protection.

#### Partnerships

This project cultivated several partnerships to bring it to fruition. The key partners included the DNREC Wetlands and Subaqueous Lands and Non-Point Source Pollution (NPS) Programs, the

Center for the Inland Bays, Envirotech Environmental Consulting, Inc. of Lewes, DE and the Sandy Beach Homeowners Association. It should be noted that Sandy Beach Homeowners Association was an active participant in the permitting and construction phases of this project. EnviroTech Environmental Consulting, Inc. donated their expertise in providing landscape design, plant acquisition and labor for planting the wetland vegetation used on this project. Environmental Scientists from the WSLs also helped plant the intertidal vegetation and provide construction oversight. The NPS contributed \$25,500 in grant funds and the Center for the Inland Bays contributed \$10,000 in funding to this project.

### Monitoring

Follow-up visits to the site have noted that the structure and vegetation are holding up well and the structure appears to be performing as designed. During high high tide events the rock sill is completely submerged.

### **ix. Urban Stormwater BMP**

Using 319 Environmental Protection Agency (EPA) funding administered through the Department of Natural Resources and Environmental Control's (DNREC) Nonpoint Source Program, several state and local agencies within Delaware including the DNREC Sediment and Stormwater Program, the Kent Conservation District, the Office of Management and Budget's Division of Facilities Management, and the City of Dover joined together recently to retrofit a poorly functioning wet pond into a new bioretention facility. The new facility provides for increased treatment to stormwater entering from an expansive parking area directly into the Saint Jones River, which runs directly into the Delaware Bay.



The original stormwater pond on the Delaware Archives property exhibited signs of failure including deteriorating structural components. Severe erosion at the pond discharge point was also contributing sediment, which can be harmful to fish and other aquatic life.

This project is a perfect example of how all levels of government can work together to clean up the environment during these difficult financial times. None of the individual agencies could have completed the project alone, yet together with the help of EPA funding, a stormwater pond was retrofitted into a bioretention facility, a technology that far surpasses treatment rates relative to traditional approaches.

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.

Although many sites in both Sussex and Kent counties were considered for retrofitting, the Delaware Archives pond had the most suitable site conditions requiring the least engineering modifications. Also considered was the strategic location of this site, which is near both the legislative center of Delaware and historic downtown Dover, where many passers-by could view the educational signage and see the project.

Once the site was selected, the planning process and the teamwork began. All planning and engineering for the project was completed by staff from DNREC's Sediment and Stormwater Program. Staff from DNREC's Drainage program performed all survey work, and worked closely with DNREC's Wetland and Subaqueous Lands Section and the U.S. Army Corps of Engineers to assist with all wetland permitting issues. Assistance in obtaining permits for water extraction during certain phases of construction was provided by DNREC's Water Allocation Branch.

As property owner, the Division of Facilities Management was instrumental in working with DNREC staff to authorize the project, acquire permits, comment on engineering plans, and provide input on plant selection for the plantings within the new facility. They also provided other resources during construction and assistance with the mulching and plantings.

Kent Conservation District constructed the project in Summer 2009, and The City of Dover provided a disposal area for the excavated fill dirt in addition to information on the underlying sewer lines. The Delaware approved biosoil was placed by an outside contractor immediately following construction. In addition, ACF Environmental, a local distributor for erosion control products, also joined in by donating a Siltsack® to protect the storm drain from sediment. After biosoil placement, the plantings were installed, and the facility was mulched using triple-shredded hardwood mulch.

