NONPOINT SOURCE PROGRAM ANNUAL REPORT

Delaware

2012

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

Nonpoint Source Program

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Celebrating 27 Years of Loyal Service!

Thanks Lyle!

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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Preface

The 2012 Delaware NPS Report is developed by the Delaware Department of Natural Resources and Environmental Control (DNREC) to meet a grant condition that appears in each annual 319(h) Grant award to the State of Delaware from the US Environmental Protection Agency. This programmatic condition in the FY11 award states:

The report shall contain the following:

- A brief summary of progress in meeting the schedule of milestones in the approved Management Program, and,
- Reductions in nonpoint source pollutant loading and improvements in water quality that has resulted from implementation of the Management Program.
- Descriptions of priority Watershed Based Plan accomplishments. Accomplishments should be based on the implementation milestone goals/objectives as identified in each priority plan. The goal information can be displayed in the form of a watershed goal/accomplishment chart showing percent achieved, supplemented by a short narrative that should give the reader a clear understanding of the actions being taken and the outputs and outcomes which are occurring from the actions. If monitoring was completed, a summary of that information should also be included. For example, if 1000 feet of streambank stabilization was completed, then how does that compare to the needs identified in the watershed based plan i.e. what percent of streambank stabilization was completed compared to the overall needs as identified by the plan. Similar comparisons should also be provided for each significant pollutant load reduction

What is Nonpoint Source Pollution?

Nonpoint source (NPS) pollution is defined as polluted stormwater runoff associated with rainfall, snowmelt or irrigation water moving over and through the ground. As this water moves, it picks up and carries pollutants with it, such as sediments, nutrients, toxics, and pathogens. These pollutants eventually reach lakes, rivers, wetlands, coastal waters and ground waters of Delaware

NPS pollution is associated with a variety of activities on the land including farming, logging, urban/construction runoff, onsite sewage systems, streambank degradation, shore erosion and others. For example, stormwater flowing off the land carries the nutrients nitrogen and phosphorus into local streams, rivers and ponds. Under natural conditions, this is beneficial up to a point. However, if excessive nutrients enter these water bodies they cause nuisance algae blooms, then these nutrients are deemed pollutants.

The pollution contributed by nonpoint sources is the main reason why many of Delaware's waters are considered "impaired." Impaired waters are those waters that do not meet Water Quality Standards for designated uses (e.g., fishing, swimming, drinking water, shellfish harvesting, etc.).

Progress in managing NPS pollution in Delaware is represented in this report. It was produced by the Department of Natural Resources and Environmental Control (DNREC) – NPS Program to meet Clean Water Act, Section 319(h) Grant conditions and to demonstrate consistency with three essential elements:

1. EPA Strategic Plan Goal 2 – Protecting America's Waters
2. EPA Strategic Objective 2.2 – Protect and Restore Watersheds and Aquatic Ecosystems
3. Work plan commitments plus time frame (overall progress is reported in this document)

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 source pollution in Delaware.

II. NPS Program Funding

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

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

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

- Non-regulatory NPS reduction programs
- Technical assistance
- Financial assistance
- Education

- Training
- Technology transfer
- Demonstration projects

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

III. Delaware NPS Issues

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

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

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

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

IV. Vision and Mission

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

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

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

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

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

V. Executive Summary

This report documents the activities and highlights of the State of Delaware, Nonpoint Source (NPS) Program during the 2012 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.

In calendar year 2012, there have been notable successes and accomplishments:

- Projects funded by 319(h) Grant that were completed during calendar year reported implementing best management practices resulting in pollutant load reductions: nitrogen 1,081,450 pounds/year and phosphorus 33,630 pounds/year.
- Two watershed plans in Delaware, the Appoquninimink and the Christina River watershed plan were drafted in 2012 and have been accepted by EPA. Five additional watershed plans are in the development process currently and are anticipated to be complete by the end of 2013. These include the Broadkill River and four sub-watersheds of the Chesapeake Bay.

Project Highlights:

Projects highlighted in the 2012 NPS Annual Report include the following:

☑ Sussex County Conservation District – Conservation Planners

Sussex County Conservation District Planners work with area farmers to encourage the installation of agriculture best management practices and partner with the USDA's Natural Resources Conservation Service in developing conservation plans, nutrient management plans and Environmental Quality Incentive Program (EQIP) contracts. Efforts are focused in priority watersheds that have approved Watershed Plans. In 2012, the SCD expended over $900,000 in conservation cost-share funds. These included payments for cover crops, pre-side dress stalk nitrogen tests, nutrient management planning, heavy use area protection pads, animal mortality structures, and various CREP practices. The efforts of the SCD Planners are represented on a watershed scale in Section VII below.

☑ Kent County Conservation District – Conservation Planners

Kent County Conservation District Planners work with Kent County Farmers to provide nutrient management planning, conservation planning and encourage the installation and/or adoption of agricultural best management practices. In 2012, 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. The efforts of the KCD Planners are represented on a watershed scale in Section VII below.

☑ Nutrient Relocation Program

The Nutrient Relocation Program accounted for the transportation of over 52 tons of poultry manure out of Delaware's priority watersheds. If that tonnage had been applied to the source farm rather than relocated**,** significant nitrogen and phosphorus could have potentially entered Delaware's surface waters. On a watershed scale, the tons of manure for each priority watershed are represented in Section VII below.

☑ **SRF Agriculture Loan Program**

The State Revolving Loan fund assists landowners in implementing BMPs by providing a low interest loan for the construction of certain conservation practices and BMP installation. In 2012, loans in the amount of $51,520 were processed.

☑ **Wetland and Stream Restoration Projects**

In 2012, Wetland and Stream Restoration projects initiated and/or completed include the following:

- Schwartz Property – wetland construction
- Webber Farm – channel restoration with water control structure
- DNERR Blackbird – wetland creation and step pool flow
- Dashiell Tract – channel restoration
- Horsepen Arm(SGS Woodland) – channel restoration with water control structures
- Del Tech-Midlands – channel restoration
- Bridgeville Rifle and Pistol Club Ditch - reconnecting flow to a channel

☑ **Stream & Corridor Enhancement Program**

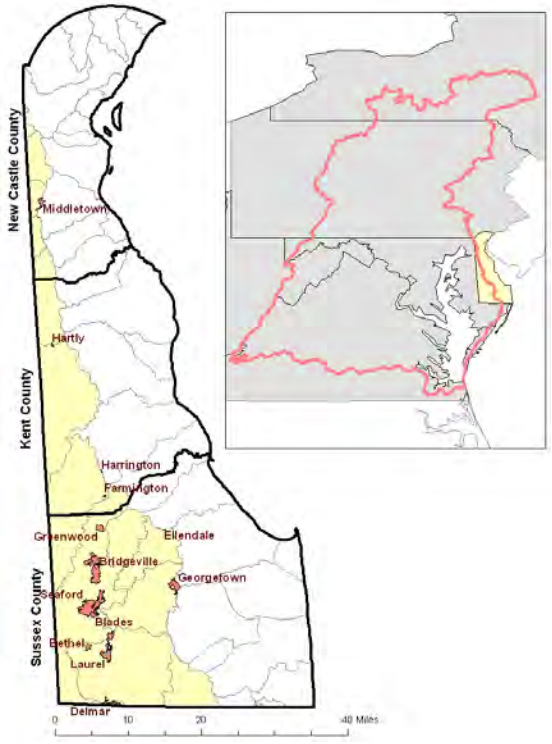
In 2012, Stream and Riparian Corridor Enhancement Program projects included the following:

- Dover Silver Lake Park Stream Restoration Site – Construction of a regenerative stormwater conveyance system for the City of Dover's Washington Street drainage area to restoration of approximately 320 feet of stream bank along the St. Jones River below the spillway at Dover's Silver Lake Park.
- Ham Run Stream Restoration Site- The Ham Run stream restoration project involves a 400–500 feet reach of Ham Run, a tributary to Red Clay Creek near the intersection of Duncan Road and Greenbank Road.

