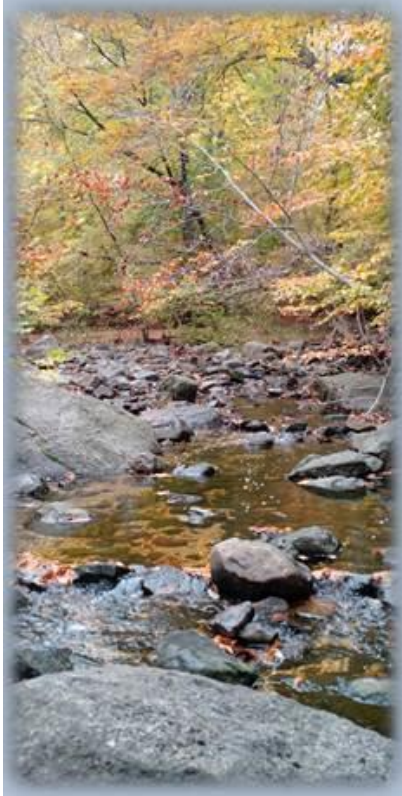
DELAWARE NONPOINT SOURCE PROGRAM
2015 ANNUAL REPORT



DELAWARE DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

Nonpoint Source Program
89 Kings Highway
Dover, Delaware 19901
Phone: 302-739-9922
Fax: 302-739-8017
www.dnrec.delaware.gov

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.

Program Staff:

Marcia Fox, Program Manager
Sharon Webb, Environmental Scientist
Mark Hogan, Planner
James Sullivan, Planner
Brenda Zeiters, Administrative Specialist

Published and Distributed by the:

Delaware Nonpoint Source Program
DNREC Division of Watershed Stewardship
89 Kings Highway
Dover, DE 19901
Telephone: (302) 739-9922
Fax: (302) 739-8017

Table of Contents

Preface

The 2015 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 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 current agricultural BMPs 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

Nonpoint source pollution continues to be, and is recognized as, the largest remaining source of water quality impairments in the State. The cumulative impact of agricultural and urban development and associated nutrient input has degraded water quality and habitat. As a result, Delaware's NPS Program promotes statewide efforts to manage nonpoint source pollution. Six priority watersheds (Chesapeake, Christina Basin, Appoquinimink River, Broadkill River, Inland Bays, and St. Jones River), which comprise of 976,040 acres (1,525 square miles), focus the State's efforts for nonpoint source pollution abatement.

This annual report documents the activities and highlights of the State of Delaware, Nonpoint Source (NPS) Program during the 2015 calendar year. It also fulfills the requirements of Section 319 of the federal Clean Water Act. DNREC's NPS Program annually prepares this report to inform stakeholders on the state's progress in the area of nonpoint source water pollution abatement. Although this report should not be considered a complete enumeration of all nonpoint source activities, it describes the most important features and accomplishments of Delaware's Nonpoint Source Program.

In 2015, the Delaware NPS Program continues to decrease pollutant loads by achieving milestone targets to achieve water quality in the First State. These milestones call for the increased implementation of numerous nonpoint source best management practices, while decreasing nitrogen and phosphorus loads to receiving waterbodies. This report relates several accomplishments during calendar year 2015 that support long-term and short-term milestones (Appendix A) identified in the State's NPS Management Program. Milestone activities successfully implemented during 2015 to support and/or enhance the program include **grant funding, education and outreach, and partnerships** with other organizations working together to reduce nonpoint source pollution in Delaware.

Grant Funding

During 2015, DNREC received $1,907,844, in federal section 319(h) grant funds, to implement Delaware's Nonpoint Source (NPS) Program. The framework for Delaware's NPS Program is detailed in the NPS Management Plan, which reflects the current goals and direction of the NPS Program. Provisions of the approved plan effectively guide Delaware's implementation of state and local nonpoint source management measures and activities through 2019. Funded projects completed during the calendar year, included implementing best management practices, resulted in the following pollutant load reductions: nitrogen 2,214,361 pounds/year and phosphorus 96,187 pounds/year. A detailed table of nutrient reductions can be found in Appendix B. Delaware continues to ensure that projects funded with CWA Section 319 dollars make progress towards restoring or protecting waters impaired by nonpoint source pollution. Other key highlights of Pollutant Reduction Controls, Practices, and Actions in 2015 are listed below and can also be found in Appendix C.

Project highlights, in the 2015 NPS Annual Report, include the following:

- **Soil and Water Conservation District, Conservation Planners -** 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. The efforts of the Conservation Planners are represented on a watershed scale in the table below.
- **Nutrient Relocation Program -** Statewide, the Nutrient Relocation Program accounted for the transportation of 54,102 tons of poultry manure out of priority watersheds. The NPS Program supported $100,000 (approximately 3,531 tons) through CWA Section 319 funding.
- **Wetland and Stream Restoration Projects –** DNREC initiated wetland and channel restoration projects, implementing 10 water control structures and restoring over 450 acres of habitat.
- **Stream & Corridor Enhancement Program -** During 2015, the second and final phase of 3,675 feet of stream restoration was completed along the upper Christina River located west of downtown Newark in the Timber Creek, West Branch and Christianstead subdivisions.
- **Delaware Conservation Reserve and Enhancement Program (CREP)** - A total of 20 expiring CRP and CREP contracts were enrolled in the Conservation Reserve Enhancement Program in Delaware totaling 152 acres. The CREP coordinator developed 51 plans and contracts for 1,129 acres and conducted 66 field spot checks representing over 1259 acres of CREP contracts.

The 2015 efforts of NPS efforts are represented in the table below:

Pollutant Controls, Practices, and Actions implemented from 319 grant funding	Unit	2015 Cumulative Progress
Cover Crop (traditional and commodity)	acres	71,701
Nutrient Relocation (net export from watershed)	tons	54,102
Nutrient Management	acres	113,312
Tree Planting	acres	57
Rain Garden	structures	5
Stream Restoration	feet	4,375

Education and Outreach

On September 16, 2015, DNREC and the Delaware Chapter of the American Water Resources Association hosted a walking field tour of the Silver Lake Park, located in Dover, DE. The tour highlighted various projects that have been implemented in the park, including: a regenerative

stormwater conveyance system, a fish ladder that was the result of a mitigation project, the installation of a riparian buffer, the USGS Water Quality Monitoring Station, Mirror Lake remediation and restoration, and finally the maintenance of Mirror Lake's plants that were a part of the restoration project. The walking tour was a resounding success and maxed out attendance with 35 participants.

Partnerships

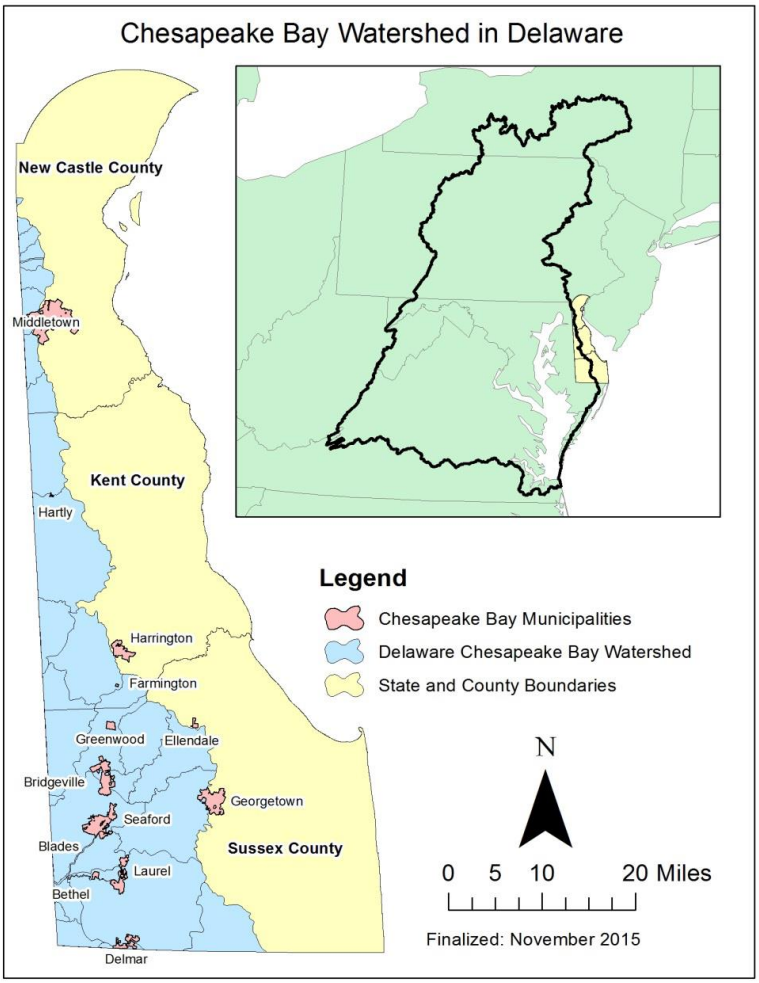
In addition to the competitive grants program, DE NPS Program works with other organizations on nonpoint source abatement projects. Some of these projects are carried out by NPS staff and others by partner organizations. In 2015, DE NPS Program assisted with Delaware's Cropland Transect Survey. DNREC (Watershed Assessment and Management Section and Nonpoint Source Program), Delaware Department of Agriculture, University of Delaware Cooperative Extension, Natural Resource Conservation Service (NRCS), Farm Service Agency (FSA), New Castle Conservation District, Kent Conservation District, and Sussex Conservation District partnered together to conduct a statewide cropland transect survey. This survey allows for the collection of cropland observation data over the course of the entire cropping system. Delaware began this survey in 2014, and it served as the first update to the state's conservation tillage practice database since 2004. New in 2015, the survey incorporated cover crop observations. In 2015 cover crop observation percentages varied from county to county; however, the greatest numbers of cover crop observations were found in Kent County, where almost half (49.0%) of all cropland observations incorporated a cover crop. In New Castle County, 29.1% of cropland observations had cover crop systems in place, and 36.1% of observations in Sussex County incorporated cover crops. These observations help to supplement the cost-shared cover crop data received from agricultural partners that may not incorporate voluntary or traditional cover crops.

In summary, Delaware's NPS Program has strongly supported and promoted the collaborative efforts of state, federal, and local agencies as well as private organizations in order to achieve nonpoint source reduction goals. The Delaware NPS Program is committed to implementing an environmentally sensitive program which focuses on the attainment of water quality goals on a watershed level by using a balanced approach of education, research, technical and financial assistance, and regulation.

VI. Watersheds

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 milestone commitments are to annually reduce nitrogen by 3,429,386 pounds, phosphorus by 283,228 pounds and sediment by 60,605,240 pounds by the end of 2017, 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 2015. 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.

Table 1. 2015 (Section 319) annual activities within the Chesapeake Bay Watershed.