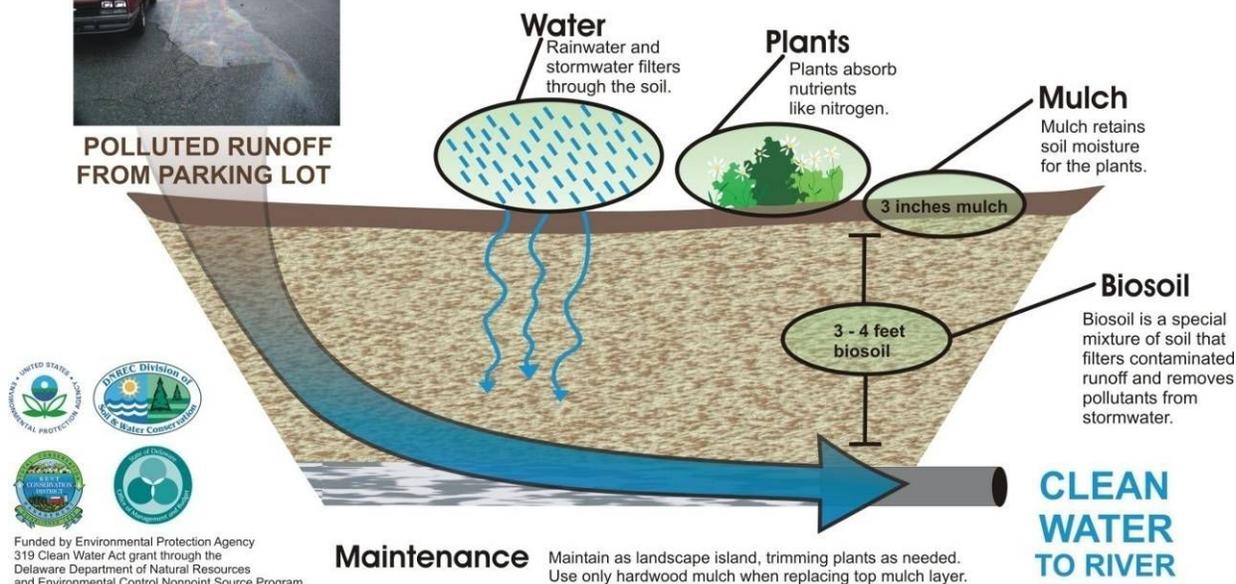
# Bioretention

This facility was converted from a stormwater pond into a bioretention facility in 2009. A bioretention facility, also known as a rain garden, filters polluted stormwater before it enters into a waterway.

When it rains, water washes over parking lots picking up pollutants like oil, garbage, sediment, and gasoline. Without stormwater management, this pollution would run directly into the river. At this site, the bioretention facility intercepts such pollutants before they can reach the Saint Jones River.



**POLLUTED RUNOFF FROM PARKING LOT**



Finally, the bioretention facility was mulched and planted by DNREC and Facilities Management staff in Fall 2009. Using a planting design containing only Delaware native plants, plants were selected based on tolerance toward the highly variable site conditions known to exist within bioretention facilities.

## Measurable Environmental Results

Delaware Sediment and Stormwater Regulations require 80% removal of total suspended solids. To quantify the removal of suspended solids and nutrients for BMPs, the State of Delaware uses the Delaware Urban Run-off Management Model (DURMM). The program was developed in 2004 and looks at predevelopment and post-development loading of nutrients as well as removal within the BMP. Run-off volumes for the design storms are determined using the TR-20 method. Nutrient loading amounts for the run-off volumes is determined based on land use and Event Mean Concentrations from the literature. DURMM looks at five major pathways for nutrient removal: infiltration, filtration, adsorption, settlement, and transformation selecting the appropriate pathway or pathways based on the BMP used. For bioretention, filtration and adsorption are the dominating pathways by which removal occurs.

To develop a DURMM model for a specific project, the user inputs the land use data, time of concentration path, and county in which the site is located for the predevelopment and post development conditions. For this project, the predevelopment and post development watershed remained unchanged. DURMM calculates the run-off volumes and nutrient loads for the site. The BMP design is then evaluated for the quality storm. The user defines the percentage of

total run-off the BMP receives (100% for archives pond), the dimensions of the BMP area (length, width, and depth), and the infiltration rate (2.83 in/hr for bioretention with under drains). Using this information the percent removal for the various nutrients is calculated. Table 1 shows both the loading and removal information for the 2143 sq ft bioretention area with 2 feet of bio-soil medium.