VI. Watersheds

a. Chesapeake Bay

Location: The Chesapeake Bay Watershed includes land area within Delaware, the District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia. The portion of the Chesapeake Drainage within Delaware makes up about 1% of the land area within the entire Chesapeake Bay Watershed. The watersheds that make up the Chesapeake Drainage in Delaware encompass a 451,268 acre area of land in all three of Delaware's counties. The Chesapeake makes up approximately 10% of New Castle County, 33% of Kent County, and 50% of Sussex County.



The headwater streams and rivers that originate in Delaware all ultimately drain to the Eastern Shore of the Chesapeake. These streams include, from north to south: Elk Creek, Perch Creek, the C&D Canal, Bohemia Creek, Sassafras River, Chester River, Choptank River, Marshyhope Creek, Nanticoke River, Gum Branch, Gravelly Branch, Deep Creek, Broad Creek, Wicomico River, and Pocomoke River.

Goal: Current goals call for the increased implementation of numerous nonpoint source best management practices, especially in the agriculture sector (see below for a highlight of key numeric targets). The milestones allow jurisdictions the opportunity to adapt implementation strategies as necessary to meet the goals and achieve the Total Maximum Daily Load (TMDL) standard. Delaware's 2012-2013 milestone commitments are to reduce nitrogen by 48,149 pounds, phosphorus by 42,702 pounds, and sediment by 18,731,484 pounds by the end of 2013, compared to the 2009 baseline.

Impairment: TMDLs were developed by DNREC in response to data collected from water quality monitoring. The data indicated that numerous streams within the Chesapeake Bay Watershed were impaired; they do not meet Delaware's Water Quality Standards for dissolved oxygen, or meet target concentrations for nitrogen or phosphorus.

Implementation: The information presented within this section is drawn from Milestone reporting made available to the Chesapeake Bay Program for 2012. Where data is available, Section 319 specific information is provided below. The Milestone data is necessary to demonstrate efforts and actions towards progress with the Phase II Chesapeake Bay Watershed Implementation Plan (WIP). As the WIP reporting criteria is more detailed and up to date, it's inclusion within this document is warranted.

In future versions of the Delaware NPS Program Annual report, more detailed sub-watershed information will be provided. Currently, Delaware has contracted with KCI Technologies, Inc. to develop approved Watershed Plans for the four sub-watersheds of Delaware's drainage to the Chesapeake Bay (the Upper Chesapeake, Chester/Choptank, Nanticoke, and the lower Chesapeake).

Section 319 Activity within the Chesapeake Bay Watershed:

319 Projects	Grant Year	Status	319 Funds
Ecological Restoration	FY08 & 09	Complete	$32,363
Nutrient Management Planning	FY08, 09 & 11	Complete	$93,109
Nutrient Relocation	FY08, 09 & 11	Complete	$75,161
CREP Acres (Salary for Coordinator)	FY2011	Complete	$60,000 (statewide)

2012 Milestone Data for the Chesapeake Bay Watershed:

Pollutant Controls, Practices, and Actions	2012
Commodity Cover Crops	6,417 acres
Cover Crops	34,656 acres
Cropland Irrigation Management	1,346 acres

Animal Waste Storage System	34 systems
Tree Planting	27.47 acres
Heavy Use Area Protection	48.8 acres
Wetland Restoration	1,499 acres
Nutrient Relocation	38,915 tons
Nutrient Management	18,280.5 acres
Comprehensive Nutrient Management	235.5 acres
Bioretention	1.38 acres
Wet Ponds and Wetlands	5,750 acres
Septic Pumpouts	430 systems
Septic Connections	32 systems

Chesapeake Bay Load Reductions based upon direct funding or leveraged funding associated with the NPS Program:

Practice	**Load Reductions N**	**Load Reductions P**
Cover Crops	443,017 lbs/year	1,363 lbs/year
Nutrient Relocation	217,903 lbs/year	15,311 lbs/year
Nutrient Management	51,409 lbs/year	3,948 lbs/year
Wetland Restoration	47,190 lbs/year	2,407 lbs/year
Bioretention	6.90 lbs/year	0.282 lbs/year
Wet Ponds/Wetlands	37,950 lbs/year	1,759 lbs/year
TOTAL	797,476 lbs/year	24,788 lbs/year

Progress Highlights: As referenced above, this section is taken from the Chesapeake Bay WIP Highlight report for 2012.

In 2012, Delaware saw steady decreases in the modeled nitrogen, phosphorus, and sediment loads due to increased implementation, improved data tracking and reporting efforts, and improved communication and coordination with partner agencies through the Watershed Plan development process.

Several of the specific implementation goals originally set in 2009 were achieved and surpassed. The total acres of cover crops planted increased more than anticipated, likely due to modified cost share programs and focused funding; data tracking and reporting (species planted, planting date and method, standard/commodity) for this practice also improved. Wetland restoration and tree planting goals were surpassed due to supporting funds from both the Chesapeake Bay Implementation Grant and a National Fish and Wildlife Foundation grant and better coordination

and reporting of partner efforts due to the creation of a WIP Restoration Subcommittee. The acres of agriculture nutrient management planning were also maintained. Finally, the total nitrogen load from the Invista facility decreased more than projected and that permit will be reissued in 2012.

Several regulatory revisions also got underway. The Concentrated Animal Feeding Operation regulations were revised to be consistent with federal standards and became effective in November 2011. Revisions to both the Sediment and Stormwater Regulations and the Regulations Governing the Design, Installation, and Operation of On-Site Wastewater Treatment and Disposal Systems also went through the regulatory revision process. Both sets of regulations propose actions to reduce nutrient inputs from urban and suburban areas and will likely be finalized in 2013.