319 Projects	Grant Year	Status	319 Funds
Ecological Restoration	FY2011	Complete	$15,785
Nutrient Management Planning	FY2012	Complete	$152,289
Nutrient Relocation	FY2012	Complete	$17,915
CREP Acres (Salary for Coordinator)	FY2013	Complete	$60,000 (statewide)

Table 2. 2015 Chesapeake Bay annual milestone data* and annual load reductions based upon direct funding or leveraged funding associated with the NPS Program.

Pollutant Controls, Practices, and Actions	Unit	2015 Chesapeake Bay Progress	Cumulative Progress	2015 Watershed Plan Goal	% Goal Achieved	Practice and N Load Reductions (lbs/year)	Practice and P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	acres	59,531	Annual	36,809	162%	820,559.0	2,342.4
Nutrient Relocation (net export from watershed)	tons	35,063	Annual	40,000	88%	896,765.1	58,441.0
Nutrient Management	acres	103,423	Annual	163,500	63%	313,621.6	22,340.1
Tree Planting	acres	57	561	520	108%	2,618.0	82.0
Rain Garden	structure	1	818	826	99%	2.0	1.5
Stream Restoration	feet	700	2,119	1,600	132%	121.5	110.2
Total Reductions						**2,033,687.2**	**83,317.1**

**Progress information includes annual progress data provided to the Chesapeake Bay Program*

Table 3: Subset of water quality monitoring stations, collected in the Chesapeake Bay from 2004 to present, show the following trends, also see Appendix D:

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
112021	Chesapeake Drainage System	Sewell Branch @ Sewell Branch Rd. (Rd. 95)	97	-0.062	95	102	--	--	101	0	--
207091	Choptank	Culbreth Marsh Ditch @ Shady Bridge Rd. (Rd. 210)	102	0.031	95	102	--	--	102	-0.09048	--
304591	Nanticoke River	Deep Creek @ Old Furnace Rd. (Rd. 46)				43	-0.007	90	43	1.162	98
302031	Marshyhope Creek	Marshyhope Creek @ Fishers Bridge Rd. (Rd. 308)	185	--	--	185	--	--	186	0	--
304151	Nanticoke River	Nanticoke River @ Buoy 66 (mouth of DuPont Gut)	97	-0.038	95	95	--	--	97	-0.216	--
304321	Nanticoke River	Williams Pond @ East Poplar St.	101	-0.063	80	100	--	--	102	0	--

Additional Implementation Activities in the Chesapeake Bay Watershed:

Bridgeville Branch Tax Ditch Stream Restoration: DNREC and Sussex Conservation District embarked on the Bridgeville Branch Tax Ditch Stream Restoration project in 2015. The project focused on restoration of a man-made tax ditch to a natural design that benefits wildlife. The project includes a +1,600 linear foot stretch of the Bridgeville Branch Tax Ditch between N. Cannon Street and N. Main Street in Bridgeville, Delaware. The innovative design provides assessments of both vertical and lateral migration of the channel, while maintaining design capacities, protection of sanitary sewer lines crossing adjacent to the Tax Ditch and improvement of water quality. This project will remove nutrient amounts (lb/yr) of 121.5 nitrogen, 110.16 phosphorus & 401,760 total suspended solids. DNREC and partners will use this project as a program initiative to educate staff on the construction methods and benefits of several stream restoration green technologies. Funding for this project was supported by 21st century funds and Chesapeake Bay Implementation Grant Funds. More information on the Bridgeville Branch Restoration project is found in Appendix E.

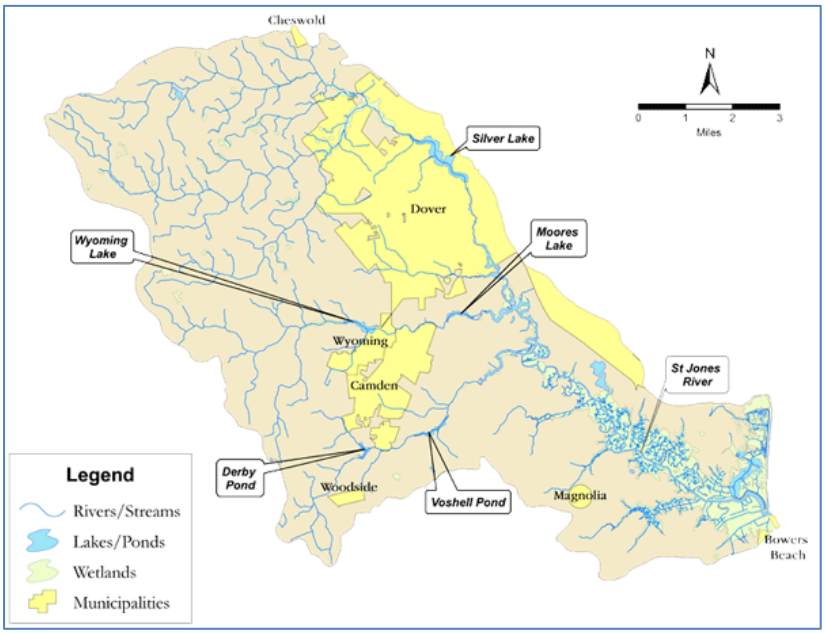
Sussex Conservation District Air Seeder Program: In 2015, the Sussex Conservation District purchased an air seeder to help farmers in the early establishment of cover crops and began a pilot program in Sussex County. The equipment allows a farmer to plant cover crops while their cash crop is still in the field. By planting early, the cover crop benefits from the longer growing degree days during the summer, therefore getting a better established crop to improve water quality and soil health. The pilot program was extremely successful with the planting of 4,017.6 acres planted. Total acres of planted cover crops are up 21.3% this year compared to last year with a total of over

39,355 acres planted countywide. Especially notable was the 33.8% increase in cover crop acres planted in the Chesapeake Bay Watershed in Sussex County. This increase can be attributed to the District's Soil Health outreach effort and the implementation of the air seeder. The additional cover crop acres will help Delaware's farmers get increased nutrient load reductions in the Chesapeake Bay Watershed Model. These reductions help Delaware work towards reducing their nutrient and sediment loads as outlined in the Chesapeake Bay Watershed Implementation Plan (WIP) and help meet Delaware's Total Maximum Daily Loads (TMDL) goals and milestones. More information on the air seeder program is found in Appendix F and a fact sheet in Appendix G.

In early September, a WTOL-11 television news team from Toledo, Ohio came to Delaware and Maryland to learn about what both states are doing to help improve water quality in the Chesapeake Bay. They featured the air seeder during their visit to Delaware. They created a three part series and the following link is part 2 How Delaware is Helping Clean Up the Chesapeake Bay.

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 (refer to Table 3). 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.

Table 1: Land use impairments for the St. Jones River

Source	TN (lbs/acre/yr)	TP (lbs/acre/yr)	TN (lbs/yr)	TP (lbs/yr)	Area
Urban	10.24	1.25	196,596.15	23,998.55	19,198.40
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 2015, have been in Silver Lake and Wyoming Pond portion of the St. Jones River Watershed.

Table 2. 2015 (Section 319) annual activities within the St. Jones River Watershed

319 Projects	Grant Year	Status	319 Funds
Nutrient Management Planning	FY2013, project 06	Complete	$7,102

Table 3. 2015 St. Jones annual progress and annual load reductions based upon direct funding or leveraged funding associated with the NPS Program.

Pollutant Controls, Practices, and Actions	Unit	St. Jones River	Practice and N Load Reductions (lbs/year)	Practice and P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	acres	1,645	5,042.0	5.0
Nutrient Relocation (net export from watershed)	tons	522	3,151.7	205.4
Nutrient Management	acres	3,181	2,145.0	56.0
Tree Planting	acres	0	-	-
Rain Garden	structure	0		
Stream Restoration	feet	0		
Total Reductions			**10,338.7**	**266.4**

Table 3: Subset of water quality monitoring stations, collected in the Saint Jones from 2004 to present, show the following trends, also see Appendix D:

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
205011	Saint Jones River	St. Jones River @ mouth, Bowers Beach	79	-0.076	98	80	--	--	82	-0.5981	--
205041	Saint Jones River	St. Jones River @ Barkers Landing	105	-0.025	95	104	--	--	101	-2.113	95
205091	Saint Jones River	St. Jones River @ East Lebanon Rd. (Rt. 10)	100	-0.067	95	101	--	--	101	-1.491	98
205151	Saint Jones River	Fork Branch @ State College Rd. (Rd. 69)	92	-0.021	90	99	-0.003	80	99	-0.2912	98
205181	Saint Jones River	Moores Lake @ S. State St. (Rd. 27)	100	--	--	101	0.001	95	101	-0.126	--
205191	Saint Jones River	Silver Lake @ Spillway (Dover City Park)	104	--	--	128	0.001	80	129	-0.1408	--
205211	Saint Jones River	Derby Pond @ Boat Ramp (Rt. 13A)	94	--	--	99	0.001	95	99	0	--

Progress Highlights: The following are specific examples of NPS Program funded projects that occurred or finalized in 2015:

1. **Mirror Lake –** The Mirror Lake project, finalized in December of 2013, 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 1,500 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.

   The construction phase of the Mirror Lake Remediation & Restoration Project, Watershed Remediation Hazardous Substance Release Site in Dover, ended December 5, ahead of schedule and under budget. In all, 79 tons of SediMite (activated carbon pellets) were applied to five (5) acres of lake and channel sediments in 10 days. Nine hundred sixty-seven (967) cubic yards (1,325 tons) of sand were placed in Mirror Lake to create the intertidal wetland; 62 tons of stone were placed in Mirror Lake to create two (2) rock vane hydraulic control structures; and 760 linear feet of 16-inch diameter coir log, double stacked, were place on the west bank of the lake to prevent erosion. Sixty-seven (67) volunteers helped on the project. The Boot Camp Program, AmeriCorps, and the Homeless Shelter contributed 770 hours of volunteer labor; and DNREC staff contributed 511 hours of labor. Sincere thanks go out to all volunteers, especially the Shoreline and Waterways crew, for help with heavy equipment and bulk material transfer. The remainder of the plantings, paid for by DE NPS program, on the new ¼ acre intertidal wetland concluded in the spring 2015. More information on the Mirror Lake Restoration Project can be found in Appendix G.

   2015 Mirror Lake Updates:

   Data collected immediately before and 1 year after activated carbon treatment showed….

   - 78% reduction of dissolved PCB concentrations in the sediment pore water
   - 72% reduction of dissolved PCB in the water column
   - 60% reduction in total PCB in resident fish within Mirror Lake, determined through fish tissue sampling. This reduction in 1 year would have taken roughly 20 years if the water hadn't been treated with activated carbon.

   A new intertidal wetland was also successfully established with the planting of over 6,000 native plugs and shrubs.