	TSS (g)	PP (g)	SP (g)	ON (g)	NH3 (g)	NO3 (g)
Nutrient Load for the Site	34,140	114	29	682	256	170
BMP Output Load	250	2.5	6.7	65.7	28.5	24.5
Percent Removal	99%	98%	77%	90%	89%	86%

Table 1. Estimated loading and removal rates for new bioretention at the Delaware Archives site.

These removal rates far surpass those associated with the pre-existing wet pond that was exhibiting severe erosion and signs of decreased structural component integrity, most likely contributing sediment and associated nutrients directly into the Saint Jones River.

**x. Pollution Control Strategies – 2008 Project Implementation**

This section details the activities that occurred in the prioritized watersheds of Delaware during the 2009 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 *2009 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.

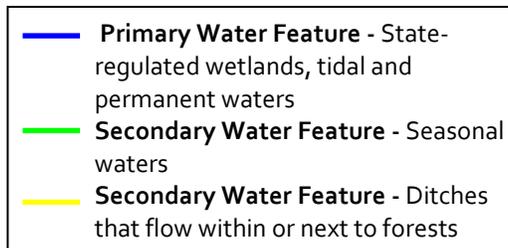
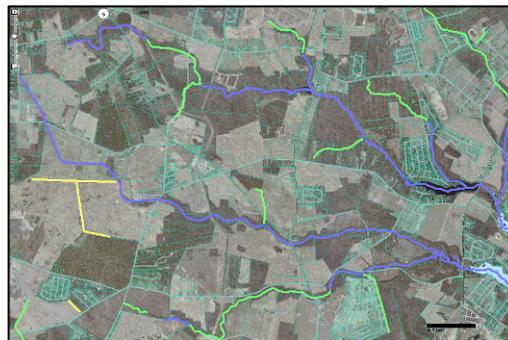
## *Inland Bays Watershed*

### Pollution Control Strategy Implementation

To insure implementation of the Inland Bays Pollution Control Strategy, staff from DNREC’s Divisions of Water Resources, and Soil and Water Conservation 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 (defined below; Figure 1). 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.



**Figure 1. Map of water features to be buffered. Buffer soils and plants trap and take up pollutants in runoff and groundwater.**

The PCS also requires that when land is developed, stormwater plans must include criteria to manage stormwater for nutrients. Developers can accomplish this using one of several methods.

*If water features are present:*

- Establish a 100-ft buffer on primary waters and a 60-ft buffer on secondary waters;
- Establish a 50-ft buffer on primary waters and a 30-ft buffer on secondary waters in combination with other pollution reduction actions.

*If water features are not present:*

- Utilize one or more pollution reduction action that reduces nutrients and sediment in stormwater runoff.

#### 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 in 2015. As of middle of October 2009, thirteen small septic systems have permits with nitrogen reducing devices which will reduce nitrogen concentration in the wastewater by 50% and to date 7 nitrogen reducing systems have been installed within the inland Bays.

#### Appoquinimink Watershed

##### Pollution Control Strategy

On September 9, the Appoquinimink Pollution Control Strategy was presented to the Appoquinimink River Association at St. Andrews School. Approximately nine individuals attended the meeting to discuss the proposed strategy. DelDOT sent two representatives and Artesian Water sent one representative. The remaining attendees were residents of the watershed or members of the Appoquinimink River Association. Most of those attending were in agreement with the PCS. However, there was a lengthy general discussion of how to best present the cost data. The consensus of the attendees was that the cost data presented was confusing and could lead to misunderstanding. Suggestions to rectify this included: breaking cost down by agriculture, wastewater, stormwater and open space; detailing economic burden vs. the economic benefit of each recommendation; representing the data in pie chart form; and detailing who would incur the cost. The attendees also indicated that the nutrient trend data needs to include data near the Delaware Bay. The attendees were informed that if they wanted a

copy the Pollution Control Strategy, a copy would be sent to them after the Department's internal review was completed and the comments were addressed.