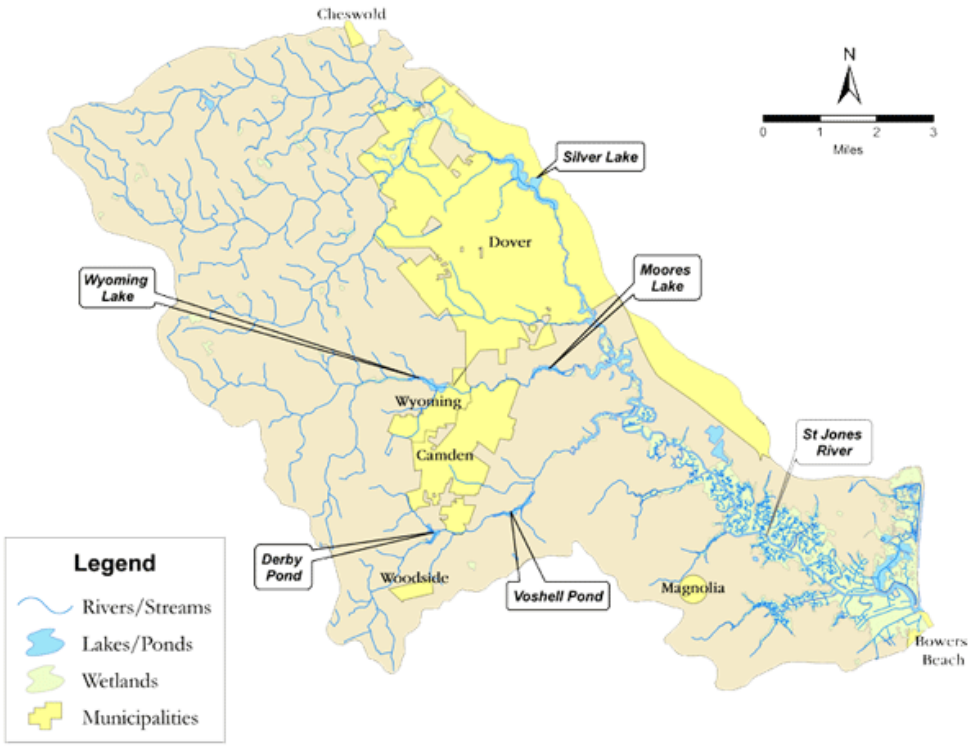
Important improvements have been made to data tracking and reporting systems through the conversion to the National Environmental Information Exchange Network (NEIEN) platform too. As a result, more data on practices that have routinely been implemented but previously not reported are now captured. To the extent possible, missing and unpopulated fields have been filled. In addition, several studies or literature reviews to examine the effectiveness of BMPs currently not modeled were initiated and include an assessment of the impacts of irrigation management and heavy use area pads. Delaware's non-farm fertilizer sales data was also examined and significant decreases in phosphorus are apparent, likely as a result of residential fertilizer Phosphorus bans in neighboring states. DNREC and DDA are working with Chesapeake Bay Program committees to determine appropriate credit for these practices.

b. St. Jones River

Watershed: St. Jones River

Location: The St. Jones River Watershed is approximately 25.9 square mile (16,576 acres) and is located in the central portion of Kent County. It is bounded on the south by the Murderkill River watershed, on the east by the Delaware Bay, on the north and northeast by the Leipsic River and Little Creek watersheds, and on the west by the Choptank River watersheds. It drains 90 square miles of land. The major watercourse in the watershed is the St. Jones River which has its headwaters in the western part of the county, about 22 miles upstream from the Delaware Bay. Significant ponds in the watershed are Silver Lake, Moores Lake, and Wyoming Lake. Flat wetlands, usually forested, exist mostly in the upper portion of the watershed and eventually drain into creeks and streams. Nontidal riverine wetlands and tidal wetlands line the banks of the river, sometimes up to 1/2 mile wide toward the mouth of the river. Wetlands comprise 9,669 acres of the watershed and provide critical services such as nutrient removal, erosion control, habitat for plants and wildlife, flood reduction, and storm water storage to the citizens of Delaware. The extent to which wetlands can perform these functions and thrive in the future depends on their health.

The St. Jones Watershed has the largest percentage of protected lands 5,236 acres with the River Reserve totaling approximately 3,750 acres of the protected lands. The Watershed land use is dominated by agriculture (33%), followed by wetlands (25.5%), and residential lands (17.4%). The impervious cover in the Watershed is approximately 9.8% with a possible future impervious cover of 23%. Between 2002 and 2007 agricultural lands decreased by 4% and residential lands increased by 2.1%. Wetland slightly decreased by 0.7% as did forested land by 0.1%.



Goal: Limit pollutants to levels at or below the Total Maximum Daily Load (TMDL) values specified in the regulation, i.e., an overall reduction of nitrogen and phosphorus in the waterways by 40%, or 869.5 lbs per day for nitrogen and 63.4 pounds per day for phosphorus. Nonpoint sources must reduce total nitrogen from 838.5 lbs per day and total phosphorus from 52.9 lbs per day. The TMDL also calls for 21.8 lbs per day reduction of nitrogen and 3.4 lbs per day from its stormwater (MS4) discharges. The designated uses for the St. Jones River include primary recreation, secondary recreation, fish, aquatic life and wildlife, industrial water supply, and agricultural water supply in freshwater segments.

Impairment: Delaware studies reviewed indicate the current condition of the Watershed is of degraded quality. Water quality samples have shown that the impairments (parameters) affect approximately 35.6 miles of streams and 208 acres of ponds. These impairments are primarily caused by nonpoint sources. Silver Lake and Moores Lake, both within the watershed, have been impaired by planktonic algae. To date, data has not been provided for Wyoming Pond. Most, if not all of the St. Jones River segments were listed as impaired by pollutants on Delaware's

303(d) list. Impairments include dissolved oxygen (DO), nutrients, and bacteria. Land use impairments for the St. Jones River are found below:

Source	TN (lbs/acre/year)	TP (lbs/acre/year)	TN (lbs/yr)	TP (lbs/yr)	Area
Urban	10.24	1.25	196,596.15	23,998.55	19,198.4
Agriculture	13.19	1.25	284,740.78	26,984.53	21,587.63
Forest	6.51	0.05	31,611.88	242.79	4,855.89
Wetland	0.00	0.00	0.00	0.00	8,685.97
Water	0.00	0.00	0.00	0.00	1,550.99
Range	7.50	0.45	2,403.58	144.21	320.48
Other	7.50	0.45	10,642.90	638.57	1,419.05

Implementation: Projects that are implementing watershed plan goals are summarized below. Most of the projects using 319 Grant funds in 2012 have been in Silver Lake and Wyoming Pond portion of the St. Jones River watershed.

Section 319 Activity within the St. Jones Watershed:

319 Projects	Grant Year	Status	319 Funds
Ecological Restoration	FY08 - 09	Complete	$221,874
Nutrient Management Planning	FY08, 09 & 11	Complete	$8,101
CREP Acres (salary for Coordinator)	FY2011	Complete	$60,000 statewide

2012 Milestone Data for the St. Jones River Watershed:

Pollutant Controls, Practices, and Actions	2012
Cover Crops	1,197 acres
Tree/Shrub Planting	1 acre
Rain Garden	1 acre
Shallow Water Area (CREP)	10 acres
Nutrient Management	1,503 acres
PSNT	5,559 acres
St. Jones Stream Restoration	1,000 feet

St. Jones River - Load Reductions based upon direct funding or leveraged funding associated with the NPS Program:

Practice	Load Reductions N	Load Reductions P
Cover Crops	25,924 lbs/year	80 lbs/year
Rain Gardens	>1 lb/year	>1 lbs/year
Shallow Water Area	89.88 lbs/year	>1 lbs/year
Nutrient Management	4,229 lbs/year	325 lbs/year
St. Jones Stream Restoration	20 lbs./year	4 lbs./year
TOTAL	30,263 lbs/year	409 lbs/year

Progress Highlights: The following are specific examples of NPS Program funded projects that occurred or finalized in 2012:

1. *Silver Lake Park Steam Restoration* - The St. Jones River restoration project at Dover Silver Lake Park was completed in March 2012. This project involved the stabilization of 350 linear feet of severely eroding stream banks and the installation of a 650 linear feet regenerative stormwater conveyance system. The bank stabilization along the main stem of the St. Jones River utilized rock toe and coir log protection along with a few rock vane structures. Following the removal of trees along the banks, which were being destroyed by beavers and the erosive forces of water (stream bank undercutting), the banks were backfilled with topsoil, seeded and covered with coir matting. Trees were also replanted along the banks of the St. Jones River.