   Earth Day 2015, twelve volunteers replanted some areas around mirror lake that did not survive from the original planting and filled in any gaps. The volunteers also maintained control of any invasives.

   September 2015 Delaware American Resources Association (DEAWRA) hosted a walking tour of The Mirror Lake project. The tour highlighted various projects that have been implemented in the park which included: a regenerative stormwater conveyance system, a fish ladder that was the result of a mitigation project, the installation of a riparian buffer, the USGS Water Quality Monitoring Station, Mirror Lake remediation

and restoration, and finally the maintenance of Mirror Lake's plants that were a part of the restoration project. The walking tour was a resounding success and maxed out attendance with 35 participants.

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

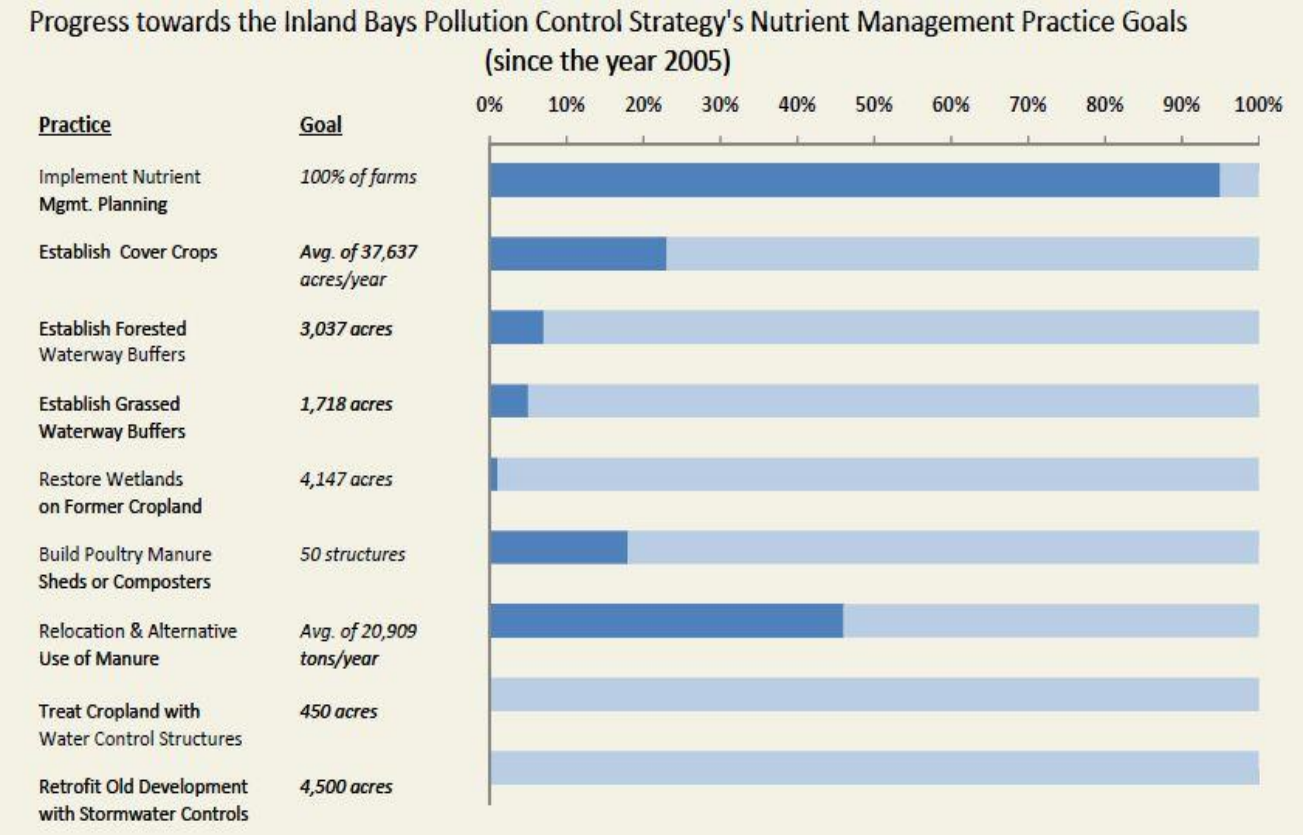


Table 2. 2015 (Section 319) annual activities within the Inland Bays Watershed

319 Projects	Grant Year	Status	319 Funds
Nutrient Management Planning	FY2011	Complete	$27,929
Nutrient Relocation	FY2011	Complete	$52,555
CREP Acres (salary for Coordinator)	FY2012	Complete	$60,000 (statewide)

Table 3. 2015 Inland Bays annual progress and annual load reductions based upon direct funding or leveraged funding associated with the NPS Program.

Pollutant Controls, Practices, and Actions	Unit	2015 Inland Bays Progress	Cummulative Progress	Watershed Plan Goal	% Goal Achieved	Practice and N Load Reductions (lbs/year)	Practice and P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	acres	7,568	Annual	37,637	20%	96,744.0	298.0
Nutrient Relocation (net export from watershed)	tons	12,015	Annual	20,909	57%	67,277.6	4,728.0
Nutrient Management	acres	10,114	Annual	53,827	19%	5,206.0	400.0
Riparian Forest Buffer	acres	0	209	3,235	6%	-	-
Rain Garden	structure	0	1	3	33%	2.0	1.5
Wetland Restoration	acres	0	29	4,175	1%	-	-
Total Reductions						**169,229.6**	**5,427.5**

Table 4: Subset of water quality monitoring stations, collected in the Inland Bays from 2004 to present, show the following trends, also see Appendix D:

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
308071	Indian River	Millsboro Pond @ John Williams Hwy. (Rt. 24)	143	-0.067	95	141	0.001	98	143	0.06214	90
308361	Indian River	Blackwater Creek @ Omar Rd. (Rd. 54)	97	-0.133	95	97	--	--	99	-0.099	--
312011	Indian River	White Creek @ mouth of Assawoman Canal	103	-0.041	98	106	-0.002	95	108	-1.398	95
310011	Little Assawoman Bay	Little Assawoman Bay @ Rt. 54 (The Ditch)	94	-0.023	95	106	--	--	109	-0.8528	95
310121	Little Assawoman Bay	Beaver Dam Ditch @ Beaver Dam Rd. (Rd. 368)	124	-0.143	95	121	0.001	90	124	-0.1183	80
306091	Rehoboth Bay	Rehoboth Bay @ Buoy 7	80	-0.015	98	95	--	--	97	-0.8721	98
306111	Rehoboth Bay	Massey Ditch @ Buoy 17	87	--	--	104	0.001	90	106	-0.9137	98

Progress Highlights/Partners: NPS pollution in Delaware is a shared responsibility among numerous local, state and federal agencies, organizations and individuals (Partners). As such, Delaware has established an extensive partnership to assist in the effort of water quality improvement. Successful partnerships are one of the most important keys to implementing NPS Program goals to restore or protect Delaware's water quality. Initially, watershed planning projects often provide an important mechanism for partnership development at the local watershed level.

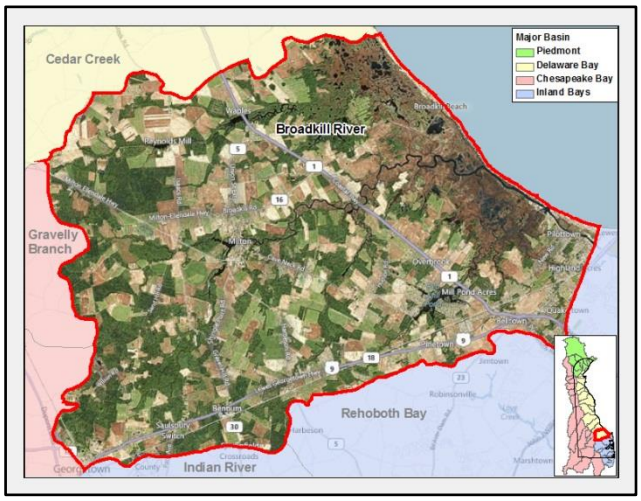
The Center for The Inland Bays is a NPS watershed partner active in the Inland Bays watershed that helps to restore and protect water quality within the Inland Bays drainage area. CIB works independently with the common interest of reducing NPS pollutants to waters of the Inland Bays.

The NPS Program assists in the implementation of CIB programs by offering guidance and technical assistance at a programmatic level. The CIB 2015 Annual Report can be viewed at **http://www.inlandbays.org/wp-content/documents/Final_CIB_Annual_Report_2015.pdf.**

Additionally, the Center for Inland Bays hired an Inland Bays Watershed Coordinator in 2015. The coordinator will be responsible for coordinating with partner organizations in the implementation, tracking, and progress reporting of the Inland Bays Comprehensive Conservation and Management Plan including the Inland Bays Pollution Control Strategy.

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 the 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 (refer to Table 1). The Milestone data is necessary to demonstrate efforts and actions towards progress within the Broadkill River Watershed.

Table 1. 2015 (Section 319) annual activities within the Broadkill River Watershed

319 Projects	Grant Year	Status	319 Funds
Nutrient Management Planning	FY2013, project 06	Complete	$745
Cover Crop	FY2010, project 10	Complete	$43,495

Table 2. 2015 Broadkill River annual progress and annual load reductions based upon direct funding or leveraged funding associated with the NPS Program.

