Delaware Division of Watershed Stewardship
Nonpoint Source Program

2019 ANNUAL REPORT

DELAWARE DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
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Nonpoint
Source Program

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

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

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Preface

The 2019 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 U.S. Environmental Protection Agency (EPA). This programmatic condition in the award states that the report shall contain the following:

- a brief summary of progress in meeting the schedule of milestones in the approved Delaware NPS Management Program;

- reductions in nonpoint source pollutant loading and improvements in water quality that has resulted from implementation of the Management Program, and

- 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 as well as 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, how would the implementation of a 1,000 foot streambank stabilization best management practice (BMP) project 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 travels, it can collect and carry pollutants such as sediments, nutrients, toxics, and pathogens. These pollutants eventually reach lakes, rivers, streams, 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. However, if excessive nutrients enter these water bodies and 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 EPA's 2018-2022 Strategic Plan. The main area of EPA's Strategic Plan in which Delaware focuses its work is Goal 1: Core Mission: Deliver real results to provide Americans with clean air, land and water and ensure chemical safety, Objective 1.2 Provide for Clean and Safe Water.

I. The Delaware NPS Program

As part of the DNREC, the Delaware NPS Program is committed to addressing the issue of NPS pollution as it affects Delaware's numerous waterbodies. Efforts include grant funding, education, outreach, and partnerships with other organizations working together to reduce NPS 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 pollution 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 solicitated annually from potential grant applicants through an advertised request for proposal (RFP) process. These grant application proposals are reviewed, evaluated, and

prioritized to determine which are most suitable for implementation 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 in *2018 Draft Combined 305(b) and 303(d) report*, includes 397 assessment units (waterbodies and stream segments) with 10 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 becomes an even harder problem to solve. Due to the rate that groundwater travels through the system, many NPS pollutants that entered the systems 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 NPS pollution is achieved through the incorporation or installation of specific 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 CWA. While this federal financial support has proven successful in complementing Delaware's NPS efforts, the NPS Program is currently seeking additional finances to expand 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 (SRF) Program, support for developing Pollution Control Strategies (PCS), and watershed plan development and/or coordination.

IV. Vision and Mission

The Department of Natural Resources and Environmental Control (DNREC) envisions a Delaware that offers a healthy environment where people are committed to the protection, enhancement, and enjoyment of the environment; 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 DNREC 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 NPS Management Program is a dynamic and open-ended program intended to facilitate and promote statewide efforts to manage NPS 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 NPS pollution through assessment updates.
2. The NPS Program will be implemented and updated to realistically reduce NPS pollution in a cost-effective manner.
3. The NPS Program will address NPS 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 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 NPS 319 Program is the DNREC, Division of Watershed Stewardship.

V. Executive Summary

The Delaware NPS Program has focused this annual report on nine (9) priority watersheds in Delaware which include; the Upper Chesapeake, Chester and Choptank, Nanticoke, Pocomoke and Wicomico, Christina Basin, Appoquinimink River, Broadkill River, Inland Bays, and St. Jones River. All of these priority watersheds suffer from impairments linked to NPS water pollution.

In 2019, the Delaware NPS Program received approximately $1.17M in federal section 319(h) grant funds to focus on nonpoint source water pollution reduction efforts. This annual report documents the activities and highlights of the DNREC NPS Program during the 2019 calendar year. It also fulfills the requirements of Section 319 of the federal CWA. DNREC's NPS Program annually prepares this report to inform stakeholders on the state's progress in the area of NPS water pollution reduction. Although this report should not be considered a complete enumeration of all NPS pollution reduction activities, it describes the most important features and accomplishments of the NPS Program.

In 2019, the Delaware NPS Program continued to reduce water pollutant levels by achieving milestone targets. Milestone targets are near-term or long-term commitments that promote a steady pace of progress towards water quality improvement. This report identifies accomplishments during the 2019 calendar year that helped Delaware achieve long-term and short-term milestones (Appendix A), all of which have been identified in the State's NPS

Management Program. Milestone activities successfully implemented during 2019 to support and/or enhance the program include: providing grant funding, education and outreach, and enhancing partnerships with other organizations to work together to reduce NPS pollution in Delaware.

- **Grant funding** – In 2019, the Delaware NPS Program received approximately $1.17M in federal section 319(h) grant funds to focus on nonpoint source pollution reduction efforts. Grant funding was used and leveraged to implement pollutant control projects, BMPs, and actions featured in the table below.

- **Education and Outreach** – Delaware's NPS Program attended several educational and outreach events across the State including Coast Day in Lewes, Blackbird Fall Festival in Odessa, the Water Family Fest in Ocean View, the Reclaim Our River Program, and the State Fair in Harrington. The Program also hosted the second annual Delaware Watersheds Photo Contest, inviting photographers of all ages and skill levels to participate. The contest aims to share the beauty of Delaware's diverse environment while acting as a vivid reminder that everything that happens on land within the state's watersheds also directly affects what's happening in our waterways. Over 300 entries were received with 2,365 votes for first place winners through online public voting and 2,756 votes submitted by fairgoers for "Best in Show" at the Delaware State Fair. Additional details and winning photograph are featured in this report.

- **Partnerships** – The Delaware NPS Program continues to develop long standing relationships with existing partners as well as attempt to foster working relationships with new partners. The NPS Program continues to work closely with the county Conservation Districts to implement various agricultural related BMPs in the landscape. During 2019, the NPS Program held meetings with prospective new partners in attempts to establish working relationships to implement BMPs including but not limited to; created wetlands, wetland restoration, woodchip bioreactors, buffers, etc.

  The NPS Program's Chesapeake Bay Implementation Team finalized and submitted the Phase III Chesapeake Bay Watershed Implementation Plan (WIP) in August 2019. The development of this Phase III WIP required numerous meetings, engagement and participation between the program and multiple partners and stakeholders.

  In October 2019, Delaware hosted the biennial NPS Conference for Region 3 states and the EPA in Rehoboth Beach, Delaware. This conference brought together both public and private sector stakeholders to discuss successes and challenges with NPS program implementation and improving water quality affected by NPS pollution.

Overall, the NPS Program funded projects that were completed during the calendar year resulting in pollutant load reductions of nitrogen at 1,307,018 pounds/year and phosphorus at 47,407 pounds/year (see table below). Delaware continues to ensure that projects funded with CWA Section 319 dollars make progress towards restoring or protecting waters impaired by NPS pollution.

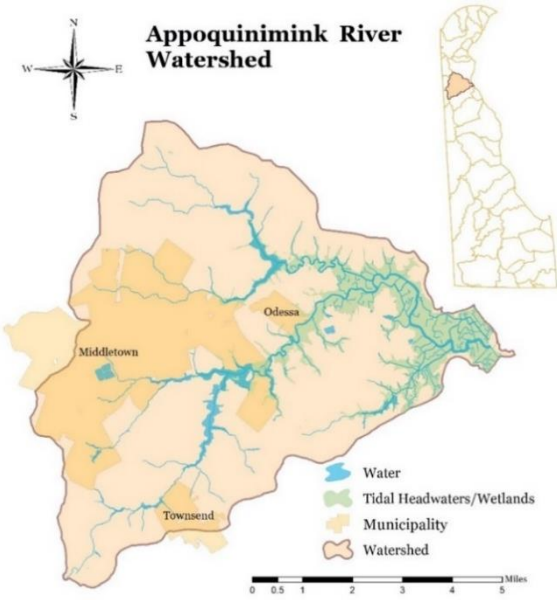
Pollutant Controls, Practices, and Actions	Unit	2019 Annual Progress
Cover Crop (traditional and commodity)	acres	58,399
Nutrient Relocation (net export from watershed)	tons	49,745
Nutrient Management	acres	221,357
Tree Planting	acres	37
Water Control Structures	Acres	1,742
Stream Restoration	Feet	9,621
Wetland Restoration	Acres	2,756

VI. Watersheds

Delaware Nonpoint Source Program 2019 Watershed Progress Report

Appoquinimink River

Watershed Description: The 16-mile Appoquinimink River meanders through farmlands and wetlands in southern New Castle County, Delaware, 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 Drawyer 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 to river kilometer 8.5, past the Drawyer Creek confluence.



Goals: TMDLs were established for the entire Appoquinimink River in December, 2003. These TMDLs called for 325,215 lbs/yr and 8,578 lbs/yr reductions in nonpoint nitrogen and phosphorus, respectively. An implementation plan was developed by a Tributary Action Team, a diverse group of citizens and government agency personnel, and 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.