   The regenerative stormwater conveyance system, which treats stormwater runoff coming onto the site from the west, collects runoff from a 43.5 acre sub-watershed. The system involved the installation of four cobble-weir structures and a plunge pool. The base of the drainage channel was lined with a mixture of sand, gravel and wood chips to treat the groundwater and promote the uptake of nutrients. The weir structures serve as grade controls and deliver water into the subsurface. This project was done in cooperation with the City of Dover, the Silver Lake Commission, and DNREC's Division of Watershed Stewardship. Funding for the project is as follows:

   - Nonpoint Source Program (FY '08): $168,664.00
   - Nonpoint Source Program (FY '08 -12): $ 36,054.54
   - Nonpoint Source Program (FY '09-12): $ 17,155.46
   - CONSTRUCTION PROJECT TOTAL: $221,874.00

2. *R&R Building Rain Garden* - The NPS Program constructed a 600 square feet rain garden using 319 contributed funds and it treats approximately 12,150 square feet of roof runoff. The finances went towards plant purchases and the installation of an interpretive sign.

The Rain Garden was designed, constructed, and planted by DNREC staff. Funding came from FY08 NPS Program Grant through the Rain Gardens for the Bays project. Funding included $575.00 for plants and $1,020.00 for the interpretive sign.

3. *Wyoming Pond Buffer planting* - On May 12, the 319 NPS Program and The Town of Wyoming initiated a multiphase water quality project which will create a riparian buffer along the banks of Wyoming Pond in Isaac Branch, a tributary of the St. Jones River. Thirty volunteers planted hundreds of trees, shrubs, and flowers to create a riparian buffer approximately 75 feet along the lake that will not only beautify Wyoming Park, but will also help reduce stormwater run-off, erosion, sediment and excess nutrients from entering the river. The buffer will also act as a deterrent for geese that reside in the Park, which should reduce bacteria levels in the St. Jones. The St. Jones River TMDL calls for a 90% reduction in bacteria levels.

   On October 6, 2012 the Town of Wyoming held its second planting event to extend the riparian buffer along the banks of Wyoming Pond. This was the second phase of a multi-phased planting plan for Wyoming Park to help improve water quality in adjacent Wyoming Pond. This planting event extended the riparian buffer another 100 feet on the west side of the Park and replanted a few areas of a larger bed that was planted in the spring. Seventeen ROTC students from Caesar Rodney High School and three local volunteers planted hundreds of trees, shrubs, and flowering perennials that will not only beautify Wyoming Park, but also help reduce stormwater run-off, erosion, sediment and excess nutrients from entering the water, while stabilizing the banks of the Lake. DNREC and NPS staff organized the event and performed preparatory work before the event including the removal of four invasive trees and vines in the new planting area. The Town of Wyoming is planning another planting event in the spring of 2013. This project should begin to reduce the bacteria levels.

4. *Mirror Lake* - This project involves dewatering Mirror Lake, mixing activated carbon into the sediments to bind contaminants, and constructing fringing wetlands to cap the contaminants. The project reach is approximately 1500 linear feet and lies within the park-like setting that borders the St. Jones River. The restoration project will focus on the creation of a stable conveyance and improved ecological diversity within Mirror Lake and along the banks of the St. Jones.

   In addition to the endorsement of Dover City Council, DNREC also held a workshop in August 2012 to introduce the project to the public and seek initial feedback, which was generally positive. The public will have additional opportunities to provide input on the project during the permitting stage. This Mirror Lake project is being funded using State Hazardous Substance Control Act (HSCA) dollars and general funds from the office of

the Secretary. Biohabitats is developing and preparing design and construction drawings, specifications and a cost estimate for the restoration of Mirror Lake and a portion of the St. Jones River from Mirror Lake downstream to the weir just below Court Street in Dover, DE. Biohabitats will also be incorporating sediment remediation plans and specifications that are being created by Upal Ghosh at the University of Maryland, Baltimore County (UMBC) which will utilize activated carbon to remediate the contaminant level of the sediments within Mirror Lake

Once Federal and State permits are received, plans and specifications will be completed in early 2013. Construction is planned for November 2013 with the assistance of DNREC's Waterways and Shoreline program plus the local Conservation District.

Additional NPS Activity in the St. Jones Watershed:

Community Water Quality Improvement Grant - The purpose of the Community Water Quality Improvement Grant Program (CWQIG) is to provide financial assistance to eligible entities to facilitate projects that will support water quality improvement in impaired Delaware watersheds. The CWQIG is administered by DNREC, Nonpoint Source Program. The goals of the program are to support projects that focus on the developed landscape that will help improve water quality. Funding for the following projects is available as a result of the interest earned from the State Revolving Fund Loan Program.

Project Name	CWQIG Award	319 Funds Leveraged	Quantity	Watershed
PDE- St. Jones- Rain Garden Installation	$27,835	NA	3	St. Jones
DE Ag. Museum:	$35,000	NA		St. Jones
• Rain Garden Installation			2	St. Jones
• Bioretention Facility			1	St. Jones
• Floating Wetlands			4	St. Jones
• Mill Pond Vegetative Buffer Planting			1	St. Jones
Puncheon Run-Flood plain restoration and treatment of urban runoff.	$ 60,000	NA	1	St. Jones

c. *Inland Bays*

Location: The Inland Bays/Atlantic Ocean Basin comprises approximately 313 square miles of eastern Sussex County, Delaware. Starting at Lewes and Cape Henlopen State Park at the southern edge of the entrance to Delaware Bay, the area extends southward approximately 24 miles along the Atlantic shoreline to the Maryland State Line. It includes the coastal towns of Rehoboth Beach, Dewey Beach, Bethany Beach, South Bethany Beach, and Fenwick Island. State Route 1 (SR 1) extends parallel to the shoreline and connects the towns.

The three inland bays are located just landward of the Atlantic Ocean shoreline. From north to south, these are Rehoboth Bay, Indian River Bay, and Little Assawoman Bay. Rehoboth Bay contains the Lewes-Rehoboth Canal and Rehoboth Bay Watershed; the Indian River Bay contains the Indian River, Iron Branch, and Indian River Bay Watersheds; and the Little Assawoman Bay contains the Little Assawoman, Assawoman, and Buntings Branch Watersheds.

Goal: Current goals call for the increased implementation of numerous nonpoint source best management practices, especially in the agriculture sector (see below for a highlight of key numeric targets). The goals are those that were presented by Inland Bays Pollution Control Strategies (PCS) and an approved EPA watershed plan. The PCS involves many strategies to reduce nitrogen and phosphorous to meet the TMDL, but what is presented here are initiatives of the 319 program.