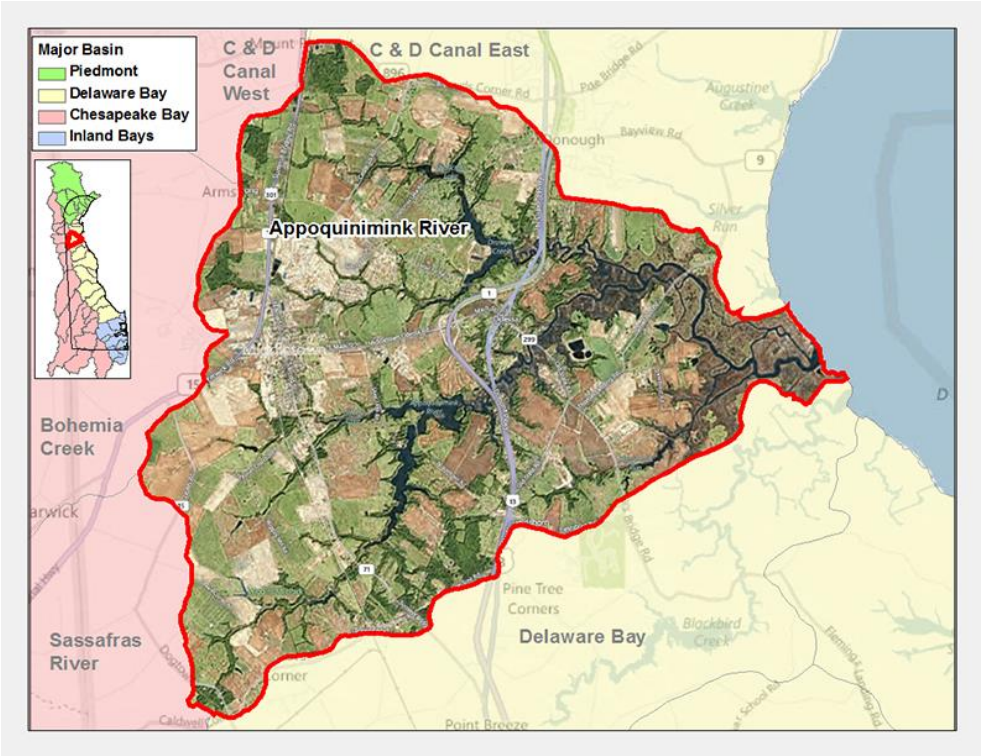
Pollutant Controls, Practices, and Actions	Unit	2015 Broadkill River Progress	Cummulative Progress	Watershed Plan Goal	% Goal Achieved	Practice and N Load Reductions (lbs/year)	Practice and P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	acres	2,957	Annual	n/a	-	40,758.5	116.4
Nutrient Relocation (net export from watershed)	tons	6,502	Annual	570	1141%	39,257.0	2,558.3
Nutrient Management	acres	2,594	Annual	79,420	3%	7,866.1	560.3
Tree Planting	acres	0	10.5	n/a	-	-	-
Rain Garden	structure	0	5.4	n/a	-	-	-
Stream Restoration	feet	0	0.0	n/a	-	-	-
Total Reductions						**87,881.6**	**3,235.0**

Table 3: Subset of water quality monitoring stations, collected in the Broadkill River from 2004 to present, show the following trends, also see Appendix D:

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
303021	Broadkill River	Ingram Branch @ Gravel Hill Rd. (Rd. 248)	104	0.154	80	103	0.015	95	--	--	--
303041	Broadkill River	Broadkill River @ Rt. 1 Bridge	104	-0.058	95	103	0.002	80	103	-0.792	--
303051	Broadkill River	Red Mill Pond @ Rt. 1	96	--	--	103	-0.003	95	103	-0.731	95
303171	Broadkill River	Beaverdam Creek @ Cave Neck Rd. (Rd. 88)	105	--	--	103	-0.003	95	104	0	--
303181	Broadkill River	Beaverdam Creek @ Carpenter Rd. (Rd. 259)	103	-0.266	98	100	-0.010	95	102	-0.366	98
303311	Broadkill River	Round Pole Branch @ Cave Neck Rd. (Rd. 88)	103	0.044	80	101	--	--	102	0	--

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 (refer to Table 1). The Milestone data is necessary to demonstrate efforts and actions towards progress within the Appoquinimink River Watershed.

Table 1. 2015 (Section 319) annual activities within the Appoquinimink River Watershed

319 Projects	Grant Year	Status	319 Funds
Nutrient Management Planning	FY2015	Complete	$ 6,545
CREP Acres (salary for Coordinator)	FY2015	Complete	$ 60,000 (statewide)

Table 2. 2015 Appoquinimink River annual progress and annual load reductions based upon direct funding or leveraged funding associated with the NPS Program.

Pollutant Controls, Practices, and Actions	Unit	2015 Appoquinimink River Progress	Cummulative Progress	Watershed Plan Goal	% Goal Achieved	Practice and N Load Reductions (lbs/year)	Practice and P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	acres	0	Annual	3,145	0%	-	-
Nutrient Relocation (net export from watershed)	tons	0	Annual	n/a	-	-	-
Nutrient Management	acres	2,263	Annual	12,584	18%	6,862.4	488.8
Riparian Buffer (forest and vegetative)	acres	0	66.1	69.3	95%	-	-
Rain Garden	structure	0	n/a	n/a	-	-	-
Stream Restoration	feet	0	n/a	n/a	-	-	-
Total Reductions						**6,862.4**	**488.8**

Table 3. Subset of water quality monitoring stations, collected in the Appoquinimink River from 2004 to present, show the following trends, also see Appendix D:

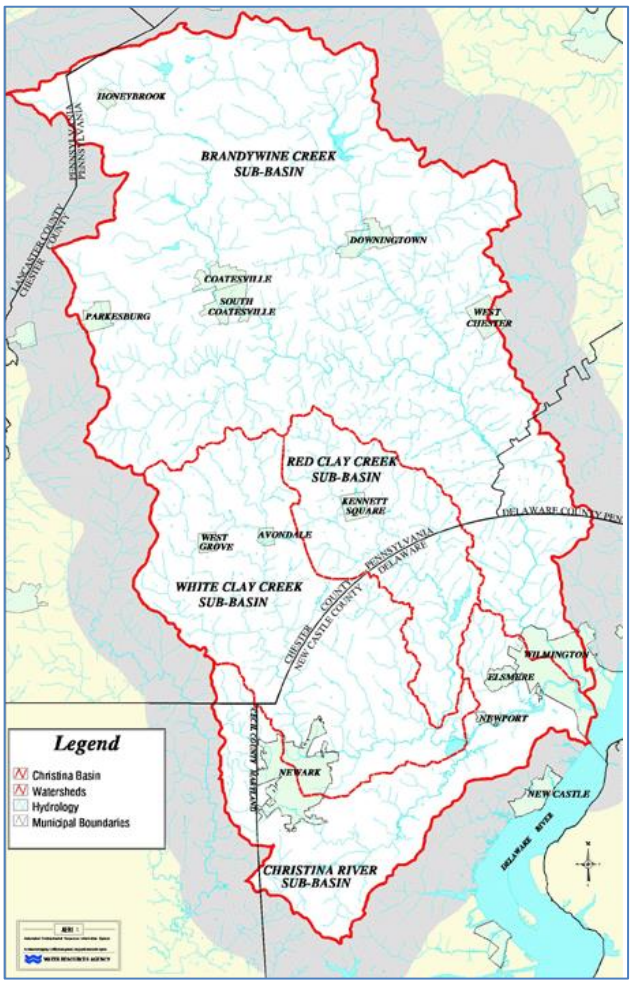
Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
109071	Appoquinimink River	Drawyer Creek off Rt. 13 @ parking area	103	-0.047	95	103	--	--	104	-0.832	--
109121	Appoquinimink River	Appoquinimink River @ Silver Run Rd. (Rt. 9) NE	103	-0.026	95	102	-0.002	80	103	-1.217	95
109131	Appoquinimink River	Noxontown Pond @ Noxontown Rd. (Rd. 38)	96	-0.020	90	102	-0.001	90	104	-0.168	--
109171	Appoquinimink River	Appoquinimink River @ MOT Gut (west bank)	94	-0.022	95	95	--	--	96	-0.121	--

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. There is still a need for further reductions in areas that are currently lacking such as wastewater and stormwater.

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. Figure 3.21 shows the subwatersheds that were used to determine the TMDLs for the Christina Basin. Figures 3.22–3.25 graphically represent the pollution reductions as mandated by the USEPA for the Brandywine Creek, Red Clay, and White Clay Creeks, and the Christina River.

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 Watershed Implementation Plan development for the Christina Watershed was approved by EPA in the Spring of 2013.

Progress Highlights: The following are specific examples of NPS Program funded projects that occurred or finalized in 2015:

1. *Upper Christina Stream Restoration* - Approximately 3,675 feet of stream restoration will be implemented along the upper Christina River located west of Newark in the Timber Creek, West Branch and Christianstead subdivisions. Severe bank erosion is occurring along numerous properties adjacent to the stream channel. The banks are being undercut, causing mature trees to fall into the stream channel. Tremendous sediment loads are being released into the waterway with every storm event, impairing habitat and creating high turbidity conditions in the water column.

   Beginning in 2010, several property owners have contacted the Division of Watershed Stewardship and expressed their concerns about the loss of trees and property with no apparent end in sight. They have requested assistance from the Division of Watershed Stewardship to rectify the problems exacerbated by upstream development and increased amounts of impervious surface throughout the watershed.

   Implementing the appropriate stream restoration techniques will help stabilize the stream banks resulting in reduced sediment and nutrient loading to the Christina, improvements to habitat and water quality, and will allow the channel to be resized for the flow volumes that pass through the systems during average storm events. Bank-toe boulder protection and vegetative plantings, along with other stream restoration construction techniques, will be utilized to stabilize the degrading stream banks and improve habitat and water quality and reduce the loss of property.

2. *Limestone Presbyterian Church Rain Garden*: As a continuation of the creation of a rain garden at the Limestone Presbyterian Church rain garden, 2015 brought both training and

plant replacement to this area of the White Clay Creek Watershed. This 1600 sq. ft. garden uses parking lot islands to drain 2.6 acres of parking lot and upland areas. Volunteers participated in 3 hours of on the ground training held by Red Tail Restoration & Land Management to learn about invasive species removal and plant identification in the rain garden. Also, 172 native plants were planted in the garden to replace species that did not thrive. Species included wild pink, blue flag iris, marsh marigold, buttonbush, New York ironweed, alumroot, cardinal flower and viburnum. Costs for 2015 paid by the Nonpoint Source Program totaled $1,005.25.

3. *Hillendale Elementary School Rain Garden:* Begun in 2013, the five rain gardens at Hillendale Elementary School in Chadds Ford, PA were finished in 2015 with the planting of thousands of native plant plugs by the volunteers of the Brandywine Valley Association. Eventually the rain gardens will be integrated into the school's curriculum and will be maintained by school staff and volunteers. Costs for 2015 paid by the Nonpoint Source Program totaled $1,947.

4. *Goddard Park Rain Garden:* Led by the White Clay Wild and Scenic Program, two rain gardens were created in Goddard Park, West Grove, PA in the White Clay Creek Watershed. The two gardens were retrofitted in two basins (approximately 3,400 sq. ft. total) that drained parking lots and overland flow. Over 70 volunteers participated in the creation of the rain gardens including plant selection, augering holes, applying leaf mulch and planting thousands of native plugs. This truly was a multi-municipality, bi-state effort. In addition, these gardens have been used for in-class and hands-on workshops on maintenance and creation of rain gardens. Costs for 2015 paid by the Nonpoint Source Program totaled $4,706.33 and $1,469.88 was paid for by United Water Delaware.

5. *East Fallowfield Township Rain Garden:* The Brandwine Valley Association working with the East Fallowfield Township installed a rain garden at the East Fallowfield Township building that drains the office and public works building. Working together, these two groups created, installed and planted this rain garden to help deal with their stormwater runoff, and to teach township staff for future projects. Costs for 2015 paid by the Nonpoint Source Program totaled $2,014.87.