Progress Highlights: All sectors have taken steps (the implementation of laws, regulations, and voluntary BMPs) to improve water quality. Analysis using a basic land use loading rate model shows nonpoint sources of TN and TP have been reduced by 109% and 111%, respectively, from TMDL baseline levels. There is still a need for further reductions in areas such as wastewater and stormwater.

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

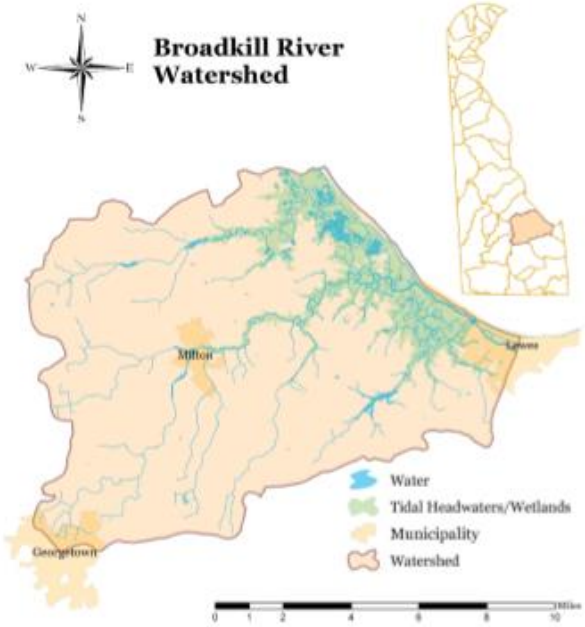
BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	-	Annual	3,145	-	-	-
Nutrient Management	Acres	8,146	Annual	12,854	63%	27,293	1,312
Riparian Buffer (forest and vegetative)	Acres	-	36	31.6	113%	1,832	35
Hardwood Tree Planting	Acres	-	1.73	-	-	79.5	2.5
Total Reductions						29,205	1,350
WIP Load Reduction Goal						325,215	8,578
Percent Load Reduction Achieved						9%	16%

Delaware Nonpoint Source Program 2019 Watershed Progress Report

Broadkill River

Watershed Description: The Broadkill River Watershed is located in the east central portion of Sussex County, Delaware. 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 and Diamond ponds 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.



Goals: In terms of daily NPS nutrient loads, the established Total Maximum Daily Load (TMDL) requires a 40% reduction in nitrogen (baseline 611,375 lbs/yr) and phosphorus (baseline 25,295 lbs/year).

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	3,821	Annual	5,200	73%	57,701	56
Nutrient Relocation (net export from watershed)	Tons	1,564	Annual	1,900	83%	10,343	228
Nutrient Management	Acres	13,552	Annual	26,476	51%	37,882	4,375
Hardwood Tree Planting	Acres	0	192.7	192	100%	6,633	506
Rain Garden	Structure	0	5.4	-	-	-	-
Total Reductions						112,559	5,165
WIP Load Reduction Goal						611,375	25,295
Percent Load Reduction Achieved						18%	20%

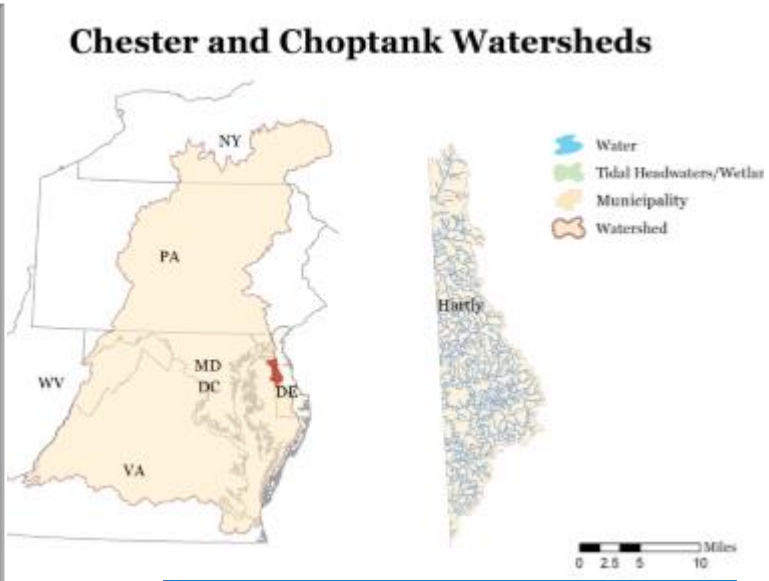
Delaware Nonpoint Source Program 2019 Watershed Progress Report

Chester and Choptank Watersheds

Watershed Description: The majority of the Chester and Choptank Watersheds are in Kent County, Delaware, while a portion of the Chester River originates in New Castle County, Delaware. Both rivers drain into Maryland's eastern shore, including Kent County, Queen Anne's County, and Caroline County. The Chester and Choptank Watersheds include 88,217.5 acres, or 137.8 square miles, of land area.

Chester River in Delaware includes a 40.0 square mile drainage area with headwaters beginning at the divide between New Castle and Kent Counties. Delaware headwater segments, including Cypress Branch, Sewell Branch, and Gravelly Run, flow west into both Kent County and Queen Anne's County, Maryland.

The Choptank River Watershed , located immediately south of the Chester River, includes 62,619.5 acres. Headwater tributaries to the Choptank River includeTappahanna Ditch, Culbreth Marsh Ditch, and Cow Marsh Creek.



Goals: The TMDL established for the Chester and Choptank River Watersheds capped the nitrogen loads at 708 lbs/day and 1,359 lbs/day, respectively. Phosphorus reductions of 40% to 12.3 lbs/day are required for the Chester, and phosphorus load reductions of 40% to 51.1 lbs/day are required for the Choptank.

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	3,845	Annual	15,618	25	36,248	75
Nutrient Relocation (net export from watershed)	Tons	713	Annual	0	-	2,945	140
Nutrient Management	Acres	11,138	Annual	1,339	831	23,097	1,198
Hardwood Tree Planting	Acres	-	197	172	114	6,152	153
Water Control Structures	Acres	-	348	3,120	11	2,602	0
Stream Restoration	Feet	-	1,924	11,880	16	260	303
Wetland Restoration	Acres	-	551	2,112	26	12,791	441
Total Reductions						84,095	2,310
WIP Load Reduction Goal						754,455	23,078
Percent Load Reduction Achieved						11%	10%

Delaware Nonpoint Source Program 2019 Watershed Progress Report

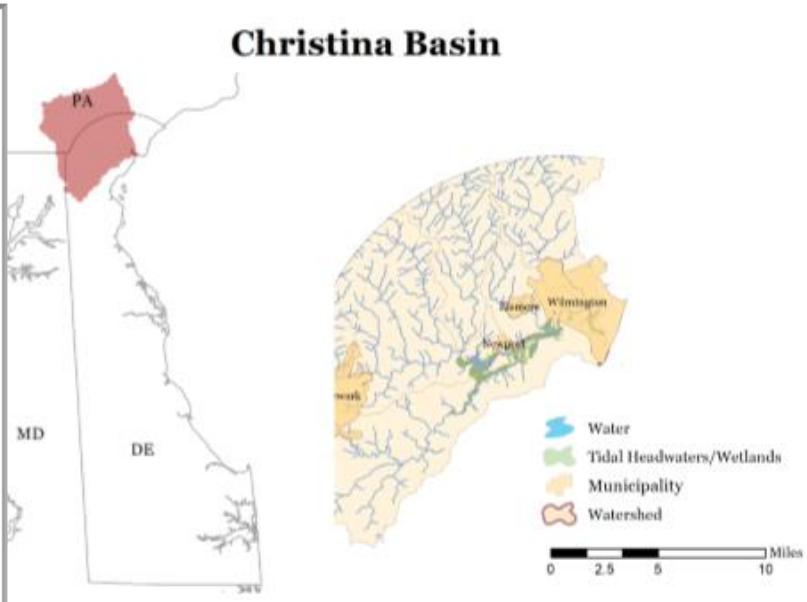
Christina Basin

Watershed Description: 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.

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



Goals: Reduce pollutant loadings from current and future land use practices with an effort to achieve the TMDL through the efforts of numerous organizations and individuals. Delaware's efforts 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. Nitrogen levels need to be reduced by 39,460 lbs/yr, and phosphorus levels by 1,716 lbs/yr. 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.