Table1. Progress toward goals within the Inland Bays Watershed

Section 319 Activity within the Inland Bays Watershed:

319 Projects	Grant Year	Status	319 Funds
Cover Crop	FY2011	Complete	$315,000
Nutrient Management Planning	FY08, 09 & 11	Complete	$70,997.00
Nutrient Relocation	FY08, 09 & 11	Complete	$22,081.00
CREP Acres (salary for coordinator)	FY2011	Complete	$60,000 Statewide
Riser Rebate Program	FY2009	Complete	$1,350

2012 Milestone Data for the Inland Bays:

Pollutant Controls, Practices, and Actions	2012
Cover Crops	9,023 acres
Manure Composter and Sheds	9 systems
Tree Planting	107 acres

Heavy Use Area Protection	91 pads
Nutrient Relocation	8,045 tons
Nutrient Management	15,155 acres
Wet Ponds and Wetlands	1.7 acres
Septic Pumpouts	11 systems
PSNT	2,136 acres

Inland Bays Load Reductions based upon direct funding or leveraged funding associated with the NPS Program:

Practice	Load Reductions N	Load Reductions P
Cover Crops	115,344 lbs/year	355 lbs/year
Nutrient Relocation	45,048 lbs/year	3,165 lbs/year
Nutrient Management	42,621 lbs/year	3,274 lbs/year
Tree Planting (CREP)	4,495 lbs/year	150 lbs/year
Wet Ponds/Wetlands (CREP)	60 lbs/year	2 lbs/year
Septic Pumpouts	30 lbs/year	12 lbs/year
TOTAL	207,598 lbs/year	6,958 lbs/year

Progress Highlights: The following are specific examples of NPS Program funded projects that occurred or finalized in 2012:

Riser Rebate Program -The project will supply rebates, not to exceed $150.00, to property owners who voluntarily have risers and an effluent filter installed on their existing septic tanks that were permitted prior to March 11, 2002. The current average cost of having risers and an effluent filter installed on a septic tank is $ 560.00. Rebates will be offered on a first come first served basis. 11 homeowners took advantage of the program within the Inland Bays watershed.

As a result of promulgation the Total Maximum Daily Load (TMDL), the Department proposed reducing the nitrogen load from older on-site wastewater treatment and disposal systems. With the retrofit installation and then by maintaining these old on-site systems in accordance with current septic regulations (pumping out the system once every three years), the N and P loads will be reduced in the watershed and their longevity should also be increased. The annual reduction of nutrients to the Inland Bays Watershed through pumpouts will be:

- Nitrogen Load (2.75 lbs/system) X 11 systems) =30.25 lbs/Yr
- Phosphorous Load (1.11 lbs/system) X 11 systems) =12.21 lbs/Yr

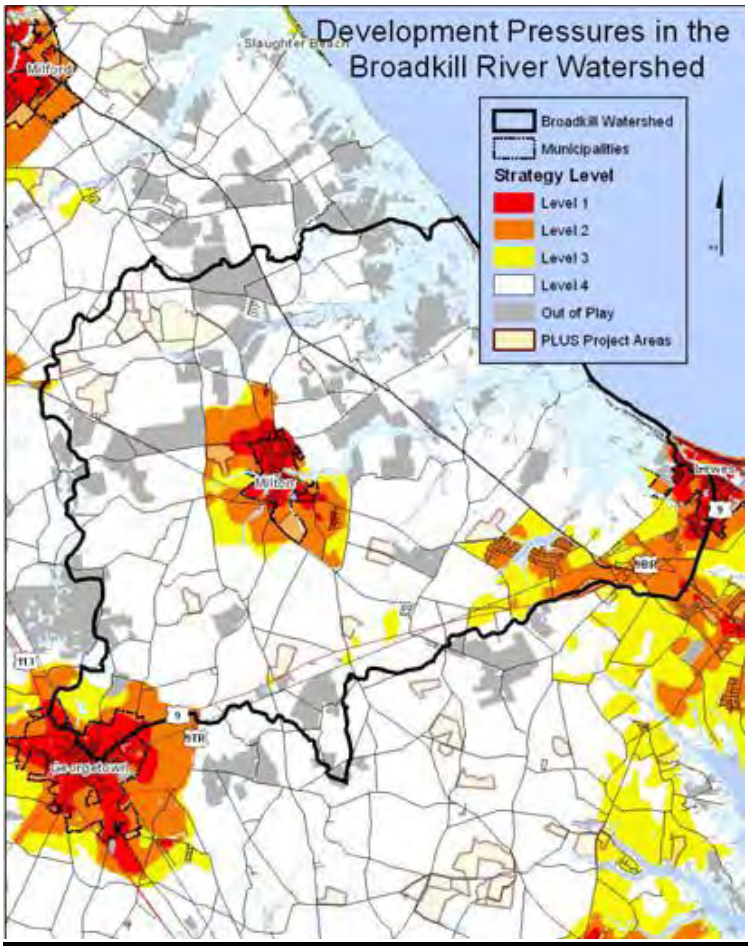
Anchorage Canal Drainage Area Stormwater Retrofit - In 2008, the Center for the Inland Bays, DelDOT, the Town of South Bethany, Sea Colony, Middlesex Beach, and Sea Colony formed a partnership to develop a stormwater retrofit assessment and strategy for the lands draining into the Anchorage Canal on Little Assawoman Bay. The goal of the partnership is to reduce excess nitrogen and phosphorus loads entering the Canal by 40% in accordance with the Total Maximum Daily Loads for the Little Assawoman Bay. The area had long been a focus for improvement due to the poor water quality conditions of the Canal and Bay, but little successful improvements had occurred. The strategy and its implementation are a demonstration project for stormwater retrofits in the Inland Bays Watershed that is helping to meet the voluntary goal of the Inland Bays Pollution Control Strategy to treat 4,500 acres of lands that were developed without stormwater controls.

The Project was highly-successful and completed in Spring of 2011. Estimated reduction of 23.7 lbs/yr TN and 3.44 lbs/yr TP. Nutrient reductions are achieved through increases in wetland areas and stormwater retention in the wetswale system.

- DNREC CWAC CWQGP $95,866
- Center for Inland Bays $31,235
- Sea Colony $21,000

d. Broadkill River

Location: The Broadkill River watershed is located in the east central portion of Sussex County. It is bounded on the north by the Cedar Creek watershed, on the west by the Gravelly Branch and Deep Creek watersheds, on the south by the Lewes-Rehoboth Canal, Rehoboth Bay, and Indian River watersheds, and on the east by the Delaware Bay. The mainstem of the Broadkill River is approximately 25 miles long. The major watercourse in this segment is the Broadkill River which originates at the Town of Milton and discharges into the Roosevelt Inlet near Lewes. Major impoundments in the area are Waggamons Pond and Diamond Pond located near Milton. The Broadkill River flows generally eastward until it approaches the coast where it turns abruptly and flows south to discharge into the Roosevelt Inlet. The flow of this stream is sluggish and the water is turbid. The watershed drains an area of 107 square miles.



Goal: The established TMDL requires in terms of daily nonpoint nutrient loads, a 40% reduction in nitrogen (baseline 1,675 lbs/day) would require a reduction of 670 lbs/day to reach the target load. A 40% reduction in phosphorus (baseline 69.3 lbs/day) would require a 27.7 lbs/day reduction to reach the target load.

Impairment: Water quality monitoring performed by the Department of Natural Resources and Environmental Control (DNREC) has shown that waters of Broadkill River and several of its tributaries and ponds are impaired by high levels of bacteria and elevated levels of nitrogen and phosphorous, and that the designated uses are not fully supported due to levels of these pollutants in these waterways. Total Maximum Daily Loads (TMDLs) were established for the Broadkill River Watershed in December 2006.