On October 13, the DNREC Planner's Technical Advisory Committee commented on the Appoquinimink PCS Draft Regulations. These comments included items from the Division of Soil and Water Conservation's Sediment and Stormwater Program. The Division of Water Resources' Watershed Assessment Section has held meetings with the municipalities of Middletown, Odessa and Townsend on the Appoquinimink PCS. If any of the three municipalities have comments, they will submit comments their to the Department us by the end of November, 2009. Also in November, Watershed met with New Castle County to discuss the Appoquinimink PCS. New Castle County had no major comments or objections to the proposed PCS. The Watershed Assessment Section hopes to hold a public workshop on the Appoquinimink PCS regulations in early 2010.

### **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.

### **Mispillion and Cedar Creek Watershed**

The introductory meeting of the Mispillion and Cedar Creek watersheds' TAT was held on March 19, 2009 at Milford's Parks and Recreation Department. Since the introductory meeting, the TAT has met 7 additional times and held a field trip within the watersheds. For the first three of those meetings, the TAT was educated on the Delaware Nutrient Management Act, manure relocation program, and existing septic system and stormwater regulations. On October 21, the TAT had a field trip that started with a boat ride down the Mispillion River beginning just west of Route 1 and continued to the DuPont Nature Center at the river mouth. Bill Pike from Milford's Department of Parks and Recreation piloted the boat discussed some of the less obvious human impacts occurring along the river such stream bank erosion from boat wakes and invasive plant that have overgrown native vegetation. After the boat trip, the Team went to Howard Webb's farm to discuss agriculture and nutrient management within the state as it applies to his farm. From there the members of the TAT observed a septic system pump-out, an

inspection carried out by B&M Septic. At the last stop, Environ Tech Environmental discussed stormwater management at the Hearthstone subdivision. The inspector from Environ Tech discussed how they manage stormwater structures. From early summer to fall, the TAT developed an issue brochure for their public forum to be held on November 4 at Milford's Carlisle Fire Hall. The public forum allows the Team to hear other concerns about surface water quality within the watershed from other Mispillion and Cedar Creek watershed residents. The Team will begin to develop pollution control strategies for the Mispillion watershed in early 2010.

**St. Jones Watershed**

*Silver Lake Revitalization Project*

Two projects have gone through extensive planning and discussion over last two years with DNREC, City of Dover and their Silver Lake Commission, and the St. Jones Tributary Action Team: Project 1– St. Jones Bank Restoration and Kings Highway Drainage, and Project 2– Washington Street Drainage. The previously mentioned parties were in agreement, along with residents that live adjacent to Silver Lake Park, to proceed with both important projects. For this reason, the City of Dover wants to construct several regenerative stormwater conveyance systems and to restore over 600 feet of the St. Jones River stream bank and channel from just below the dam at Silver Lake to the foot bridge that crosses the river in Silver Lake Park. This design work is funded through other federal funds but the construction will be funded by 319 NPS.

A design engineer from Biohabitats Inc. will develop and prepare final design and construction drawings, specifications and a cost estimate (75% and 100% submittals) for both projects. For the St. Jones Bank Restoration and Kings Highway Drainage project, the design will address a reach of the St. Jones River from the dam at Silver Lake to the pedestrian bridge located approximately 600 feet downstream (Figure 2).



The design will propose the use of a boulder toe on one or both sides of the stream to allow the opportunity to create a walkway for fishermen, create a wetland bench that would provide water quality through infiltration and aesthetic improvements, and to increase habitat diversity along the reach. Additionally, the design will suggest soil amendments to be placed along the existing stream banks to aid in their recovery from years of heavy use.

For the Washington Street Drainage project, the design will address the restoration of the drainage ditch which enters the St. Jones River just south of the pedestrian bridge. The design will include a proposed solution known as Regenerative Stormwater Conveyance (RSC) for the Washington Street outfall and drainage ditch out. The proposed design will stabilize the ditch, elevate local groundwater levels, restore hydrology to the adjacent wetland area, and most importantly, provide water quality treatment for the stormwater runoff associated with the ditch. This project will also temporarily store some of the stormwater discharging from the streets and treat it through the wooded wetlands.