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

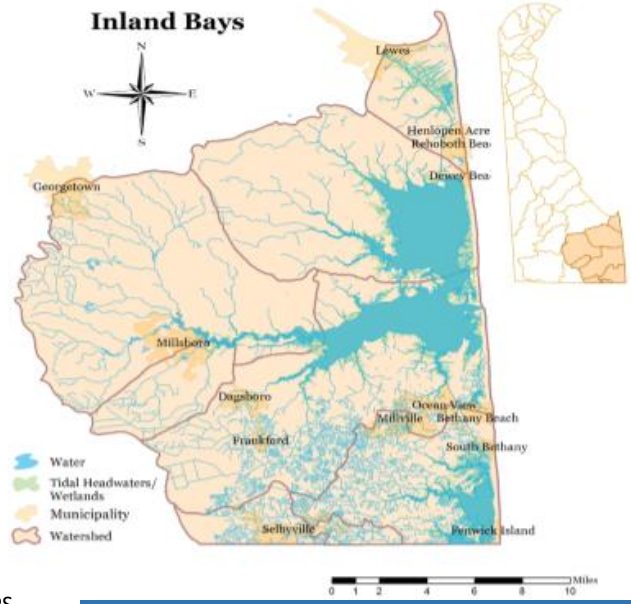
BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	-	Annual	12.4	-	-	-
Nutrient Management	Acres	437	Annual	7,559.0	6%	1,462	70
Rain Garden	Structure	-	36	31.6	113%	-	-
Stream Restoration	Feet	-	3,675	0.0	-	-	-
Hardwood Tree Planting	Acres	0	0.8	-	-	-	-
Total Reductions						1,462	70
WIP Load Reduction Goal						39,460	1,716
Percent Load Reduction Achieved						4%	4%

Inland Bays

Watershed Description: 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 (Rehoboth Bay, Indian River Bay, and Little Assawoman Bay) are located just landward of the Atlantic Ocean shoreline. 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.



Goals: Goals call for the increased implementation of numerous NPS BMPs, especially in the agriculture sector to reduce nitrogen by 508,445 lbs/yr and phosporous by 22,630 lbs/yr. 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 presented here are initiatives of the 319 program.

Water Quality Trends

TP:  TN:  TSS: 

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	10,103	Annual	37,637	27%	129,125	397
Nutrient Relocation (net export from watershed)	Tons	14,696	Annual	20,909	70%	82,290	5,783
Nutrient Management	Acres	28,534	Annual	53,827	59%	80,247	6,163
Riparian Buffer (forest and vegetative)	Acres	-	241	3,235	7%	10,129	337
Wetland Restoration	Acres	-	29	4,175	1%	913	47
Rain Garden	Structure	-	1	3	33%	-	-
Total Reductions						302,704	12,727
WIP Load Reduction Goal						508,445	22,630
Percent Load Reduction Achieved						60%	56%

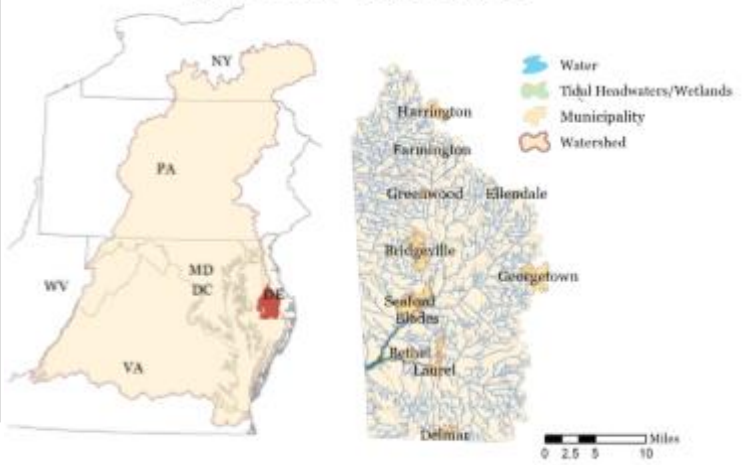
Delaware Nonpoint Source Program 2019 Watershed Progress Report

Nanticoke River Watershed

Watershed Description: The Nanticoke River Watershed includes the Middle Nanticoke and Upper Nanticoke Rivers.The majority of the two rivers originate in Sussex County, Delaware, while a portion of the Middle and Upper Nanticoke Rivers originate in Kent County, Delaware. Both rivers drain to the southwest into Maryland's eastern shore, including Caroline County, Dorchester County, and Wicomico County. The Nanticoke includes 315,890.7 acres, or 493.6 square miles, of land area.

The Middle Nanticoke River refers to the Marshyhope Creek. Headwater tributaries to the Upper Nanticoke River include Gum Branch, Gravelly Branch, Deep Creek and Broad Creek.

Nanticoke Watershed



Goals: Current goals call for the increased implementation of numerous NPS BMPs, especially in the agriculture sector. The milestones allow jurisdictions the opportunity to adapt implementation strategies as necessary to meet the goals and achieve the TMDL standard. Delaware's milestone commitments are to annually reduce nitrogen by 3,391,050 lbs., phosphorus by 276,832 lbs., and sediment by 99,793,936 lbs., by the end of 2025, compared to the 2009 baseline.

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	24,709	Annual	10,448	236	316,331	674
Nutrient Relocation (net export from watershed)	Tons	24,304	Annual	Maximum available	-	146,740	9,563
Nutrient Management	Acres	74,707	Annual	1,258	-	180,637	10,975
Hardwood Tree Planting	Acres	5	695.5	157	439	31,930	997
Water Control Structures	Acres	-	1,219	2,394	51	9,106	0
Stream Restoration	Miles	-	1.3	465	.3	911	1,060
Wetland Restoration	Acres	-	1,929	74,043	3	65,480	3,098
Total Reductions						751,135	26,367
WIP Load Reduction Goal						3,391,050	276,832
Percent Load Reduction Achieved						22%	9%

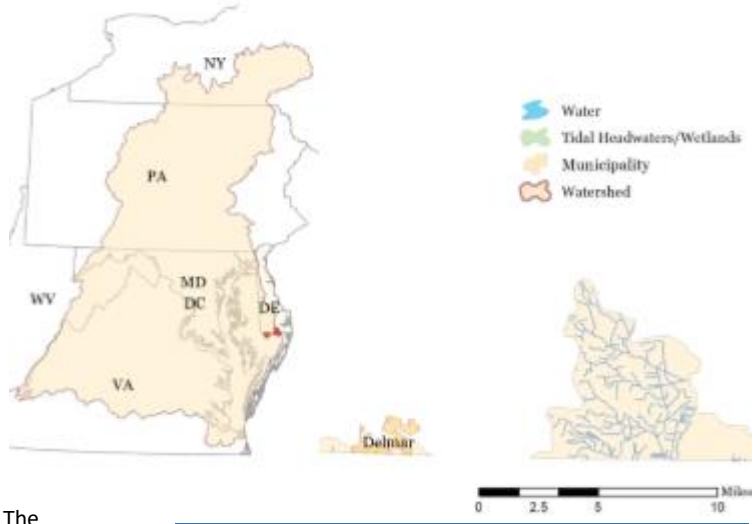
Delaware Nonpoint Source Program 2019 Watershed Progress Report

Pocomoke and Wicomico River Watershed

Watershed Description: The Pocomoke and Wicomico Rivers both originate in Sussex County, Delaware, and drain into Maryland's eastern shore, primarily in Wicomico County.

The Delaware portion of the Pocomoke River comprises 35 square miles and includes four headwater tributaries - Bald Cypress Branch, Gum Branch, Lewis Prong, and North Fork Green Branch. The headwaters for the Wicomico River begin at the Delaware-Maryland divide, with the Delaware portion contributing only 2.1 square miles. Four very small stream segments of the Wicomico watershed are located in Delaware, accounting for just 0.7 stream miles.

Pocomoke and Wicomico Watersheds



Goals: A TMDL was established in 2005 for the Pocomoke River. The Pocomoke nitrogen load allocations are 102.7lbs/day or 37,255.5 lbs/year. The Pocomoke phosphorus load allocations are 6.1 lbs/day or 2,228 lbs/year. The Wicomico nitrogen and phosphorus load allocations are 9,103 lbs/year and 708 lbs/year, respectively.