Table 1. 2015 Christina River Basin annual progress and annual load reductions based upon direct funding or leveraged funding associated with the NPS Program.

Pollutant Controls, Practices, and Actions	Unit	Christina Basin	Cummulative Progress	Watershed Plan Goal	% Goal Achieved	Practice and N Load Reductions (lbs/year)	Practice and P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	acres	0	Annual	12.4	0%	-	-
Nutrient Relocation (net export from watershed)	tons	0	Annual	0.0	0%	-	-
Nutrient Management	acres	0	Annual	7,559.0	0%	-	-
Tree Planting	acres	0	0	0.0	0%	-	-
Rain Garden	structure	4	36	31.6	113%	8.0	6.0
Stream Restoration	feet	3,675	3,675	0.0	-	637.9	578.3
Total Reductions						**645.9**	**584.3**

Table 2. Subset of water quality monitoring stations, collected in the Christina Basin from 2004 to present, show the following trends, also see Appendix D:

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
103011	Red Clay Creek	Stanton, Rt. 4 at Stanton Bridge (USGS gage 01480015)	115	--	--	114	-0.006	95	115	-0.1105	--
103031	Red Clay Creek	Red Clay Creek @ Lancaster Pike (Rt. 48)	142	--	--	141	-0.005	95	142	-0.0978	90
105151	White Clay Creek	White Clay Creek @ Delaware Park Blvd.	144	--	--	142	-0.002	90	144	-0.0949	--
106141	Christina River	Christina River @ Sunset Lake Rd. (Rt. 72)	135	-0.046	98	132	--	--	135	-0.3515	98
106291	Christina River	Christina River near Conrail Bridge	124	-0.030	95	124	-0.001	90	124	-0.3691	--

Additional NPS Activity in the Christina Watershed:

1. *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
Upper Christina River Stream Restoration Project	$150,000	150,000	1	Christina

2. *City of Newark Community Wildlife Habitat Certification:* In 2015, the City of Newark became the 78th community in the country and the 2nd in the State of Delaware to be designated an NWF Community Wildlife Habitat. To reach this goal, the City and partners helped to create and certify multiple habitat areas in schools, businesses, backyards, parks and other spaces and to educate residents about the benefits of habitat creation to our environment. Costs for 2015 paid by the Nonpoint Source Program totaled $500.

3. *Citizen Attitudes about a Clean Water Fee Survey (Statewide):* The Delaware Nature Society commissioned a representative statewide survey and three regional focus groups to gauge the level of support or opposition for a proposed clean water fee in Delaware. The poll of 400 randomly-selected adult Delaware residents was conducted by telephone, using trained and supervised live interviewers. Focus groups were also conducted in each of the state's three counties among a cross-section of area residents. Costs for 2015 paid by the Nonpoint Source Program totaled $2,000.

VII. Load Reductions

In 2015, 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.

2015 Project Load Reductions/Year by Watershed

Project	Nitrogen (lbs)	Phosphorus (lbs)
Chesapeake Bay	2,033,687	83,317
St. Jones River	10,339	266
Inland Bays	169,228	5,426
Broadkill River	87,882	3,235
Appoquinimink River	6,862	489
Christina Basin	646	584
TOTAL	**2,308,643**	**93,318**

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.

Current activity will be summarized and accounted for during the *2015 Delaware NPS Management Plan* development process. A first draft was submitted to EPA in late 2015. Comments were received and will be addressed during the next revision. A final approved plan will be developed by September 2015 that identifies the NPS Program's long-term goals reflecting a strategically focused state NPS management program designed to achieve and maintain water quality standards and to maximize water quality benefits.

Annual milestones in the Delaware NPS Management Plan will describe outcomes and key actions expected each year. The Plan includes objectives that address nonpoint sources of surface water and ground water pollution as appropriate (including sources of drinking water) in alignment with the goals of the Clean Water Act. The objectives include both implementation steps and how results will be tracked (e.g., water quality improvements or load reductions). The Plan will include long-term goals and shorter-term (e.g., three- to five-year) objectives that are well integrated with other key environmental and natural resource programs. The program goals and objectives will be periodically revised as necessary to reflect progress or problems encountered, strategies to make progress towards achieving the goals, and indicators to measure progress. Updates to the NPS Milestones can be found in Appendix A.

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 2015 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.

Bart Wilson	U.S. Fish and Wildlife Service	Jim Short	DNREC/Solid Waste
Andrew Whitman	DE Department of Transportation	Jim Sullivan	DNREC/Watershed Stewardship
Ann Marie Townshend	City of Dover Planning Office	Joe Farrell	University of Delaware
Austin Short	DE Department of Agriculture	John Barndt	DNREC/Water Resources
Bob Coleman	Delaware Nutrient Management Program	John Schneider	DNREC/Watershed Stewardship
Brenda Zeiters	DNREC/NPS Program	Kacey Taylor	USDA/NRCS
Brittany Sturgis	DNREC/ Watershed Stewardship	Kevin Donnelly	New Castle Conservation District
Carol Cain	DE Department of Transportation	Kimberly Cole	DNREC/Delaware Coastal Program
Chris Bason	Center for the Inland Bays	Kip Foskey	Sussex Conservation District
Chris Brosch	DE Department of Agriculture	Lara Allison	DNREC/NPS Program
Chuck Williams	DNREC/Shoreline	Lynn Mangus	Farm Service Agency/State Office
Dale Churchey	Delaware CREP Program	Marcia Fox	DNREC/Watershed Stewardship
Dave Schepens	DNREC/Groundwater Discharges	Marianne Walch	Center for the Inland Bays
David Saveikis	DNREC/Fish&Wildlife	Mark Biddle	DNREC/Watershed Stewardship
Debbie Absher	Sussex Conservation District	Mark Hogan	DNREC/NPS Program
Dorothy Morris	State of Delaware Planning Office	Paul Petrichenko	NRCS State Office
Ed Lewandoski	University of Delaware	Robert Baldwin	Delaware Assoc of Conservation Districts
Frank Piorko	DNREC/Watershed Stewardship	Robert Palmer	DNREC/NPS Program
Fred Suffian	US EPA	Sally Boswell	Center for the Inland Bays
James Gregory	DNREC/ Watershed Stewardship	Sally Kepfer	NRCS State Office
Jamie Rutherford	DNREC/Sediment & Stormwater	Sara Esposito	DNREC/ Watershed Stewardship
Jen Walls	DNREC/Watershed Stewardship	Sara Wosniak	DNREC/ Watershed Stewardship
Jenn Volk	University of Delaware	Sharon Webb	DNREC/ NPS Program
Jerry Kauffman	Water Resources Agency	Steve Williams	DNREC/ Watershed Stewardship
Jessica Watson	Sussex Conservation District	Tim Garrahan	NRCS State Office
Jim Cassidy	DNREC/Groundwater Discharges	Tim Riley	Kent Conservation District
Jim Chaconas	DNREC/Wetlands & Subaqueous Lands	Tom Barthelmeh	DNREC/Watershed Stewardship

Appendix

Appendix A – 2015 Milestones

Appendix B – Annual Nutrient reductions for N & P

Appendix C – Annual Numeric Milestones

Appendix D – Water Quality Trend Data

Appendix E – Bridgeville Branch fact sheet

Appendix F – Air Seeder Summary

Appendix G – Air Seeder Fact Sheet

Appendix H - Mirror Lake Restoration Fact Sheet

Appendix A – 2015 Milestones

Target Date	Short and Mid Term Milestones (2015 – 2019)	Deliverable	2015 Comments/Status Updates
2015	Establish baseline conditions for program indicators	Program indicator baseline	Program indicator tracking is ongoing. NPS Staff will establish a complete list of program indicators in 2016 and provide updates in the 2016 annual report.
2015	Complete approval of all existing watershed plans	Watershed plans	COMPLETED - Eleven (11) priority watershed plans approved in Delaware in 2015.
2015	Complete baseline sampling for initial priority watersheds	Priority watershed baseline	Establish a load reduction baseline for nitrogen, phosphorus and sediment in priority watersheds. NPS Staff will establish in 2016 and provide updates in the annual report.
2015	Estimated pollutant load reductions achieved for sediment, phosphorus and nitrogen from BMPs implementation in Delaware's watersheds.	Increase annual load reductions as funding allows	Interim goal: Establish baseline load reductions based on current monitoring data achieved in select Delaware watersheds (to be determined as funding allows) for FY2015. (b) Increase annual load reductions in Delaware watersheds by 2% annually from the FY2015 baseline

Target Date	Short and Mid Term Milestones (2015 – 2019)	Deliverable	2015 Comments/Status Updates
2015	Estimated pollutant load reductions achieved for sediment, phosphorus and nitrogen from BMPs implementation in priority watersheds.	Establish baseline load reductions	Increase annual load reductions in non-Chesapeake Bay priority watersheds by 2% annually from the FY2015 baseline. Increase annual load reductions in Chesapeake Bay priority watersheds by 20% annually from the FY2015 baseline. (to be determined as funding allows) for FY2015.
2015	Reduce nutrient loads from NPS sources in Delaware's priority watersheds.	Establish baseline load reductions from BMP implementation	Establish baseline of load reductions from BMP implementation in FY 2015 for the following priority watersheds: Inland Bays Little Assowoman Bay St. Jones River Appoquinimink River Christina River
2016	watersheds.	Increase number of outreach and education interactions	Increase number of outreach and education interactions by 10% over FY 2015 baseline
2019	Remove NPS related impairments from stream segments	one stream segment (2015) five stream segments (2019)	One stream segment will be identified annually as having improved water quality baseline assessment and will be included in the NPS annual success story. In 2015, one stream segment was removed. A total of five stream segments will be identified as having improved water quality baseline assessment by 2019.

Target Date	Short and Mid Term Milestones (2015 – 2019)	Deliverable	2015 Comments/Status Updates
2019	Assess interim and 2015 progress milestones	Biennial milestone updates	Assessment ongoing.
2019	Review and update plan as needed	Management plan update	Progress is ongoing. Plan will be reviewed in 2017 when Milestones are updated. A complete plan will be provided to EPA in 2019.
2019	Show relative progress towards BMP implementation activities for all the EPA approved watershed plans	Increase BMP implementation annually by watershed	Progress ongoing.
2019	Demonstrate water quality improvement in the priority watersheds resulting from plan implementation activities	303(d) de-listing	305(b) reports are prepared every even numbered year. Any water quality improvements would result in a 303(d) delisting. NPS will maintain delisting records and update annually.
2019	Show a 10% decrease of pollutant loadings in 50% or more of the priority watersheds	Annual load reduction decreases	Increase load reductions annually in non-Chesapeake Bay priority watersheds by 2% and by 20% in Chesapeake Bay priority watersheds from baseline.
Annual through 2019	Show annual increases in funding and quantities of BMPs implemented in priority watersheds	Procurement of funds to close BMP implentation gaps	NPS will seek alternative funding sources to assist with implementation of water quality BMPs.
Annual through 2019	Remove one stream segment per year from the 303(d) list through 2019	Removal of 303(d) stream segment	305(b) reports are prepared every even numbered year. Any water quality improvements would result in a 303(d) delisting. NPS will maintain delisting records and update annually. Significant delistings, as a result of NPS Program activities, will be highlighted in the annual NPS success story.