The Washington Street Drainage project design will also include providing concept drawings for the relocation of the parking lot and the implementation of bioretention and water quality treatment wetlands to the east of the St Jones River to capture untreated runoff from the adjacent areas. To the extent allowed, Biohabitats will employ “**Green Infrastructure**” concepts to create functional and aesthetically pleasing water quality treatment throughout the park area. Green Infrastructure is the framework of an interconnected green space network that is planned and managed for its natural resource values and for the associated benefits it confers to all living systems. These systems are often most vibrant and dynamic when they serve multiple functions including stormwater management.

Some parts of the stormwater ditch for the Washington Street Drainage project lie on private property. DNREC and the City have been working on a stormwater easement document, which may give the property owners a tax break and allow the City to utilize the wetlands on the back of their properties. Both property owners are in favor of this easement.

#### St. Jones Watershed Coordinator

Resources from this grant funded the position of Watershed Coordinator in the St. Jones Watershed in Kent County, Delaware. The St. Jones Tributary Action Team recommended that a Watershed Coordinator position be procured in order to better address the needs of the St. Jones Watershed. Hired in May 2009, the Watershed Coordinator endeavors to:

- A. Determine what water quality projects are feasible from the Implementation Plan based upon water quality benefits, cost of installation and ability to implement project(s).
- B. Work with Silver Lake Commission to create partnerships for water quality project(s).
- C. Obtain funds for design and construction of water quality projects.
- D. Work with the City of Dover to plan and create a stormwater utility for watersheds within City of Dover municipal boundaries.

Specifically, the Watershed Coordinator has begun planning for multiple projects in the St. Jones Watershed that will decrease the amount of nonpoint source pollutants from entering the St. Jones River and aid in meeting Total Maximum Daily Load standards. The projects are described below:

Project Planning

- A. **Dover High School** - Located at Walker Road and Patrick Lynn Drive in Dover Delaware, the high school campus would benefit from better stormwater infiltration practices. URS Corp. has submitted a proposal for design and conceptual work for the site. Proposed ideas for the property include: disconnecting downspouts from entering storm drains and construction of several rain gardens around the school to intercept roof runoff; construction of a bioretention area in the student parking lot, restoring hydrology to unnamed channel in flood plain that receives stormwater from Dover High and nearby neighborhoods and drains directly into Silver Lake, and retrofitting an overflow retention area. The principal of Dover High School has been contacted and has given the Watershed Coordinator permission to explore the project on the school's property. If the project is implemented it is estimated that 10 pounds of nitrogen, 1 pound of phosphorous and zinc, and 675 pounds of sediment per year will be prohibited from entering Silver Lake.
- B. **Delaware Technical and Community College** - Located at Scarborough Road and Route 13 in Dover, Delaware. The Technical and Community College's campus offers an opportunity to work with students and officials to create a stormwater management and sustainability plan that will address the College's future needs of expansion while maintaining and enhancing stormwater infiltration and bioretention practices.
- C. **Wyoming Park Riparian Buffer** - Owned and maintained by the Town of Wyoming and located on the banks of Wyoming Lake, Wyoming Park is subject to invasive vegetation encroachment, erosion, and bacteria runoff from a population of Canadian Geese. The Park does not currently offer a riparian buffer. Riparian buffers are proven resources that can reduce the amount of nonpoint source pollution from entering waterways. By planting a riparian buffer on the banks of Wyoming Park, there will be less erosion, sedimentation, and nonpoint source bacteria entering into Wyoming Lake. The Watershed Coordinator has contacted the Town of Wyoming, gained their permission to investigate the project, and is working with a landscape architect on the design of the buffer.
- D. **Delaware Agricultural Museum** - The Delaware Agricultural Museum, which is located on Route 13 in Dover, Delaware, contains a dry pond that no longer functions correctly. The property could revert much of its property to meadow and allow room for rain gardens. There is also a wet pond on the property that drains directly to Silver Lake, which suffers from regular algal blooms. The Watershed Coordinator is working with the Agricultural Museum in exploring their options to improve infiltration practices and educate the public on the matter.
- E. **Pet Waste Bag Dispensers** - The Watershed Coordinator is working with the City of Dover and potentially the Town of Wyoming on the placement of pet waste stations,