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

BMP Progress FY 2019

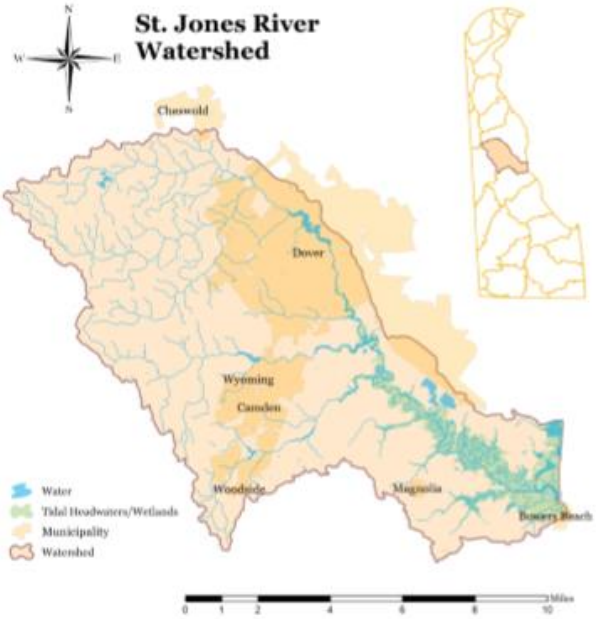
BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	2,353	Annual	1,897	124	16,636	93
Nutrient Relocation (net export from watershed)	Tons	2,913	Annual	Maximum available	-	9,021	1,146
Nutrient Management	Acres	6,650	Annual	8,771	76	10,526	1,436
Hardwood Tree Planting	Acres	-	49.3	24	205	1,047	71
Water Control Structures	Acres	-	87	189	46	650	0
Stream Restoration	Feet	-	481	1712	28	65	76
Wetland Restoration	Acres	-	138	154	90	2,403	222
Total Reductions						40,348	3,044
WIP Load Reduction Goal						46,359	714
Percent Load Reduction Achieved						87%	426%

Delaware Nonpoint Source Program 2019 Watershed Progress Report

St. Jones River

Watershed Description: The St. Jones River Watershed is approximately 25.9 square miles (16,576 acres) and is located in the central portion of Kent County. 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. Non-tidal riverine wetlands and tidal wetlands line the banks of the river, sometimes up to a ½ 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 St. Jones Watershed has 5,236 acres of protected lands, including 3,750 acres preserved in the St. Jones River Reserve.



Goals: Reduce the overall levels of nitrogen and phosphorus in the waterway by 40%, or 317,368 lbs/year and 23,141 lbs/year, respectfully. Nonpoint sources, must reduce total nitrogen from 306,053 lbs/ year and total phosphorus from 19,309 lbs/ year. The TMDL also calls for 7,957 lbs per year reduction of nitrogen and 1,241 lbs per year 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.

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	1,577	Annual	6,247	25%	4,688	23
Nutrient Management	Acres	9,200	Annual	21,588	43%	6,204	167
Hardwood Tree Planting	Acres	-	1.7	-	-	16	0.2
Total Reductions						10,908	190
WIP Load Reduction Goal						317,368	23,141
Percent Load Reduction Achieved						3%	.1%

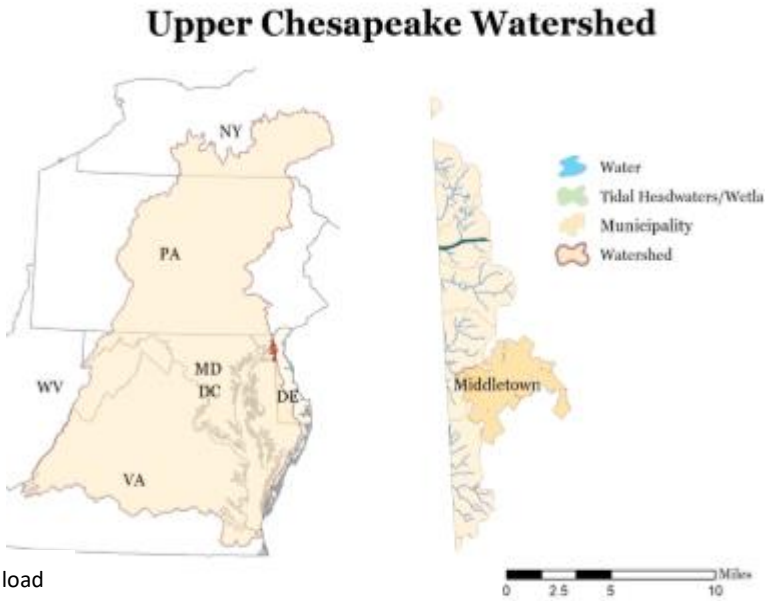
Delaware Nonpoint Source Program 2019 Watershed Progress Report

Upper Chesapeake Watershed

Watershed Description:

The Upper Chesapeake Watershed includes the Elk, Bohemia, and Sassafras Rivers and the C & D Canal, all of which originate in New Castle County, Delaware, and drain to the west into Maryland's upper eastern shore, primarily in Cecil County. The Upper Chesapeake includes 23,351.7 acres or 36.5 square miles of land area.

The Upper Chesapeake as a whole is made up of a mixture of land use, primarily including agriculture, forest, and developed lands . Over two-thirds of the Upper Chesapeake is agricultural use (38.4%) or developed land (34.0%) with the remaining land use largely comprised of forest (27.1%).



Goals: The watershed plan for the Upper Chesapeake says that load reductions proposed meet the allocations for the Upper Chesapeake in the Bay TMDL. By targeting the most effective BMPs to the critical areas with the greatest recovery potential, the TN agriculture load can be decreased from 112,510 to 60,365 lbs/year. The agricultural TP loads can be reduced from 119,235 to 6,134 lbs/year.

The TN urban load is second largest load and can be reduced from 67,790 to 60, 138 lbs/year. Urban TP loads can be reduced from 4,332 to 3,668 lbs/year.

Water Quality Trends

TP: TN: TSS:

Note: BMPs reflected in the BMP Progress Table below represent the reported BMPs from partner organizations that were cost shared with NPS 319 funds.

BMP Progress FY 2019

BMP Name	Units	2019 Progress	Cumulative Progress	WIP Goal	% Achieved	Practice & N Load Reductions (lbs/year)	Practice & P Load Reductions (lbs/year)
Cover Crop (traditional and commodity)	Acres	-	Annual	2,229	-	-	-
Nutrient Relocation (net export from watershed)	Tons	1,260	Annual	Maximum available	-	5,203	247
Nutrient Management	Acres	774	Annual	100%	-	1,605	83
Hardwood Tree Planting	Acres	-	49.55	-	-	1,544	38
Water Control Structures	Acres	-	87	155	56	650	-
Stream Restoration	Feet	-	481	2,732	176	65	76
Wetland Restoration	Acres	-	138	247	56	3,204	110
Total Reductions						12,271	554
WIP Load Reduction Goal						112,510	119,235
Percent Load Reduction Achieved						10.9%	0.5%

2019 Annual BMP Nutrient Reductions for Nitrogen

Nitrogen Load Reductions (lbs./year)	Upper Chesapeake	Chester /Choptank	Nanticoke	Pocomoke/ Wicomico	St. Jones River	Inland Bays	Broadkill River	Appoquinimink River	Christina Basin	Total N (lbs./year)
Cover Crops	0	36,248	316,331	16,636	4,688	129,125	57,701	0	0	560,729
Nutrient Relocation	5,203	2,945	146,740	9,021	6,204	82,290	10,343	0	0	262,746
Nutrient Management	1,605	23,097	180,637	10,526	0	80,247	213	27,293	1,462	325,080
Hardwood Tree Planting	1,544	6,152	31,930	1,047	16	10,129	6,633	1,911.5	0	59,362.5
Water Control Structures	650	2,602	9,106	650	0	0	0	0	0	13,008
Stream Restoration	65	260	911	65	0	0	0	0	0	1,301
Wetland Restoration	3,204	12,791	65,480	2,403	0	913	0	0	0	84,791
Total N Reductions	**12,271**	**84,095**	**751,135**	**40,348**	**10,908**	**302,704**	**74,890**	**29,204.5**	**1,462**	**1,307,017.5**

2019 Annual BMP Nutrient Reductions for Phosphorus

Phosphorus Load Reductions (lbs./year)	Upper Chesapeake	Chester /Choptank	Nanticoke	Pocomoke/ Wicomico	St. Jones River	Inland Bays	Broadkill River	Appoquinimink River	Christina Basin	Total P (lbs./year)
Cover Crops	0	75	674	93	23	397	56	0	0	1,318
Nutrient Relocation	247	140	9,563	1,146	0	5,783	228	0	0	17,107
Nutrient Management	83	1,198	10,975	1,436	167	6,163	5	1,312	70	21,409
Hardwood Tree Planting	38	153	997	71	0.2	337	506	2.5	0	2104.7
Water Control Structures	0	0	0	0	0	0	0	0	0	0
Stream Restoration	76	303	1,060	76	0	0	0	0	0	1,515
Wetland Restoration	110	441	3,098	222	0	47	0	0	0	3,918
Total P Reductions	**554**	**2,310**	**26,367**	**3,044**	**190.2**	**12,727**	**795**	**1,314.5**	**70**	**47,371.7**

VII. Project Highlights

Delaware Nonpoint Source Program 2019 Watershed Progress Report

2019 Photo Contest

1st place winners of each category received DE State Park passes, a canvas print of their work, and had their winning photographs featured in Outdoor Delaware magazine.