Target Date	Short and Mid Term Milestones (2015 – 2019)	Deliverable	2015 Comments/Status Updates
Target Date	**Long Term Milestones (2019-2030)**	**Deliverable**	**2015 Comments/Status Updates**
2030	Complete BMP implementation for 75% of the EPA approved watershed plans	Increase BMP implementation by 75%	Progress ongoing.
2030	Remove 50% or more of high priority TMDLs from 2010 303(d) list	Removal of half of high priority TMDLs from 303(d) list	Progress ongoing.

Appendix B – Annual Nutrient reductions for N & P

Nitrogen Load Reductions (lbs/year)	Chesapeake	St. Jones River	Inland Bays	Broadkill River	Appoquinimink River	Christina Basin	Total
Cover Crops	820,559.0	5,042.00	96,744.00	40,758.50	-	-	963,103.50
Nutrient Relocation	896,765.1	3,151.70	67,277.60	39,257.00	-	-	1,006,451.43
Nutrient Management	313,621.6	2,145.00	5,206.00	7,866.10	6,862.40	-	335,701.10
Tree Planting	2,618.0	-	-	-	-	-	2,618.00
Rain Gardens	2.0	-	-	-	-	8	10.00
Stream Restoration	121.5	-	-	-	-	637.9	759.40
Total N Reductions	**2,033,687.23**	**10,338.70**	**169,227.60**	**87,881.60**	**6,862.40**	**645.90**	**2,308,643.43**

Phosphorus Load Reductions (lbs/year)	Chesapeake	St. Jones River	Inland Bays	Broadkill River	Appoquinimink River	Christina Basin	Total
Cover Crops	2,342.4	5	298	116.4	-	-	2,761.77
Nutrient Relocation	58,441.0	205.4	4,728.00	2,558.30	-	-	65,932.70
Nutrient Management	22,340.1	56	400	560.3	488.8	-	23,356.39
Tree Planting	82.0	-	-	-	-	-	82.00
Rain Gardens	1.5	-	-	-	-	6	7.50
Stream Restoration	110.2	-	-	-	-	578.3	688.46
Total P Reductions	**83,317.12**	**266.40**	**5,426.00**	**3,235.00**	**0.00**	**584.30**	**92,828.82**

Appendix C – Annual Numeric Milestones

Pollutant Controls, Practices, and Actions	Unit	2015 Cumulative Progress	Chesapeake Bay	St. Jones River	Inland Bays	Broadkill River	Appoquinimink River	Christina Basin
Cover Crop (traditional and commodity)	acres	71,701	59,531	1,645	7,568	2,957	0	0
Nutrient Relocation (net export from watershed)	tons	54,102	35,063	522	12,015	6,502	0	0
Nutrient Management	acres	113,312	163,004	3,181	1,851	2,594	2,263	0
Tree Planting	acres	57	57	0	0	0	0	0
Rain Garden	structure	5	1	0	0	0	0	4
Stream Restoration	feet	4,375	700	0	0	0	0	3,675

Appendix D – Water Quality Trend Data

Total nitrogen and total phosphorus data from 1999-2015 for all Delaware STORET stations was retrieved. Data from stations with 40 or more data points were analyzed using WQSTAT software to evaluate for concentration trends using non-parametric methods. 133 stations had 40 or more data points for total phosphorus and 132 stations for total nitrogen. The software reported statistically significant trends at various confidence levels depending on the type of statistical test used. For regulatory purposes the Department would not ordinarily consider 80 or 90 percent confidence levels as a trigger for further action. For this analysis, however, the lower confidence results are reported and mapped to aid in "telling the story", especially in the mapped data. See the tables and maps below.

Of the 133 stations evaluated for total phosphorus concentration trends, 45 had statistically significant trends. Trends were closely divided between upward and downward trends. 88 stations showed no trend, either positive or negative. Of the 132 stations evaluated for total nitrogen concentration trends, 76 stations had statistically significant trends and 56 stations had no trend upward or downwards. The vast majority of significant trends for total nitrogen were downward trends, mostly at higher confidence levels.

140 Stations were analyzed for trends in measured concentrations of total suspended solids for the 1998-2014 period of record. Of those 140 stations, sixty one stations had statistically significant trends. Of the sixty one stations with trends, six stations had statistically significant upward trends and the remaining fifty five stations showed downward trends. Seventy nine stations did not have statistically significant trends either upward or downward.

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
101021	Naamans Creek	Naaman Creek @ State Line near Hickman Rd.	115	--	--	111	--	--	115	0.1322	98
101031	Naamans Creek	Naaman Creek S. Branch @ Darley Rd. (Rd. 207)	90	-0.052	98	90	--	--	90	-0.0851	95
101061	Naamans Creek	Naaman Creek South Branch @ Marsh Rd. (Rt. 3)	66	--	--	64	--	--	66	0	--
102041	Shellpot Creek	Shellpot Creek @ Hay Rd. (Rd. 501)	106	-0.052	98	104	--	--	106	-0.8908	95
102051	Shellpot Creek	Shellpot Creek @ Market St. (Rt. 13 Bus.)	95	--	--	93	--	--	95	0	--
102081	Shellpot Creek	Shellpot Creek @ Carr Rd.	64	-0.041	98	62	--	--	64	0	--
103011	Red Clay Creek	Stanton, Rt. 4 at Stanton Bridge (USGS gage 01480015)	115	--	--	114	-0.006	95	115	-0.1105	--
103031	Red Clay Creek	Red Clay Creek @ Lancaster Pike (Rt. 48)	142	--	--	141	-0.005	95	142	-0.0978	90
103041	Red Clay Creek	Red Clay Creek @ Barley Mill Rd. (Rd. 258A)	115	--	--	114	-0.010	95	115	-0.2505	98
103061	Red Clay Creek	Burroughs Run @ Creek Rd. (Rt. 82)	115	-0.017	90	114	--	--	116	-0.1187	98
104011	Brandywine Creek	Brandywine Creek @ Foot Bridge in Brandywine Park	114	--	--	113	-0.002	90	114	-0.0694	--
104021	Brandywine Creek	Brandywine Creek @ New Bridge Rd. (Rd. 279)	143	-0.019	95	142	--	--	143	0	--

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
104051	Brandywine Creek	Brandywine Creek @ Smith Bridge Rd. (Rd. 221)	113	--	--	111	--	--	113	-0.2003	95
105031	White Clay Creek	White Clay Creek @ Chambers Rock Rd. (Rd. 329)	114	--	--	113	-0.005	95	115	-0.3199	98
105151	White Clay Creek	White Clay Creek @ Delaware Park Blvd.	144	--	--	142	-0.002	90	144	-0.0949	--
105171	White Clay Creek	White Clay Creek @ McKees Lane	96	--	--	94	--	--	96	-0.2606	--
106021	Christina River	Christina River beneath Rt. 141 Bridge	105	-0.046	95	105	--	--	105	-0.5993	95
106031	Christina River	Smalleys Dam Spillway @ Smalleys Dam Rd.	108	--	--	106	--	--	108	-0.1913	--
106141	Christina River	Christina River @ Sunset Lake Rd. (Rt. 72)	135	-0.046	98	132	--	--	135	-0.3515	98
106191	Christina River	Christina River @ Nottingham Rd. (Rt. 273)	108	--	--	103	--	--	108	0	--
106281	Christina River	Little Mill Creek @ DuPont Rd.	108	-0.049	95	104	--	--	108	-0.2813	98
106291	Christina River	Christina River near Conrail Bridge	124	-0.030	95	124	-0.001	90	124	-0.3691	--
107011	Red Lion Creek	Red Lion Creek @ Bear Corbitt Rd. (Rt. 7)	105	-0.027	98	104	--	--	105	-0.1792	98
107031	Red Lion Creek	Red Lion Creek @ Rt. 9	103	--	--	102	0.004	95	103	-0.5605	--
108021	Chesapeake & Delaware Canal	C & D Canal @ DuPont Pkwy. (Rt. 13) N. side	102	--	--	101	--	--	102	0.5151	--

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
108111	Chesapeake & Delaware Canal	Lums Pond @ Boat Ramp	97	-0.023	95	108	--	--	--	--	--
109041	Appoquinimink River	Appoquinimink River @ DuPont Pkwy. (Rt. 13)	101	-0.051	95	103	--	--	104	-0.1259	--
109071	Appoquinimink River	Drawyer Creek off Rt. 13 @ parking area	103	-0.047	95	103	--	--	104	-0.8321	--
109091	Appoquinimink River	Appoquinimink River @ Mouth	104	-0.022	95	103	--	--	104	0.111	--
109121	Appoquinimink River	Appoquinimink River @ Silver Run Rd. (Rt. 9) NE	103	-0.026	95	102	-0.002	80	103	-1.217	95
109131	Appoquinimink River	Noxontown Pond @ Noxontown Rd. (Rd. 38)	96	-0.020	90	102	-0.001	90	104	-0.1677	--
109171	Appoquinimink River	Appoquinimink River @ MOT Gut (west bank)	94	-0.022	95	95	--	--	96	-0.1207	--
109191	Appoquinimink River	Shallcross Lake @ Shallcross Lake Rd. (Rd. 428)	103	-0.073	95	101	--	--	103	0	--
109251	Appoquinimink River	Deep Creek Branch @ Summit Bridge Rd. (Rt. 71)	86	-0.222	98	84	--	--	85	0	--
110011	Appoquinimink River	Blackbird Creek @ Blackbird Station Rd. (Rd. 463)	95	-0.028	90	97	--	--	98	0	--
110031	Lower Blackbird	Blackbird Creek @ Blackbird Landing Rd. (Rd. 455)	60	--	--	66	0.005	90	66	-0.4215	--
110041	Lower Blackbird	Blackbird Creek @ Taylors Bridge Rd. (Rt. 9)	101	-0.040	95	99	--	--	101	-0.8024	--