called Dogi-Pots, in their municipal parks. Pollution Prevention techniques, such as picking up after pets, is an important behavioral aspect to a clean and healthy watershed.

- F. **Fiscal Year 2010 319 Grant** - The Watershed Coordinator received a Grant from Delaware's Department of Natural Resources and Environmental Control's Nonpoint Source Program to implement a watershed wide fertilizer project. The project is designed to encourage watershed residents to properly fertilize their lawn and provide soil tests to interested individuals. The project will also highlight a demonstration lawn that has given a lawn a soil test and then would properly fertilize the lawn. The goals of this project are to increase the number of people who have a soil test on their lawn, increase the number of people fertilizing properly, and decrease the number of people who fertilize when their lawn does not require it and/or fertilize improperly.

### Education

The Watershed Coordinator has also taken on watershed and nonpoint source pollution educational projects. These efforts include:

- A. Writing articles for local newspapers and municipal newsletters,
- B. Participating in the Rain Gardens for the Bay steering committee, which is a partnership between the State of Delaware and the Environmental Protection Agency to promote and educate the benefits of rain gardens in the Delaware Estuary,
- C. Responding to resident concerns and questions regarding stormwater issues
- D. Working with the St. Jones Greenway and Silver Lake Commission,
- E. Attending the Native Plant Society's Native Plant Sale at the St. Jones National Estuarine Research Reserve,
- F. Re-visioning the St. Jones Tributary Action Team website into a Watershed Highlight webpage that will provide easier access to educational resources, regulatory documents, and scientific data.

### Christina Watershed

The University of Delaware's Water Resources Agency finalized a project to quantify load reductions of selected pollutant parameters through the use of stormwater BMPs in the Christina Basin. The following parameters were assessed using a methodology developed by the Agency: Total Nitrogen (TN), Total Phosphorous (TP), Total Suspended Sediment (TSS), and Copper (Cu). The project focused on the Delaware portion of the Christina Basin. The analysis included an assessment of the effectiveness of BMPs associated with developed subdivisions to determine whether these methods are an adequate means of stormwater and pollution control. The Agency examined land use in each of the BMP's catchments to calculate the pollutant loads and then determined the reduction achieved by the BMP. The Agency calculated reductions for 600 wet and dry ponds. Those ponds treated over 14,571 acres in the Christina Basin. This process

calculated 31,852 lbs per year of sediment reduction. In addition, the process calculated reductions of 653 pounds nitrogen and 83 pounds phosphorus per year. The Agency also demonstrated reductions in bacteria numbers ranging from 5,157 to 11,603 in billions of colonies per year.

***i. 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, over 1,000 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.



Many residents realized the benefits of a rain barrel and told us that they had wanted to purchase one for years but the price of the barrel made it cost prohibitive.

**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**

<b>Project</b>	<b>Nitrogen (lb)</b>	<b>Phosphorus (lb)</b>	<b>Sediment (ton)</b>
Conservation Reserve Enhancement Program	4,571	128	428
Ecological Restoration	193	97	97
Inland Bays Best Management Practices	107,377	NA	NA
Kent Conservation District Planners	164,091	2,077	NA
Nutrient Management Relocation	247,895	24,790	NA
Sussex Conservation District Planners	501,171	15,536	NA
Vegetative Shoreline Stabilization	26	13	15
<b>Total</b>	<b>1,025,325</b>	<b>42,640</b>	<b>540</b>

## 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 2009 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	Paul Evans	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 Campagnini	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