From Top down, Best in Show and 1st Place in Waterscapes – Little Creek Wildlife Area by Ryan Shlan

1st Place in Natural Landscapes—Beautiful Countryside off Wilkins Road by Bernard Dennis

1st Place in Agriculture—Corn Field in Magnolia at Sunset by Zachary Williams

1st Place in Wildlife—Snowy Egrets Fighting by Kimberly Basrksdale

What is the Delaware Watersheds Photo Contest?

2019 marked the second year of DNREC's Nonpoint Source (NPS) program's Delaware Watersheds Photo Contest, which replaced the rain barrel art contest from previous years. The goal of the contest was to share the beauty of Delaware's diverse environment and remind citizens that everything happening on land within the State's watersheds also directly affects what happens in our waterways.

The photo contest featured four categories:

1. Natural Landscapes of Delaware
2. Waterscapes of Delaware
3. Native Wildlife of Delaware
4. Agriculture in Delaware

Who could enter? How did participants register?

Photographers of all ages were invited via social media and press releases to submit their photos of Delaware's waterscapes, landscapes, wildlife, and agriculture through an online form. The contest was open to legal residents of the United States at the time of entry and encouraged photographers of all skill levels to enter. Photographs were required to be taken in Delaware, fit the properties criteria, fall within one of the four possible categories, and be submitted through the form.

Over 300 photos submitted and 5000 votes!

How were winners determined?

DNREC determined qualified entries that proceeded to the next stage of online public voting. The public determined the first place winners in each category. Winners were then on display at the 2019 Delaware State Fair and voted on by fairgoers to determine Best in Show.

DelawareWatersheds.org

2019 Reclaim Our River Program

2019 marked the sixth annual Reclaim Our River Program, Nanticoke Series.

Photos above highlight ROR events and opportunities used to educated the public on nonpoint source pollution. ROR events above include the Eco Paddle on Broad Creek, the Recycled Cardboard Boat Regatta at the Nanticoke River Public Marine Park and a Rain Barrel Building Workshop in Blades.

What is the Reclaim Our River (ROR) Program?

The ROR Program is designed to bring water quality related events, workshops, presentations, and recreational opportunities to the Chesapeake Bay Watershed.

This program provides important information and techniques for reducing nutrient and sediment pollution and improving the overall health of communities' local waterways. The monthly series of activities is offered from early spring to fall.

Who are the partners?

The ROR program, sponsored by DNREC's Nonpoint Source Program, core partners include DNREC, The Delaware Nature Society's Abbotts Mill Nature Center and the Nanticoke Watershed Alliance.

The program is designed to bring a variety of partners together including but not limited to state and federal agencies, local municipalities, nonprofits, private businesses and community groups.

Each event brings together additional partners from the various sectors listed above and partners are encouraged to adopt events and expand upon the program.

What type of Activities are Offered?

The 2019 ROR schedule included a variety of opportunities to have fun and learn about local water quality as well as the actions community members can take to improve water quality. Activities included:

- Rain Barrel Building Workshop
- Eco paddle on Broad Creek
- Bee-autiful Homes for our Native Pollinators Presentation
- Native Trees for the Birds and the Bees and the Seas Presentation
- Recycled Cardboard Boat Regatta on the Nanticoke
- Wade In at Trap Pond
- Coastal Cleanup at Williams Pond

VIII. Load Reductions

In 2019, 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.

2019 Project Load Reductions/Year by Watershed

Project	Nitrogen (lbs.)	Phosphorus (lbs.)
Upper Chesapeake Bay	12,271	554
Chester and Choptank	84,095	2,310
Nanticoke River	751,135	26,367
Pocomoke and Wicomico	40,348	3,044
St. Jones River	10,908	190
Inland Bays	302,704	12,727
Broadkill River	74,890	795
Appoquinimink River	29,205	1,350
Christina Basin	1,462	70
TOTAL	**1,307,018**	**47,407**

IX. Future Changes and Challenges

Delaware has developed this report to highlight accomplishments made in 2019 to reduce nitrogen, phosphorus, and sediment NPS pollution. The charts and tables above signify the continued progress in reducing loads to impaired watersheds. Additional commitments were made between DNREC and EPA with the development of annual milestones identified in Delaware's 2019 NPS Management Plan. These milestones describe the outcomes and key actions expected over a determined timeframe. The NPS Management Plan includes objectives that address nonpoint sources of surface and ground water pollution as appropriate (including sources of drinking water) in alignment with the goals of the CWA. Objectives of the plan include both implementation steps and how results will be tracked (e.g., water quality improvements or load reductions). Additionally, long-term goals and short-term milestones are integrated with other key environmental and natural resource programs. NPS's program goals and objectives are periodically revised to reflect progress or problems encountered, develop strategies to make progress towards achieving the goals, and develop indicators to measure progress. Updates to the NPS Milestones can be found in Appendix A.

Delaware continues to make progress toward meeting water quality goals with continued commitments of funding implementation activities to address the agriculture and urban sectors. For example, many of the key personnel working within the County Conservation Districts help to write nutrient management plans, install agriculture BMPs, and help farmers to identify resource concerns. Additional DNREC staff work with private landowners on buffers, wetland and stream restoration projects, as well as septic system pump-outs, repairs, and/or replacements.

While some goals have been missed, Delaware has continued to make substantial progress and has invested significant effort into programmatic changes, such as regulations, permits, and reorganizing programs. Although these additional efforts improve accountability, they do not necessarily have an immediate impact on nutrient reductions. Delaware's agricultural community works every day to conserve and protect our water resources, with many of our farmers implementing BMPs that are not accounted for or reported. We are now capturing some of the previously unreported BMP data through statewide transect surveys and Chesapeake Bay related verification efforts. Funding for cover crop cost-share programs has increased farmer participation and allowed us to increase cover crop BMP implementation acreages. In 2019, an additional $2.9M in state funds was allocated for conservation cost share practices specifically designated for cover crops. As a result of this increased funding, implementation of cover crop acres across all counties in Delaware increased. It is unclear, however, if this additional funding will continue in the future. In terms of regulations, in 2013, Delaware promulgated new On-Site Wastewater Regulations. The implementation of this new regulation is helping Delaware to meet future nutrient reduction goals for septic connections, pump-outs, and advanced treatment systems. In February 2019, the Delaware Sediment and Stormwater Regulations were updated and implemented which cover all land disturbing activities greater than 5,000 square feet. Also in 2019, the Sediment and Stormwater Program drafted and submitted a new Construction General Permit (CGP) to the EPA and is currently under review. This CGP is required for any land disturbing activities that are greater than one (1) acre and require National Pollutant Discharge Elimination System (NPDES) permit coverage for such activities.

Delaware's NPS Program in recent years has undergone an internal reorganization which aligned the following programs - 319 NPS program, Chesapeake Bay Implementation Program, Conservation Reserve Enhancement Program (CREP) as well as additional funding and resources through Delaware's Water Infrastructure Advisory Council (WIAC). The newly enhanced NPS Program has proven its efficiency by centralizing and reducing data reporting requirements while increasing grant funding availability and leveraging capacity for federal grants while expanding partnerships.

Looking forward, Delaware's NPS Program will continue to make progress toward our goals and will work to align funding with water quality priorities. Although our state faces many challenges, we remain committed to working with our partners at the state, local, and federal levels to reduce the levels of NPS pollution from entering our waterbodies.