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
111011	Dragon Run Creek	Dragon Creek @ Wrangle Hill Rd. (Rt. 9)	91	--	--	104	0.003	95	--	--	--
111031	Dragon Run Creek	Dragon Creek @ S. DuPont Hwy. (Rt. 13)	99	-0.041	95	98	--	--	--	--	--
112021	Chesapeake Drainage System	Sewell Branch @ Sewell Branch Rd. (Rd. 95)	97	-0.062	95	102	--	--	101	0	--
114011	Army Creek	Army Creek @ River Rd. (Rt. 9)	97	-0.059	98	98	0.003	90	99	1.282	98
201011	Smyrna River	Mill Creek (Lake Como outfall) @ Rt. 13	57	--	--	68	--	--	68	-0.6384	95
201021	Smyrna River	Mill Creek @ Carter Rd. (Rd. 137)	96	-0.048	95	101	--	--	103	0	--
201041	Smyrna River	Smyrna River @ Flemings Landing (Rt. 9)	104	-0.028	95	102	--	--	104	-2.199	90
201051	Smyrna River	DucK Creek @ Smyrna Landing Rd. (Rd. 485)	96	--	--	102	--	--	104	0.348	--
201161	Smyrna River	Providence Creek @ Duck Creek Rd. (Rt. 15)	99	--	--	94	--	--	99	-0.2022	95
202021	Leipsic River	Garrisons Lake @ DuPont Hwy. (Rt. 13)	87	-0.027	80	102	--	--	--	--	--
202031	Leipsic River	Leipsic River @ Denny St. (Rt. 9)	102	-0.033	95	102	--	--	--	--	--
202191	Leipsic River	Leipsic River @ Mt. Friendship Rd. (Rt. 15)	60	-0.095	98	62	-0.004	90	62	-0.2735	--
204031	Little River	Little River @ Bayside Dr. (Rt.	104	-	98	103	--	--	104	0.7003	--

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
		9)		0.043							
204041	Little River	Little River @ N. Little Creek Rd. (Rt. 8)	105	--	--	104	--	--	105	-0.2628	--
205011	Saint Jones River	St. Jones River @ mouth, Bowers Beach	79	-0.076	98	80	--	--	82	-0.5981	--
205041	Saint Jones River	St. Jones River @ Barkers Landing	105	-0.025	95	104	--	--	101	-2.113	95
205091	Saint Jones River	St. Jones River @ East Lebanon Rd. (Rt. 10)	100	-0.067	95	101	--	--	101	-1.491	98
205151	Saint Jones River	Fork Branch @ State College Rd. (Rd. 69)	92	-0.021	90	99	-0.003	80	99	-0.2912	98
205181	Saint Jones River	Moores Lake @ S. State St. (Rd. 27)	100	--	--	101	0.001	95	101	-0.126	--
205191	Saint Jones River	Silver Lake @ Spillway (Dover City Park)	104	--	--	128	0.001	80	129	-0.1408	--
205211	Saint Jones River	Derby Pond @ Boat Ramp (Rt. 13A)	94	--	--	99	0.001	95	99	0	--
206011	Murderkill River	Murderkill River @ Rt. 13	168	--	--	165	--	--	168	-0.1614	95
206041	Murderkill River	Browns Branch @ Milford-Harrington Hwy. (Rt. 14)	138	-0.219	98	136	--	--	138	-0.2408	98
206091	Murderkill River	Murderkill River @ Bay Rd. (Rt. 1/113)	134	-0.028	80	132	-0.005	95	134	-1.705	95
206101	Murderkill River	Murderkill River @ Bowers Beach Wharf (mouth)	148	-0.020	80	153	--	--	153	-2.484	95

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
206141	Murderkill River	Murderkill River near levee @ MNWA (RM 3.25)	124	--	--	123	-0.007	98	124	-1.906	95
206231	Murderkill River	Murderkill Rv. @ confl. of KCWWTF discharge ditch	123	-0.038	90	121	-0.006	80	123	-1.594	95
206361	Murderkill River	McColley Pond @ Canterbury Rd. (Rt. 15)	138	--	--	136	0.001	95	138	0	--
206451	Murderkill River	Coursey Pond @ Canterbury Rd. (Rt. 15)	129	0.031	80	134	--	--	136	-0.4087	95
206561	Murderkill River	Double Run @ Barratts Chapel Rd. (Rd. 371)	135	-0.080	95	134	0.002	90	135	0.4632	80
207021	Choptank	Cow Marsh Creek @ Mahan Corner Rd. (Rd. 208)	99	--	--	99	0.001	90	99	0	--
207081	Choptank	Tappahanna Ditch @ Sandy Bend Rd. (Rd. 222)	98	-0.020	80	101	0.002	80	101	0	--
207091	Choptank	Culbreth Marsh Ditch @ Shady Bridge Rd. (Rd. 210)	102	0.031	95	102	--	--	102	-0.0905	--
207111	Choptank	White Marsh Br. @ Cedar Grove Church Rd. (Rd. 268)	100	0.100	98	100	--	--	100	-0.0412	80
208021	Mispillion River	Mispillion River @ Rt. 1	107	--	--	106	-0.171	80	107	-1.134	95
208061	Mispillion River	Mispillion River @ Cedar Creek confluence	103	-0.036	95	110	--	--	110	-1.485	80
208181	Mispillion River	Abbotts Pond @ Abbotts Pond Rd. (Rd. 620)	109	--	--	104	--	--	108	0	--
208211	Mispillion River	Silver Lake @ Maple Ave.	108	--	--	107	--	--	109	-0.3279	95

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
208231	Mispillion River	Beaverdam Branch @ Deep Grass Ln. (Rd. 384)	110	0.053	98	106	--	--	109	-0.237	95
301021	Cedar Creek	Swiggetts Pond @ Cedar Creek Rd. (Rt. 30)	108	0.031	80	104	--	--	107	-0.1727	95
301031	Cedar Creek	Cedar Creek @ Coastal Hwy. (Rt. 1)	110	--	--	109	0.004	95	109	0.3437	--
301091	Cedar Creek	Cedar Creek @ Cedar Beach Rd. (Rt. 36)	108	-0.031	95	106	--	--	109	-0.8542	--
302031	Marshyhope Creek	Marshyhope Creek @ Fishers Bridge Rd. (Rd. 308)	185	--	--	185	--	--	186	0	--
303011	Broadkill River	Savannah Ditch @ Savannah Drive (Rd. 246)	103	-0.416	90	102	--	--	102	0	--
303021	Broadkill River	Ingram Branch @ Gravel Hill Rd. (Rd. 248)	104	0.154	80	103	0.015	95	--	--	--
303031	Broadkill River	Broadkill River @ Union St (Rt. 5)	136	-0.063	95	133	--	--	135	0	--
303041	Broadkill River	Broadkill River @ Rt. 1 Bridge	104	-0.058	95	103	0.002	80	103	-0.792	--
303051	Broadkill River	Red Mill Pond @ Rt. 1	96	--	--	103	-0.003	95	103	-0.7305	95
303061	Broadkill River	Broadkill River 0.10 Miles From Mouth	81	--	--	85	--	--	87	0	--
303171	Broadkill River	Beaverdam Creek @ Cave Neck Rd. (Rd. 88)	105	--	--	103	-0.003	95	104	0	--
303181	Broadkill River	Beaverdam Creek @ Carpenter Rd. (Rd. 259)	103	-0.266	98	100	-0.010	95	102	-0.3657	98

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
303311	Broadkill River	Round Pole Branch @ Cave Neck Rd. (Rd. 88)	103	0.044	80	101	--	--	102	0	--
303331	Broadkill River	Waples Pond @ Rt. 1	105	--	--	101	--	--	104	0	--
303341	Broadkill River	Pemberton Branch @ Gravel Hill Rd. (Rt. 30)	104	0.051	98	99	--	--	103	-0.2019	95
304011	Nanticoke River	Nanticoke River @ Sharptown	94	--	--	93	--	--	95	0	--
304151	Nanticoke River	Nanticoke River @ Buoy 66 (mouth of DuPont Gut)	97	-0.038	95	95	--	--	97	-0.216	--
304191	Nanticoke River	Nanticoke River @ Rifle Range Rd. (Rd. 545)	183	--	--	181	--	--	183	-0.1827	98
304311	Nanticoke River	Concord Pond @ German Rd. (Rd. 516)	104	--	--	101	--	--	104	0	--
304321	Nanticoke River	Williams Pond @ East Poplar St.	101	-0.063	80	100	--	--	102	0	--
304381	Nanticoke River	Bucks Branch @ Conrail Rd. (Rd. 546)	91	--	--	90	--	--	91	0	--
304471	Nanticoke River	Nanticoke River @ Rt. 13	102	--	--	100	--	--	102	0.2111	--
304591	Nanticoke River	Deep Creek @ Old Furnace Rd. (Rd. 46)				43	-0.007	90	43	1.162	98
304681	Nanticoke River	Nanticoke River @ Beach Hwy. (Rt. 16)	49	--	--	49	--	--	49	-0.2804	--
305011	Lewes and Rehoboth Canal	Lewes & Rehoboth Canal @ Rt. 1	105	--	--	104	--	--	106	-0.8797	98

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
305041	Lewes and Rehoboth Canal	Lewes & Rehoboth Canal @ Rt. 9	104	--	--	104	--	--	106	-0.6095	95
306091	Rehoboth Bay	Rehoboth Bay @ Buoy 7	80	-0.015	98	95	--	--	97	-0.8721	98
306111	Rehoboth Bay	Massey Ditch @ Buoy 17	87	--	--	104	0.001	90	106	-0.9137	98
306121	Indian River	Indian River Bay @ Buoy 20	102	--	--	116	0.002	95	119	-0.8166	95
306181	Indian River	Indian River @ Buoy 49 (Swan Creek)	95	-0.054	95	95	--	--	97	0.3747	--
306321	Indian River	Indian River Inlet @ Coast Guard Station	114	-0.016	98	123	--	--	125	-0.2767	--
306331	Indian River	Indian River @ Island Creek	96	-0.032	95	94	--	--	96	-0.6217	80
306341	Indian River	Island Creek upper third	95	--	--	93	--	--	95	-0.6645	80
307011	Broad Creek	Records Pond @ Willow Street	103	-0.045	95	101	0.001	90	103	0	--
307031	Broad Creek	Broad Creek @ Bethel Rd. (Rd. 493)	47	0.157	80	47	0.005	95	47	2.607	95
307081	Broad Creek	Hitch Pond Branch @ Pepper Pond Rd. (Rd. 449)	44	--	--	49	--	--	49	0.2381	--
307171	Broad Creek	Horsey Pond @ Sharptown Rd. (Rt. 24)	98	-0.076	90	98	--	--	100	0	--
307371	Broad Creek	Raccoon Prong @ Pepperbox Rd. (Rd. 66)	62	--	--	66	--	--	65	0	--