Implementation: Where data is available, Section 319 specific information is provided below. The Milestone data is necessary to demonstrate efforts and actions towards progress within the Broadkill River Watershed.

In future versions of the Delaware NPS Program Annual report, more detailed watershed information will be provided. Currently, Delaware has contracted with KCI Technologies, Inc. to develop an approved Watershed Plan for the Broadkill River Watershed.

Section 319 Activity within the Broadkill River Watershed:

319 Projects	Grant Year	Status	319 Funds
Nutrient Management Planning	FY12	Complete	$15,412.30
Nutrient Relocation	FY-08, 09, & 11	Complete	$1,872.09
Bioretention	FY10	Complete	$7,500.00

2012 Milestone Data for the Broadkill River Watershed:

Pollutant Controls, Practices, and Actions	2012
Commodity Cover Crops	1,959 acres
Cover Crops	2,139 acres
Pre-Sidedress Nitrogen Test (PSNT)	661 acres
Heavy Use Area Protection	21 systems
Nutrient Relocation	187 tons
Nutrient Management	4,337 acres
Bioretention	1 system

Broadkill River Load Reductions based upon direct funding or leveraged funding associated with the NPS Program:

Practice	Load Reductions N	Load Reductions P
Cover Crops	27,343 lbs./year	84 lbs./year
Nutrient Relocation	1,047 lbs./year	74 lbs./year
Nutrient Management	12,197 lbs./year	937 lbs./year
Bioretention	>1 lbs./year	>1 lbs./year
Rain Garden	>1 lbs./year	>1 lbs./year
TOTAL	48,589	1097

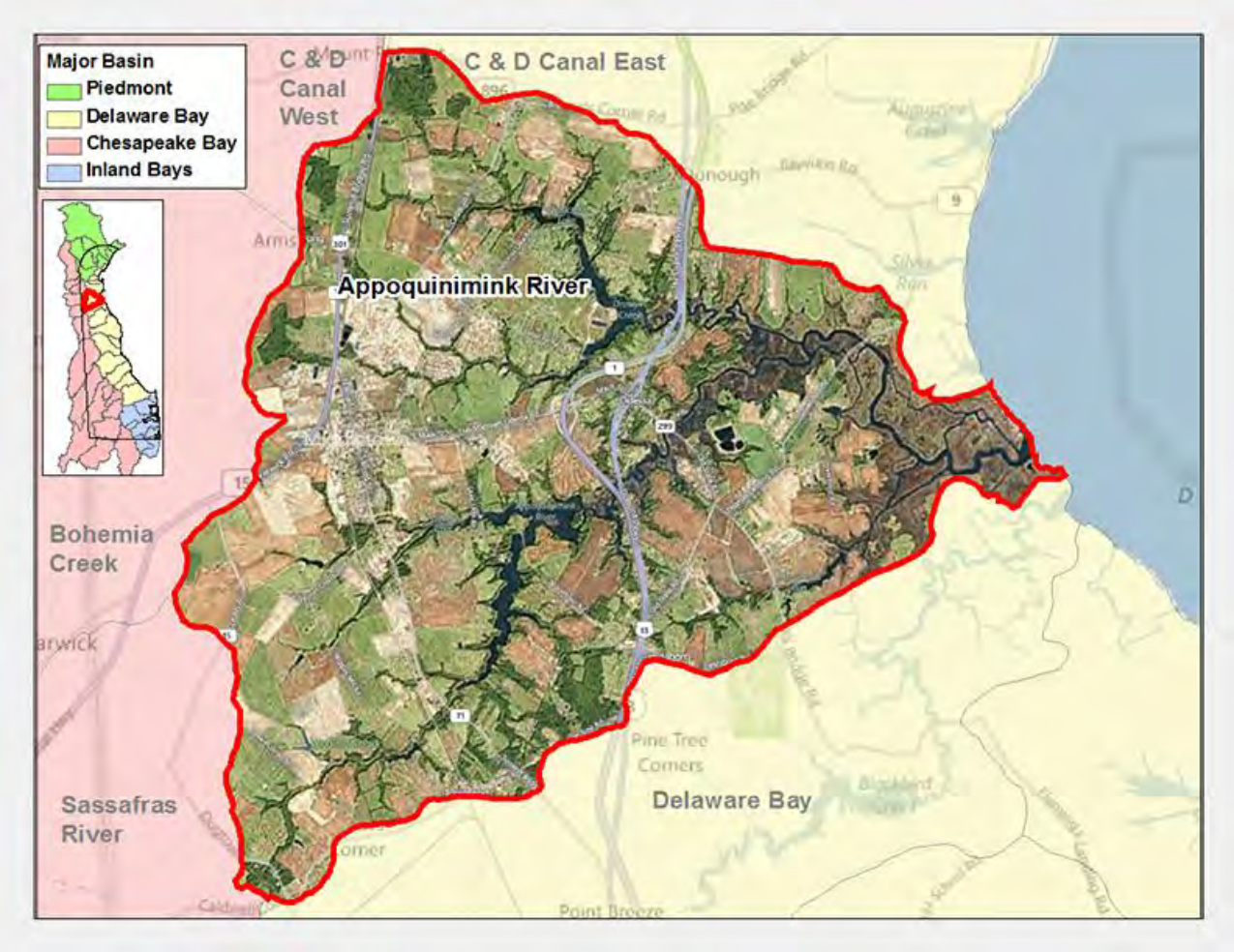
Additional NPS Activity in the Broadkill Watershed:

Community Water Quality Improvement Grant - The purpose of the Community Water Quality Improvement Grant Program (CWQIG) is to provide financial assistance to eligible entities to facilitate projects that will support water quality improvement in impaired Delaware watersheds. The CWQIG is administered by DNREC, Nonpoint Source Program. The goals of the program are to support projects that focus on the developed landscape that will help improve water quality. Funding for the following projects is available as a result of the interest earned from the State Revolving Fund Loan Program.

Project Name	CWQIG Award	319 Funds Leveraged	Quantity	Watershed
Town of Milton Rain Garden Installation	$50,000	NA	3	Broadkill
Bioretention Facility		$ 7,500	1	Broadkill

e. Appoquinimink River

Location: The 16-mile Appoquinimink River meanders through farmlands and wetlands in southern New Castle County, draining 47 square miles. The headwater drains mostly agricultural lands, and feeds four major ponds. The tidal freshwater segment of the Appoquinimink is bound by the head of tide at Noxontown Pond and Silver Lake, and by Drawyers Creek's confluence with the Appoquinimink. The remainder of the watershed consists of a tidal marsh extending to the Delaware River. The Appoquinimink River system consists of five main tributaries, the Appoquinimink River main stem, Deep Creek, Dove Nest, Hangman's Run, and Drawyer Creek. There are several shallow, man-made small lakes and ponds in the watershed: Wiggins Mill Pond, Noxontown Pond, Silver Lake, and Shallcross Lake. The Appoquinimink River is tidal from the confluence with Delaware Bay to the dam at Noxontown Lake on the main stem, the dam at Silver Lake on Deep Creek, and the confluence with Drawyer Creek. Salinity intrusion from Delaware Bay typically reaches upstream past the Drawyer Creek confluence at river kilometer (Rkm) 8.5.