X. 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 2019 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.

Name	Agency
Absher, Debbie	Sussex Conservation District
Arthurs, Jayme	NRCS State Office
Bason, Chris	Center for the Inland Bays
Biddle, Mark	Watershed Stewardship
Bounds, Kenny	DE Department of Agriculture
Brosch, Chris	Delaware Nutrient Management Program
Brown, Lori	NPS Program
Cassidy, Jim	Groundwater Discharges
Chaconas, Jim	Wetlands & Subaqueous Lands
Cole, Kimberly	Delaware Coastal Program
Coleman, Bob	Delaware Nutrient Management Program
Coverdale, Ben	NPS Program
Donnelly, Kevin	New Castle Conservation District
Esposito, Sara	DE Department of Transportation
Foskey, Kip	Sussex Conservation District
Fox, Marcia	Conservation Programs
Garrahan, Tim	NRCS State Office
Hogan, Mark	NPS Program
Kauffman, Jerry	UD Water Resources Agency
Kepfer, Sally	NRCS State Office
Lewandowski, Ed	University of Delaware
Manges, Lynn	Farm Service Agency
Monteith, Tyler	NPS Program
Nelson, Jennifer	Delaware Assoc of Conservation Districts
Riley, Tim	Kent Conservation District
Rutherford, Jamie	Sediment & Stormwater
Saveikis, David	Fish & Wildlife
Schepens, Dave	Groundwater Discharges
Sevcik, Clare	NPS Program
Sturgis, Brittany	NPS Program
Suffian, Fred	US EPA
Sullivan, James	NPS Program
Taylor, Kacey	USDA/NRCS
Webb, Patti	Delaware CREP Program
Volk, Jenn	University of Delaware
Walch, Marianne	Center for the Inland Bays
Watson, Jessica	Sussex Conservation District
Webb, Sharon	NPS Program
Williams, Chuck	Shoreline
Williams, Steve	Watershed Stewardship
Wilson, Bart	U.S. Fish and Wildlife Service
Wozniak, Sara	Watershed Stewardship
Zeiters, Brenda	NPS Program

Appendices

Appendix A – 2019 Milestones

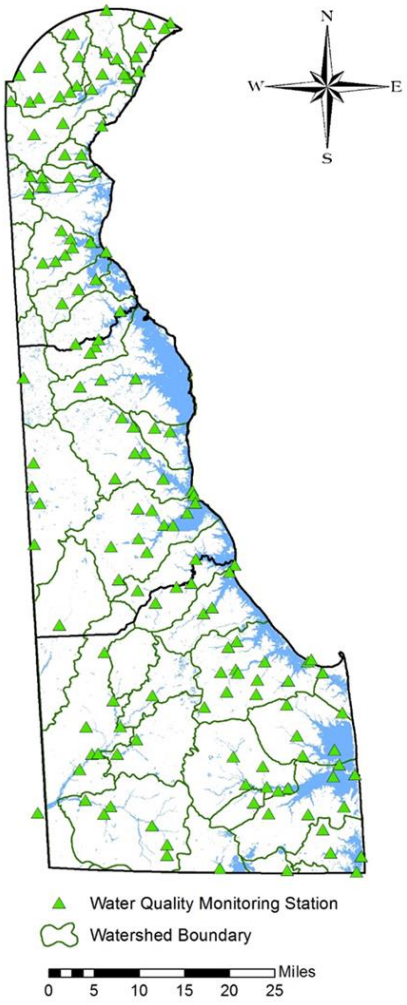
Type	Timeline	Milestone	Comments/Status Updates
Short Term	FY2019 - 2024	Increase number of outreach and education interactions by 10% over FY 2018 baseline (approx. 8,500 and 3,500 interactions, respectively)	2019 Update: A 10% increase in the number of outreach and education interactions over the FY2018 baseline of 8,500 and 3,500 interactions respectively, would be a total of 13,200 outreach and education interactions over the FY2019 – 2024 timeframe. In 2019, the NPS Program staff had a total of 7,500 interactions which represents 56.82% of the interaction total goal during this measured timeframe of 2019 through 2024.
Short Term	FY2019 – 2024	Increase estimated nutrient load reductions from implementation of NPS BMPs in non-Chesapeake Bay and Chesapeake Bay priority watersheds by at least 5% and 20%, respectively. The modeling tools used for the Chesapeake Bay will be used for all watersheds to assess progress from the determined 2002-baseline year. Using the Chesapeake Assessment Scenario Tool, loads will be assessed to enumerate progress in the Management Plan	2019 Update: Due to formatting and collection differences between GRTS submission and CB Program Progress submission, it is difficult to standardize data for a CAST analysis outside of the CB Watershed. Through use of CBRAP funding, we have developed a new BMP Tracking and Reporting Tool which was used for 2019 Progress

			submission. The plan is to utilize this tool for tracking state-wide data in a standard format to aid in analyses for different watersheds.
Short Term	FY2019 - 2024	Characterize baseline conditions and establish timeframe for subsequent monitoring following BMP implementation in priority watersheds that do not have established baselines and re-evaluate old baselines.	2019 Update: The currently approved a-i watershed implementation plans (WIP) have WIP reduction goals. These goals are identified on the individual watershed progress report for all identified priority watersheds. BMP implementation and reporting to the NPS program is calculated and compared to the established WIP goals for each priority watershed. Establishing baseline conditions for watersheds would be conducted by the DNREC's Watershed and Assessment Management Section. This effort is part of an ongoing process.
Short Term	FY2019 – 2024	Demonstrate stable or improving water quality trends for the sub-watersheds of the Inland Bays and Chesapeake Bay relative to data established from 1990 to present.	2019 Update: The DNREC Watershed Assessment and Management Section monitors water quality data throughout the state at a total of 133 STORET stations. Of the 133 stations evaluated for total phosphorus concentration trends, 45 had statistically significant trends.

Short Term	FY2019 - 2024	Demonstrate stable or improving water quality trends for the sub-watersheds of the Inland Bays and Chesapeake Bay relative to data established from 1990 to present.	88 stations showed no trend, either positive or negative. 132 stations were evaluated for total nitrogen trends. 76 stations had statistically significant trends and 56 stations had no trend upward or downward. At confidence levels between 80 – 98%, 22 stations showed statistically significant decreases for total phosphorous and 66 sites showed statistically significant decreases for total nitrogen. New trend analysis is currently being compiled and will be available for a future reporting period.
Short Term	FY2019 - 2024	Remove an identified impairment from a Land River Segment currently included on Delaware's list of impaired waterways.	2019 Update: The Tappahanna Ditch was removed from Delaware's list of impaired waters for bacteria in 2019.
Long Term	By FY2030	Show significant progress towards completion of implementation activities for all Delaware's priority watersheds with approved Nine Element Watershed Plans.	2019 Update: This is to be continually assessed and tracked through BMP data submissions to the NPS Program. For example, the increase in cover crop funding in 2019 had a positive impact on cover crop acres implemented throughout the state.

Long Term	By FY2030	Demonstrate water quality improvement in 20% or more of the priority and monitored priority watersheds as reported in the NPS Annual Report	2019 Update: This will be assessed in the future as this milestone was just established in the 2019 Delaware NPS Management Plan.
Long Term	Annually through FY2030	Show annual increases in funding and quantities of BMPs implemented in priority watersheds	2019 Update: In 2019, $2.9 million of additional state general funds were allocated towards cover crop implementation efforts. This resulted in a significant increase in cover crop acres implemented by farmers in all three counties of Delaware. These cover crop implementation acres were implemented across the priority watersheds established by the Delaware NPS Program.
Long Term	Annually through FY2030	Remove one water body currently listed for nutrient pollutants from the 303(d) List	2019 Update: To be assessed and determined annually as additional BMPs are incorporated into priority watersheds. Tappahanna Ditch was removed from the 303(d) list in 2019 for bacteria impairment.

Appendix B – 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 map (right) and tables below (pages 31 – 40).

Of the 133 stations evaluated for total phosphorus concentration trends, 45 had statistically significant trends. Upward and downward trends were closely divided. 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.

One hundred forty stations were analyzed for trends in measured concentrations of total suspended solids for the 1998-2014 period of record. Of those 140 stations, 61stations had statistically significant trends. Of the 61stations with trends, six stations had statistically significant upward trends and the remaining 55 stations showed downward trends. 79 stations did not have statistically significant trends either upward or downward.

Chesapeake Bay Non-tidal Monitoring

For 2019, Delaware DNREC is participating in a multi-State non-tidal monitoring Program conducted by the Chesapeake Bay Program and other jurisdictions, including Maryland, Virginia, West Virginia, Pennsylvania, New York, and the District of Columbia. The Non-Tidal Monitoring Network contains about 120 monitoring sites with the following two sites in Delaware: (1) Nanticoke River near Bridgeville and (2) Marshyhope Creek at Fishers Bridge Road. Monitoring at the sites is conducted monthly using sample collection protocol developed by the Chesapeake Bay Program non-tidal monitoring workgroup (1). In addition to monthly sampling, eight storm samples per year (two per season) are collected at these sites.