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
308031	Rehoboth Bay	Burton Pond @ John Williams Hwy. (Rt. 24)	104	--	--	104	--	--	107	0	--
308051	Rehoboth Bay	Guinea Creek @ Banks Rd. (Rd. 298)	107	-0.104	95	104	0.001	80	107	-0.2523	80
308071	Indian River	Millsboro Pond @ John Williams Hwy. (Rt. 24)	143	-0.067	95	141	0.001	98	143	0.06214	90
308091	Indian River	Pepper Creek @ Main St. (Rt. 26)	109	-0.050	95	107	0.001	95	109	0.1428	--
308281	Indian River	Cow Bridge Branch @ Zoar Rd. (Rd. 48)	103	-0.076	95	107	0.001	90	108	0	--
308341	Indian River	Swan Creek @ Mount Joy Rd. (Rd. 297)	103	--	--	96	--	--	103	0	--
308361	Indian River	Blackwater Creek @ Omar Rd. (Rd. 54)	97	-0.133	95	97	--	--	99	-0.099	--
308371	Rehoboth Bay	Bundicks Branch @ Beaver Dam Rd. (Rt. 23)	94	0.212	95	94	--	--	94	-0.1164	80
309041	Iron Branch	Whartons Branch @ Dagsboro Rd. (Rt. 20)	107	-0.106	95	106	-0.001	95	107	-0.4364	95
310011	Little Assawoman Bay	Little Assawoman Bay @ Rt. 54 (The Ditch)	94	-0.023	95	106	--	--	109	-0.8528	95
310031	Little Assawoman Bay	Dirickson Creek @ Old Mill Bridge Rd. (Rd. 381)	100	-0.068	95	105	--	--	107	-0.9807	95
310071	Little Assawoman	Little Assawoman Bay Mid-Bay (Ocean Park Lane)	98	-0.049	95	105	-0.002	95	108	-1.281	95

Station	Watershed	Station Location	Total N count	Total N Trend	Total N Confidence	Total P Count	Total P trend	Total P Confidence	TSS Count	TSS Trend	TSS Confidence
	Bay										
310121	Little Assawoman Bay	Beaver Dam Ditch @ Beaver Dam Rd. (Rd. 368)	124	-0.143	95	121	0.001	90	124	-0.1183	80
311041	Buntings Branch	Buntings Branch @ Fenwick Rd. (Rt. 54)	99	--	--	99	--	--	100	0	--
312011	Indian River	White Creek @ mouth of Assawoman Canal	103	-0.041	98	106	-0.002	95	108	-1.398	95
313011	Pocomoke River	Pocomoke River @ Bethel Rd. (Rd. 419)	97	--	--	101	--	--	101	0	--
316011	Nanticoke River	Gravelly Branch @ Coverdale Rd. (Rd. 525)	106	--	--	101	--	--	106	0	--
316031	Nanticoke River	Gravelly Branch @ Deer Forest Rd. (Rd. 565)	53	-0.036	80	53	--	--	53	-0.0384	--
401011	Delaware Bay	Roosevelt Inlet Mouth	99	--	--	109	--	--	--	--	--

Appendix E – Bridgeville Branch fact sheet

Appendix F – Air Seeder Summary

Sussex Conservation District
Air Seeder Program Summary

The Air Seeder – Establishing Cover Crops Early to Improve Water Quality and Soil Health

The Sussex Conservation District recently purchased an air seeder to help farmers in the early establishment of cover crops. The technology of the Miller Nitro with a 90 ft. boom equipped with a specialized seed box allows the farmer to plant cover crops while their cash crop is still in the field. The air seeder drops seed below the canopy allowing for better seed to soil contact and more even seed distribution. By planting early, the cover crop benefits from the longer growing degree days during the summer, therefore getting a better established crop to improve water quality and soil health.

A pilot program was created enrolling more than 20 interested farmers which began planting in late July and ran through mid-October. The pilot included a $60 per acre incentive for using the air seeder which is a $10 increase over regular early planted cover crops. There was no fee for using the air seeder but the farmer was responsible for purchasing and loading the seed as well as the fuel. The District partnered on this project with Buckeye Soil Solutions of Ada, Ohio who modified the Miller Nitro with the specialized seed box and distribution system which they built. Southern States Coop – Dagsboro Store also partnered on this project by providing an operator for the air seeder.

The District's goal was to plant 4,000 acres of cover crops in the first year into standing corn, soybeans, sorghum, and vegetables. The program was a success with 4,017.6 acres planted. Total acres of planted cover crops are up 21.3% this year compared to last year with a total of over 39,355 acres planted countywide. Especially notable was the 33.8% increase in cover crop acres planted in the Chesapeake Bay Watershed in Sussex County. This increase can be attributed to the District's Soil Health outreach effort and the implementation of the air seeder. The additional cover crop acres will help Delaware's farmers get increased nutrient load reductions in the Chesapeake Bay Watershed Model. These reductions help Delaware work towards reducing their nutrient and sediment loads as outlined in the Chesapeake Bay Watershed Implementation Plan (WIP) and help meet Delaware's Total Maximum Daily Loads (TMDL) goals and milestones.
To encourage participation in the air seeder pilot program, SCD offered an additional $10 per acre incentive. The concern was that producers may be hesitant to run the air seeder through their cash crop.

This is a new technology in the region and we needed a few willing early adopters to give it a try. The air seeder was featured in the Sussex Conservation District's newsletter, *Crossroads,* in May which sparked a lot of interest (article attached). By early July we had surpassed our goal of 4,000 acres enrolled. In August, The *Delmarva Farmer* ran an article in their special section "New Technology." Here is a link to the article entitled Air seeder plants cover crops before corn harvest.

In early September, a WTOL-11 television news team from Toledo, Ohio came to Delaware and Maryland to learn about what both states are doing to help improve water quality in the Chesapeake Bay. They featured the air seeder during their visit to Delaware. They created a three part series and the following link is part 2 How Delaware is Helping Clean Up the Chesapeake Bay.

Below are pictures of the air seeder. The District has received positive feedback from program participants and we are anticipating an increase in demand for 2016. The additional acres and early establishment of cover crops will help improve water quality and soil health in the region.

The cost of the air seeder was $275,000. Buckeye Soil Solutions discounted the cost of the machine $75,000, bringing the total cost to the District to $200,000.

Appendix G – Air Seeder Fact Sheet

SUSSEX CONSERVATION DISTRICT'S

AIR SEEDER PILOT PROGRAM

The Air Seeder is a piece of equipment used to broadcast cover crop seed into a standing crop. It was developed by Buckeye Soil Solutions, and is built on a Miller Nitro base- providing clearance for mature corn- with a 90' boom.

The Sussex Conservation District purchased the Air Seeder and developed the program with the intent to:

- Establish cover crops earlier in the growing season
- Accrue more growing degree days to get a better cover crop stand (better for soil health and nutrient uptake)
- Allow an earlier timing to open management window for more acres

SCD planted 4,017.6 acres of cover crops with the air seeder in the first year of the program. Their goal for 2016 is to plant 8,000+ acres.

Challenges in the first year included a need for clean seed to avoid clogging the machine, farmers' lack of equipment to help load the seed into the seed box on top of the machine, and scheduling and transportation logistics. SCD is evaluating ways to address these issues and make operations more efficient in the second year of the program, potentially through purchasing one or two high-quality seed mixes in bulk, from a vendor who can also load it.

WHAT PRODUCERS SAY...

17 producers answered a survey about their experience in the 2015 Pilot Program. All but one producer said that they will participate again next year.

SEED AND SEEDING RATE

Producers agreed that clean seed was very important. Cover crop seed mixes were popular. The manufacturer doesn't recommend pure radish seed, but some producers thought that the high seeding rates recommended for small grains, like rye, slowed seeding rates.

THE OPERATOR

Producers preferred having an operator to run the air seeder. Being the first year, there were a few technical issues, including seed calibration, which resulted in a heavier application rate than intended on some fields. Producers would like to see the same operator return next year.

CROP DAMAGE

Crop damage occurs mainly in the turnrows and in entrance and exit points in the field. 25% said crop damage was higher than they expected and 25% said it was lower than expected.

Sussex conservation district

23818 Shortly Road, Georgetown, DE 19947
(302) 856-2105

Appendix H - Mirror Lake Restoration Fact Sheet

Mirror Lake Remediation and Restoration

Fall 2015 Update

BACKGROUND

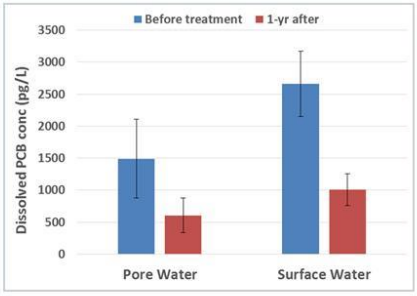
Mirror Lake—a part of the tidal St. Jones River in Dover, DE— has been plagued with excess nutrients, chemical contaminants, sedimentation, stormwater runoff, invasive plant species, and bacteria for decades. A fish consumption advisory to protect public health has been in effect for the St. Jones River since 1988 based on elevated levels of PCBs and other contaminants. With the use of activated carbon, DNREC has implemented an innovative project that has reduced the amount of time that it will take for the fish to be safe to eat again.

In fall 2013, seventy nine (79) tons of activated carbon (SediMite™) were applied to 5 acres of lake and downstream channel. This process took 10 days to complete and was the largest application of SediMite™ anywhere in the United States.

2015 UPDATES

Data collected immediately before and 1 year after activated carbon treatment showed….

- **78% reduction** of dissolved PCB concentrations in the sediment pore water
- **72% reduction** of dissolved PCB in the water column

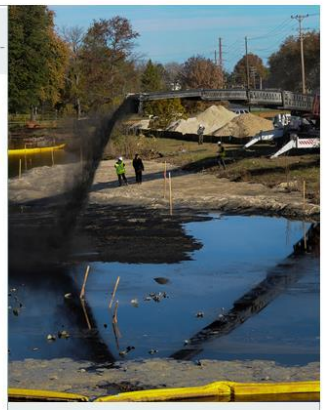


Graph demonstrating PCB concentrations in pore water and surface water before (blue) and 1-year after (red) the activated carbon treatment.

- **60% reduction in total PCB in resident fish** within Mirror Lake, determined through fish tissue sampling. This reduction in 1 year would have taken roughly 20 years if the water hadn't been treated with activated carbon.

A new intertidal wetland was also successfully established with the planting of over 6,000 native plugs and shrubs.

The site will continue to be monitored for several additional years.



SPECIAL POINTS OF INTEREST

This project was awarded second place in the nation in the small projects category (<$5 million) by the American Academy of Environmental Engineers & Scientists.

This project was a part of the WATAR Program of DNREC. WATAR, or the Watershed Approach to Toxics Assessment and Restoration, aims to link the cleanup of contaminated sites to improving overall watershed health.

This technology has great potential elsewhere in Delaware, the region, nation, and the world. It was also used in Little Mill Creek in the fall of 2015.

To learn more about the Mirror Lake project or the WATAR Program, please contact:

Brittany Sturgis
Brittany.Sturgis@state.de.us
302-739-9939

http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/WATAR.aspx