Goal: Total Maximum Daily Loads (TMDLs) were established for the entire Appoquinimink River in December, 2003. These TMDLs called for a 60% reduction in nonpoint nitrogen and phosphorus loading. An implementation plan, or a Pollution Control Strategy, was to be developed by a Tributary Action Team, a diverse group of citizens and government agency personnel presented to the Department for promulgation to reach the prescribed TMDLs. Load reductions will be achieved through the implementation of BMP's in agriculture, development, wastewater, and private stewardship. The Strategy is designed to reduce nutrient loadings from current and future land practices. This combination of actions will lead to the achievement of the TMDL.

Impairment: The Appoquinimink River watershed has historic water quality problems with respect to nutrient and low dissolved oxygen concentrations. A Total Maximum Daily Load for nutrients and bacteria has been established requiring a 60% reduction in nitrogen and phosphorus loads and a bacteria reduction of between 11-15% in freshwater areas and 72-73% in marine areas.

Implementation: Where data is available, Section 319 specific information is provided below. The Milestone data is necessary to demonstrate efforts and actions towards progress within the Appoquinimink River Watershed.

Section 319 Activity within the Appoquinimink River Watershed:

319 Projects	Grant Year	Status	319 Funds
Nutrient Management Planning	2012	Complete	$6,261.75
CREP Acres (salary for Coordinator)	2012	Complete	$ 60,000 (statewide)

2012 Milestone Data for the Appoquinimink River Watershed:

Pollutant Controls, Practices, and Actions	2012
Nutrient Management	1,699.50 acres

Appoquinimink River Watershed Load Reductions based upon direct funding or leveraged funding associated with the NPS Program:

Practice	Load Reductions N	Load Reductions P
Nutrient Management	4,781	367

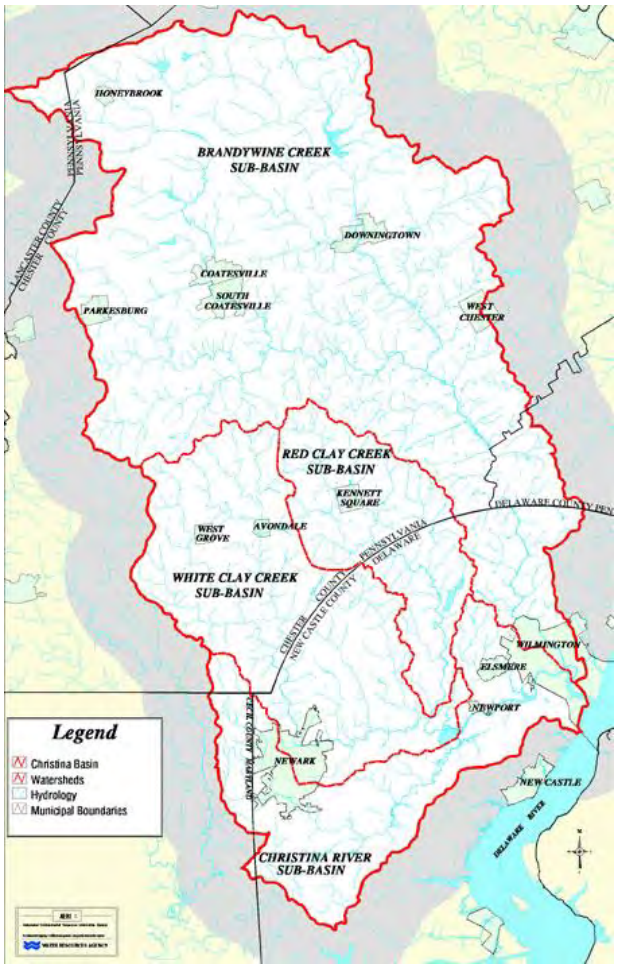
Progress Highlights: All sectors have taken steps to improve water quality through the implementation of laws, regulations, and voluntary BMPs. Analysis using a basic land use loading rate model shows that, to date, nonpoint sources of TN and TP have been reduced by 109% and 111%, respectively, from the TMDL baseline levels. While land use modeling based on current practices predicts reductions exceeding that required by the TMDL, there is still a need for further reductions in areas that are currently lacking such as wastewater and stormwater.

f. Christina Basin

Location: The Christina Basin is a 565 square mile basin contained in the larger Delaware River Basin. The Christina Basin, located in New Castle County in northern Delaware, includes four sub-watersheds:

- Brandywine Creek 325 sq. mi.
- Red Clay Creek 54 sq. mi.
- White Clay Creek 107 sq. mi.
- Christina River 78 sq. mi.

Although a small portion can be found within Maryland, the Christina Basin falls principally within two states, Pennsylvania to the north and Delaware to the south. The Pennsylvania portion is characterized by more open space, including agricultural land and forests, while the more urban, southerly portion in Delaware tends to have more built-up land.



Goal: Delaware's goal is to reduce pollutant loadings from current and future land use practices with an effort to achieve the TMDL. The effort for the Delaware portion of the Christina Basin will be implemented through the work of numerous organizations and individuals and will be

coordinated with the ongoing pollution reduction efforts in the Pennsylvania portion of the Christina Basin. The level of pollution reductions necessary to achieve the designated uses in the streams of the Delaware portion of the Christina Basin vary significantly. For example, bacteria levels need to be reduced as much as 95 percent in some areas, nitrogen levels need to be reduced as much as 50 percent in some areas, and phosphorus levels need to be reduced as much as 89 percent in some areas. In contrast, other areas of the Christina Basin are relatively free of excess nitrogen, phosphorus, and bacteria and simply need to be protected in their current state.

Impairment: The streams of the Christina Basin in Delaware suffer from impaired water quality due to the following problems:

- *Nutrients*: One hundred and thirty stream miles have higher than desired nitrogen and phosphorus loads, which could cause low dissolved oxygen (DO) levels.
- *Bacteria* (pathogens): Concentrations along 134.2 miles of stream frequently exceed the primary recreation standards for swimming of 100 colonies per 100 milliliters.
- *Sediment*: The streams are degraded by high sediment loads that range between 311 and 975 pounds per acre annually, depending on the subwatershed.
- *Stream Habitat*: While biological diversity of the streams has been improving, 39 percent of the nontidal streams in the Piedmont have poor habitat due to the increased frequency and rate of runoff from urban/suburban development and rural activities (Shaver et al., 1995).
- *Contaminated Waste Sites:* Contaminated waste sites are situated throughout the watershed.
- *Fish Consumption Advisories*: Health warnings advising against the consumption of fish have been posted along 82.2 stream miles due to PCB contaminated sediment and high PCB levels in fish tissue.

Implementation: The NPS Program is currently in the final stages of Watershed Implementation Plan development for the Christina Watershed. A Draft Plan has been submitted to EPA for approval. We are awaiting the results of that review.

Progress Highlights: The following are specific examples of NPS Program funded projects that occurred or finalized in 2012:

1. *Upper Christina* - Approximately 3,000 linear feet of the upper Christina River west of Newark are restored using a variety of restoration techniques (e.g., rock toe and log toe protection, cross vanes, log vanes, root wads, riffle and pool sequences, and random bolder placement).