Continuous Water Quality Monitoring

Delaware DNREC, in cooperation with the Delaware Geological Survey (DGS) and the United States Geological Survey (USGS), is maintaining a number of continuous monitoring sites in the State. During FY 2018, six sites in Delaware are being monitored continuously. These sites include Brandywine Creek at Wilmington, Christina River at Newport, Appoquinimink River near Odessa, Millsboro Pond Outlet at Millsboro, Broadkill River near Milton, and Massey Ditch at Massey Landing.

Measurements of water temperature, dissolved oxygen (DO), pH, and specific conductance at these sites are conducted at every 15 minute intervals by using multi-parameter water-quality data sondes (such as YSI sondes). All data are collected following USGS protocols and will be stored in USGS National Water Information System (NWIS) databases**,** http://waterdata.usgs.gov/de/nwis/current/?type=quality.

Water Quality Trend Data

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
109171	Appoquinimink River	MOT Gut (Appo Gut) - West Bank	52	1.61	52	0.173	--	--	--
306091	Rehoboth Bay	Buoy 7, Rehoboth Bay	41	0.49	41	0.056	32	15.9	1
306121	Indian River	Buoy 20, Indian River Bay	57	0.56	57	0.069	45	26.8	5
206231	Murderkill River	Confluence of Kent County STP trib.	39	2.33	39	0.213	--	--	--
305011	Lewes and Rehoboth Canal	Canal Rt. 1	48	0.81	48	0.079	--	--	--
306321	Indian River	Indian River Inlet	67	0.38	67	0.056	46	19.3	1
306341	Indian River	Island Creek, upper third	41	1.66	41	0.093	32	21.7	5
312011	Indian River	White Creek at the mouth of Assawoman Canal	48	0.65	48	0.049	--	--	--
206091	Murderkill River	US Rt. 113 at Frederica By-Pass	49	2.72	49	0.172	--	--	--
305041	Lewes and Rehoboth Canal	Lewes and Rehoboth Canal at Rd. 18 Bridge	48	0.70	48	0.079	--	--	--
306111	Rehoboth Bay	Massey's Ditch at Bouy 17	48	0.40	48	0.053	33	17.0	1
310031	Little Assawoman Bay	Dirrickson Creek, Rd. 381	48	2.15	48	0.160	33	17.8	1
310071	Little Assawoman Bay	Little Assawoman Bay, Mid-Bay	48	0.78	48	0.047	33	10.0	1
109121	Appoquinimink River	Rt. 9 Bridge (East)	52	1.64	52	0.147	--	--	--
306331	Indian River	Island Creek mouth	41	1.29	41	0.087	32	26.0	5

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
310011	Little Assawoman Bay	Little Assawoman Bay Ditch at Rd. 58 Bridge	48	0.68	48	0.047	33	13.0	1
308051	Rehoboth Bay	Guinea Creek at Rt. 298 Bridge	48	1.74	48	0.066	33	9.6	1
306181	Indian River	Buoy 49, Indian River	41	1.79	41	0.103	32	35.4	5
206141	Murderkill River	3.25 miles from the mouth	40	1.78	40	0.176	--	--	--
109091	Appoquinimink River	Delaware River (Appoquinimink at Mouth)	58	1.71	58	0.175	--	--	--
206101	Murderkill River	Bowers Beach Wharf	52	1.26	52	0.157	--	--	--
101021	Naamans Creek	Naamans Road	46	1.55	46	0.031	--	--	--
101031	Naamans Creek	South Branch at Darley Rd.	45	1.12	45	0.042	--	--	--
101061	Naamans Creek	South Branch at Marsh Rd.	46	1.69	46	0.046	--	--	--
102041	Shellpot Creek	Cherry Island at Rd. 501 Bridge	45	1.75	45	0.105	--	--	--
102051	Shellpot Creek	Rt. 13 Bus (Market Street) Bridge	84	1.13	84	0.047	--	--	--
102081	Shellpot Creek	Carr Road Bridge	46	1.07	46	0.033	--	--	--
103011	Red Clay Creek	Stanton, Rt. 4 at Stanton Bridge (USGS gage 01480015)	45	2.90	45	0.060	--	--	--
103031	Red Clay Creek	Wooddale, Rt. 48 (USGS gage 01480000)	84	3.31	84	0.088	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
103041	Red Clay Creek	Ashland, Rd. 258a	46	3.78	46	0.077	--	--	--
103061	Red Clay Creek	Burrough's Run at Creek Rd. (Rt. 82)	46	1.88	46	0.026	--	--	--
104011	Brandywine Creek	Footbridge in Brandywine State Park	45	2.88	45	0.071	--	--	--
104021	Brandywine Creek	Rd. 279 Bridge (USGS guage 014)	84	2.83	84	0.085	--	--	--
104051	Brandywine Creek	Smith Bridge	46	2.86	46	0.068	--	--	--
105031	White Clay Creek	Chambers Rock Rd. (Road 329) near Thompson	46	3.90	46	0.060	--	--	--
105151	White Clay Creek	DE Park Race Track (USGS gage 01479000), 35ft downstream	84	3.13	84	0.070	--	--	--
105171	White Clay Creek	McKee Lane in Newark	44	3.72	44	0.055	--	--	--
106021	Christina River	Rt. 141 Drawbridge, Newport (USGS tide gage 01480065)	45	2.05	45	0.086	--	--	--
106031	Christina River	Smalley's Dam Spillway	46	1.32	46	0.062	--	--	--
106141	Christina River	Rt. 72, Below Newark (USGS guage 01478000)	83	1.63	83	0.055	--	--	--
106191	Christina River	Rt. 273, Above Newark	46	2.30	46	0.028	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
106281	Christina River	Little Mill Creek at atlantic Avenue	46	1.12	46	0.031	--	--	--
106291	Christina River	Conrail Bridge (USGS tide gage 01481602) Up river from Port	69	2.27	69	0.095	--	--	--
107011	Red Lion Creek	Rt. 7	51	0.85	51	0.033	--	--	--
107031	Red Lion Creek	Rt. 9 Bridge	51	1.59	51	0.128	--	--	--
108021	Chesapeake & Delaware Canal	St. Georges Bridge	51	1.77	51	0.143	--	--	--
108111	Chesapeake & Delaware Canal	Lums Pond Boat Ramp	47	1.26	47	0.055	--	--	--
109041	Appoquinimink River	Rt. 13 Bridge below Odessa	52	1.72	52	0.177	--	--	--
109071	Appoquinimink River	Drawyer Creek, Rt 13	52	1.93	52	0.190	--	--	--
109131	Appoquinimink River	Noxontown Pond Overflow, Rd 38	52	1.61	52	0.068	--	--	--
109191	Appoquinimink River	Shallcross Lake Overflow, Dischrg Drawer Cr, Rd. 428	52	1.99	52	0.053	--	--	--
110011	Appoquinimink River	Road 463 East of RR Tracks	79	1.35	79	0.079	--	--	--
110031	Lower Blackbird	Rd 455, Blackbird Landing	52	1.54	52	0.212	--	--	--
110041	Lower Blackbird	Rt. 9 Taylors Bridge	52	1.36	52	0.182	--	--	--
111011	Dragon Run Creek	Rt. 9 Bridge	51	0.90	51	0.117	--	--	--
111031	Dragon Run Creek	Rt. 13 Bridge (flow at Rd. 407)	51	1.40	51	0.057	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
112021	Chesapeake Drainage System	Sewell Branch at Rd. 95	44	1.74	44	0.198	--	--	--
114011	Army Creek	Rt. 9 Below Llangollen Wells	49	1.16	49	0.172	--	--	--
114021	Army Creek	Army Creek @ S. DuPont Hgwy. (Rt. 13)	20	1.26	20	0.055	--	--	--
114041	Army Creek	Trib Army Crk. @ Rt. 13 near Airport Ind. Park	19	0.86	19	0.051	--	--	--
114051	Army Creek	Army Creek @ Rt. 13 near Rt. 40	15	1.17	15	0.014	--	--	--
201011	Smyrna River	Lake Como at US Route 13 Bridge	52	1.39	52	0.108	--	--	--
201021	Smyrna River	Rd. 137 Bridge, Mill Creek	51	1.60	51	0.115	--	--	--
201041	Smyrna River	Rt. 9 Fleming's Landing	52	1.52	52	0.207	--	--	--
201051	Smyrna River	Rd. 485 Bridge at Smyrna Landing	52	1.97	52	0.216	--	--	--
201161	Smyrna River	Rd. 38 Bridge, Providence Creek	52	3.12	52	0.040	--	--	--
202021	Leipsic River	Rt. 13 Bridge, Garrisons Lake	51	1.73	51	0.168	--	--	--
202031	Leipsic River	DE Rt. 9 Bridge	52	1.36	52	0.238	--	--	--
202191	Leipsic River	Upstream of Masseys Millpond at Rt. 15	52	3.09	52	0.118	--	--	--
204031	Little River	Rt. 9 Bridge	52	2.23	52	0.298	--	--	--
204041	Little River	Rt. 8 Bridge	52	1.64	52	0.108	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
205011	Saint Jones River	St. Jones at Bowers Beach	65	1.33	63	0.210	--	--	--
205041	Saint Jones River	3.5 miles from mouth at Barkers Landing	53	1.57	53	0.202	--	--	--
205091	Saint Jones River	Rt. 10 Bridge near DAFB	53	1.81	53	0.186	--	--	--
205151	Saint Jones River	Rd. 69 State College, Fork Branch	53	1.16	53	0.154	--	--	--
205181	Saint Jones River	Rt. 13 Alt. Moores Lake	53	3.60	53	0.067	--	--	--
205191	Saint Jones River	Silver Lake Spillway, Dover City Park	80	1.36	79	0.130	--	--	--
205211	Saint Jones River	Derby Pond at Rt. 13A	53	2.58	53	0.061	--	--	--
206011	Murderkill River	US Rt. 13 Bridge below Felton	85	3.12	84	-0.026	--	--	--
206041	Murderkill River	Browns Branch at Rt. 14 Bridge	49	2.82	49	0.041	--	--	--
206361	Murderkill River	McCauley Pond near spillway	49	3.81	49	0.067	--	--	--
206451	Murderkill River	Coursey Pond at Rd. 388 Bridge	49	3.15	49	0.081	--	--	--
206561	Murderkill River	Double Run at Rd. 371	48	2.81	48	0.105	--	--	--
207021	Choptank	Cow Marsh Creek at Rd. 208	43	1.50	43	0.063	--	--	--
207081	Choptank	Tappahanna Ditch at Rd. 222	46	1.14	46	0.090	--	--	--
207091	Choptank	Culbreth Marsh at Rd. 210	46	2.51	46	0.078	--	--	--
207111	Choptank	White Marsh Branch at Rd. 268	46	5.08	46	0.066	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
208021	Mispillion River	Rt. 1 Bridge	50	3.40	50	0.082	--	--	--
208061	Mispillion River	1.09 miles from mouth at lighthouse	65	1.22	64	0.170	--	--	--
208121	Mispillion River	7.48 miles from mouth, mouth of Fishing Branch	11	1.96	11	0.146	--	--	--
208181	Mispillion River	Abbotts Pond at Rd. 620	50	3.23	50	0.036	--	--	--
208211	Mispillion River	Rt. 36 Silver Lake	49	3.03	50	0.039	--	--	--
208231	Mispillion River	Beaverdam Branch, Rd. 384	50	4.45	50	0.041	--	--	--
301021	Cedar Creek	Rd. 212, Swiggetts Pond	50	2.92	50	0.022	--	--	--
301031	Cedar Creek	Rt. 1 Bridge	50	2.96	50	0.105	--	--	--
301091	Cedar Creek	Rt. 36 Bridge	50	1.23	50	0.161	--	--	--
302031	Marshyhope Creek	Rd. 308 Bridge	91	3.25	91	0.098	--	--	--
303011	Broadkill River	Ingram Branch, Savanah Ditch at Rd. 246	48	11.30	48	0.286	--	--	--
303021	Broadkill River	Ingram Branch at Rd. 248	48	8.36	48	0.238	--	--	--
303031	Broadkill River	Rt. 5 Bridge	84	3.02	83	0.045	--	--	--
303041	Broadkill River	Rt. 1 Bridge (Mainstem)	48	2.76	48	0.138	--	--	--
303051	Broadkill River	Red Mill Pond at Rt. 1	48	2.09	48	0.077	--	--	--
303061	Broadkill River	0.10 Miles From Mouth	69	1.12	68	0.101	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
303181	Broadkill River	Beaverdam Creek above Rd. 259, Hunters Mill Pond	47	5.05	46	0.063	--	--	--
303311	Broadkill River	Round Pole Branch at Rd. 88	48	4.14	48	0.063	--	--	--
303331	Broadkill River	Waples Pond at Rt. 1	48	2.97	48	0.024	--	--	--
303341	Broadkill River	Pemberton Branch at Rt. 30 above Wagamons Pond	47	4.47	47	0.023	--	--	--
304151	Nanticoke River	Buoy 66 (Conf DuPont Gut)	40	3.15	40	0.089	--	--	--
304191	Nanticoke River	Rd. 545 Mainstem Nanticoke	91	5.16	91	0.046	--	--	--
304311	Nanticoke River	Concord Pond overflow	45	2.19	45	0.030	--	--	--
304321	Nanticoke River	Williams Pond, below the pond at Rd. 535	45	3.21	45	0.064	--	--	--
304371	Nanticoke River	Clear Brook @ Cannon Rd. (Rt. 18)	41	3.14	41	0.122	--	--	--
304381	Nanticoke River	Bucks Branch at Rd. 546	44	9.67	44	0.048	--	--	--
304471	Nanticoke River	Rt. 13 Bridge	45	3.15	45	0.057	--	--	--
304591	Nanticoke River	Deep Creek above Concord Pond, near Old Furnace at Rd. 46	6	0.63	6	0.037	--	--	--
304681	Nanticoke River	Nanticoke River at Beach HWY (Ellendale Greenwood HWY) on east edge of Greenwood	45	3.66	45	0.052	--	--	--
304741	Nanticoke River	Deep Creek @ Old Furnace Rd. (Rd. 46)	39	1.89	39	0.028	--	--	--
307011	Broad Creek	Records Pond at Rt. 13	45	4.37	45	0.054	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
307031	Broad Creek	Broad Creek at Main Street in Bethel (Rd 493)	45	4.79	45	0.077	--	--	--
307081	Broad Creek	Trap Pond on Hitch Pond Branch @ Co. Rd. 449 or Trap Pond Rd	42	1.73	42	0.088	--	--	--
307171	Broad Creek	Horseys Pond 50 Yards Above Spillway 50% RB	45	3.14	45	0.064	--	--	--
307371	Broad Creek	Raccoon Prong @ Pepperbox Rd. (Rd. 66)	35	1.34	35	0.051	--	--	--
308031	Rehoboth Bay	Burton Pond, Rd. 24	47	1.20	47	0.018	26	2.6	1
308071	Indian River	Millsboro Dam Overflow	83	2.92	83	0.040	58	4.7	1
308091	Indian River	Pepper Creek at Rt. 26	48	2.12	48	0.088	33	8.0	1
308281	Indian River	Cow Bridge Branch Rd. 48	45	1.56	45	0.041	31	3.8	1
308341	Indian River	Swan Creek at Rd. 297	47	2.19	47	0.013	27	1.0	1
308361	Indian River	Blackwater Creek at Rd. 54	47	4.14	47	0.054	32	5.5	1
308371	Rehoboth Bay	Bundick's Branch at Rt. 23	47	2.85	47	0.039	30	3.2	1
309041	Iron Branch	Whartons Branch at Rt. 334 Bridge	48	2.69	48	0.053	--	--	--
309041	Iron Branch	Whartons Branch at Rt. 334 Bridge	48	2.69	48	0.053	--	--	--

Station	Watershed	Description	TN Count	TN LCL	TP Count	TP LCL	TSS Count	TSS LCL	TSS Status
311041	Buntings Branch	Buntings Branch at Rt. 54	48	3.40	48	0.079	--	--	--
313011	Pocomoke River	Rd. 419 Bridge	46	2.33	46	0.094	--	--	--
316011	Nanticoke River	Gravelly Branch at Rd. 525 Bridge	45	2.21	45	0.020	--	--	--
316031	Nanticoke River	Gravelly Branch at Deer Forest Road (Rd 565) on west edge of Redden State Forest Jester Tract	45	1.82	45	0.031	--	--	--

2019
Delaware Nonpoint Source Program
Delaware Department of Natural Resources and Environmental Control