   The restoration project includes the planting of native trees and shrubs along the stream banks serving as riparian canopy cover/filter strips. The goals are to establish stream-side buffers, restore bank stability, reduce in-stream sediment loading, reconnect stream with floodplain, improve water quality and provide wildlife habitat. Project implementation funding provided includes the following sources:

   - Clean Water Advisory Council: $30,000

- Nonpoint Source Program - 319 Funds (FY '08): $30,000
- Nonpoint Source Program – 319 Funds (FY '10): $12,820

2. *Ham Run Stream Restoration Site* **-** The Ham Run stream restoration project involves a 400 – 500 feet reach of Ham Run, a tributary to Red Clay Creek near the intersection of Duncan Road and Greenbank Road. This is a joint project between the Historic Marshallton Civic Association, Department of Transportation (DelDOT) and the Department of Natural Resources and Environmental Control (DNREC). This project is being funded by DelDOT and the EPA Nonpoint Source Program. Funding for the Ham Run Project included the following:

    - DelDOT Community Transportation: $ 97,056
    - Nonpoint Source Program (FY '09): $ 9,943
    - CONSTRUCTION PROJECT TOTAL: $107,000

Christina River Load Reductions based upon direct funding or leveraged funding associated with the NPS Program:

Practice	Load Reductions N	Load Reductions P
Upper Christina Stream Restoration	60 lbs./year	11 lbs./year
Ham Run Stream Restoration (not complete)	NA	NA
TOTAL	60 lbs./year	11 lbs./year

Additional NPS Activity in the Christina Watershed:

Community Water Quality Improvement Grant - The purpose of the Community Water Quality Improvement Grant Program (CWQIG) is to provide financial assistance to eligible entities to facilitate projects that will support water quality improvement in impaired Delaware watersheds. The CWQIG is administered by DNREC, Nonpoint Source Program. The goals of the program are to support projects that focus on the developed landscape that will help improve water quality. Funding for the following projects is available as a result of the interest earned from the State Revolving Fund Loan Program.

Project Name	CWQIG Award	319 Funds Leveraged	Quantity	Watershed
Rosetree Hunt Stormwater Pond Restoration	$87,500	NA	1	Christina
Cool Run-Stormwater improvements on UD campus	$60,000	NA	1	Christina

VII. Load Reductions

In 2012, the Delaware NPS Program load reductions were calculated for many of the 319 funded projects implemented on a watershed scale. The load reductions are calculated using guidance established during the Pollution Control Strategy development process.

2012 Project Load Reductions/Year by Watershed

Project	Nitrogen (lbs)	Phosphorus (lbs)
Chesapeake Bay	798,159	24,788
St. Jones River	30,263	409
Inland Bays	207,598	6,958
Broadkill River	40,589	1,097
Appoquinimink River	4,781	367
Christina Basin	60	11
TOTAL	1,081,450	33,630

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 target watersheds with accepted Watershed Plans meeting the a) through i) criteria.

Shortfalls

While we have met or exceeded our overall load reduction expectations within the targeted watersheds, the NPS Program did not achieve a few specific implementation goals we have set for ourselves. The exact goals for early/standard/late cover crops were not achieved, but cost share programs have been modified to emphasize early plantings and this acreage is expected to increase in the future. Forest buffer acreage did not increase and members of the agriculture community have indicated that current market prices of crops do not support land conversion for buffers at this time. A collaborative group plans to examine how much of an additional cost share incentive is needed to encourage additional enrollment in buffer programs. The tons of poultry litter transported has decreased in recent years; Delaware believes in general that the total volume of litter has decreased as has the nutrient content of the litter and staff are working with the CBP Ag Workgroup to assess the data and make necessary model modifications. Finally, the onsite pump out goal was not achieved, but regulations have been proposed requiring a pump-out and inspection at the time of property sale or transfer and will also require reporting when inspections occur; both requirements are expected to increase the number of pump-outs reported each year.

Land Use Changes/Challenges

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 approximately 900,000 acres of farmland in 1920. Currently, 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.

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 2012 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**
Ann Marie Townshend	**Kent County Planning Office**
Austin Short	**DE Department of Agriculture**
Bob Coleman	**Delaware Nutrient Management Program**
Brenda Zeiters	**DNREC/NPS Program**
Brian Bloch	**DNREC/ Watershed Stewardship**
Bryan Hall	**State of Delaware Planning Office**
Chuck Williams	**DNREC/Shoreline**
Brittany Sturgis	**DNREC/ Watershed Stewardship**
Chris Bason	**Center for the Inland Bays**
Dale Churchey	**Delaware CREP Program**
Debbie Absher	**Sussex Conservation District**
Dave Schepens	**DNREC/Groundwater Discharges**
E.J. Chalavala	**Center for the Inland Bays**
Ed Lewandoski	**University of Delaware**
Eric Beuhl	**Center for the Inland Bays**
Frank Piorko	**DNREC/Watershed Stewardship**
Fred Suffian	**US EPA**
Glenn Gladders	**DE Department of Agriculture**
Gordon Johnson	**University of Delaware**
Greg Moore	**DNREC/Fish&Wildlife**
Jamie Rutherford	**DNREC/Sediment & Stormwater**
Jen Walls	**DNREC/Watershed Stewardship**
Jen Gochenauer	**Delaware Nature Society**
Jenn Volk	**University of Delaware**
Jerry Kauffman	**Water Resources Agency**
Jessica Watson	**Sussex Conservation District**
Jim Cassidy	**DNREC/Groundwater Discharges**
Jim Chaconas	**DNREC/Wetlands & Subaqueous Lands**
Jim Short	**DNREC/Solid Waste**
Joe Farrell	**University of Delaware**
Jim Sullivan	**DNREC/Watershed Stewardship**
John Barndt	**DNREC/Water Resources**
John Schneider	**DNREC/Watershed Stewardship**
Kevin Donnelly	**New Castle Conservation District**
Kimberly Cole	**DNREC/Delaware Coastal Program**
Kip Foskey	**Sussex Conservation District**
Lyle Jones	**DNREC/Watershed Stewardship**
Lara Allison	**DNREC/NPS Program**
Larry Towle	**DE Department of Agriculture**
Lynn Mangus	**Farm Service Agency/State Office**
Marcia Fox	**DNREC/Watershed Stewardship**
Marianne Walch	**DE Department of Transportation**
Mark Biddle	**DNREC/Watershed Stewardship**
Mark Davis	**DE Department of Agriculture**
Mark Hogan	**DNREC/NPS Program**
Paul Petrichenko	**NRCS State Office**
Randy Cole	**DE Department of Transportation**
Robert Baldwin	**DNREC/Watershed Stewardship**
Robert Palmer	**DNREC/NPS Program**
Russel Morgan	**USDA/NRCS**
Sally Boswell	**Center for the Inland Bays**
Sally Kepfer	**NRCS State Office**
Sara Esposito	**DNREC/ Watershed Stewardship**
Sara Wosniak	**DNREC/ Watershed Stewardship**
Sharon Webb	**DNREC/ NPS Program**
Shelley Tovell	**DNREC/Fish&Wildlife**
Steve Williams	**DNREC/ Watershed Stewardship**
Sue McDowell	**US EPA**
Tiana Blount	**US EPA**
Tim Garrahan	**NRCS State Office**
Tim Riley	**Kent Conservation District**
Tom Barthelmeh	**DNREC/Watershed Stewardship**