Delaware's Five-Year Nonpoint Source Program Management Plan

Photo by David Haas

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The Delaware Nonpoint Source (NPS) Program is committed to addressing the issue of NPS pollution as it affects Delaware's numerous waterbodies. Efforts will include grant funding, education, outreach, and partnerships with other organizations working together to reduce NPS pollution in Delaware.

Reduction of NPS 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.

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List of Acronyms

AFO	Animal Feeding Operation
AMA	Agricultural Management Assistance
AMS	Agricultural Marketing Service
BMP	Best Management Practice
CAFO	Concentrated Animal Feeding Operation
CBP	Chesapeake Bay Program
CBWI	Chesapeake Bay Watershed Initiative
CCMP	Comprehensive Conservation and Management Plan
CIB	Center for the Inland Bays
CNPCP	Coastal Nonpoint Pollution Program
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
DACD	Delaware Association of Conservation Districts
DALPP	Delaware Agricultural Lands Preservation Program
DCMP	Delaware Coastal Management Program
DDA	Delaware Department of Agriculture
DelDOT	Delaware Dept. of Transportation
DFS	Delaware Forest Service
DFW	Division of Fish and Wildlife
DGS	Delaware Geological Survey
DGS	Delaware Environmental Observing System
DNMC	Delaware Nutrient Management Commission
DNMP	Delaware Nutrient Management Program
DNREC	Department of Natural Resources and Environmental Control
DNS	Delaware Nature Society
DSTC	Delaware State Technical Committee
DWS	Division of Watershed Stewardship
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ERES	Exceptional Recreational or Ecological Significance
FAB	Financial Assistance Branch
FOTG	Field Office Technical Guide
FSA	Farm Service Agency
FY	Fiscal Year
GAMN	General Assessment Monitoring Network
GRTS	Grant Reporting and Tracking System
KCD	Kent Conservation District
MS4	Municipal Separate Storm Sewer Systems
NCCD	New Castle Conservation District

NFWF	National Fish and Wildlife Foundation
NMP	Nutrient Management Plans
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NWA	Nanticoke Watershed Alliance
NWIS	National Water Information System
PCS	Pollution Control Strategy
PDE	Partnership for the Delaware Estuary
PLUS	Preliminary Land Use Service
RCPP	Regional Conservation Partnership Program
RMA	Risk Management Agency
SCD	Sussex Conservation District
STAC	Scientific and Technical Advisory Committee
SWM	Stormwater Management
SWQMP	Surface Water Quality Monitoring Program
TMDL	Total Maximum Daily Load
TSP	Technical Service Provider
UD	University of Delaware
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WHIP	Wildlife Habitat Incentives Program
WIAC	Water Infrastructure Advisory Council
WQL	Water Quality Limited
WRP	Wetland Reserve Program
WWTP	Wastewater Treatment Plant
WAMS	Watershed Assessment and Management Section

Executive Summary

Nonpoint source (NPS) pollution is a growing threat to Delaware's environment and public health. 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 the lakes, rivers, wetlands, coastal waters, and ground waters of Delaware. Unfortunately, unlike point source pollution, NPS pollution often cannot be traced to a singular source; indeed, sometimes it cannot be traced at all.

This type of 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 waterbodies and cause nuisance algae blooms, then these nutrients are deemed pollutants.

Delaware has been a leader in addressing NPS pollution for many years. The state already has many tools to achieve cleaner water through NPS management. Some tools are regulatory, but the vast majority are voluntary programs. Watershed efforts have addressed problems in many areas of the state. There are numerous examples of innovative approaches to management and funding. Yet, despite all the work accomplished to date, a majority of Delaware's waterways are considered impaired. Thus, a more urgent effort to control NPS pollution is required for waterways to comply with Delaware's surface water quality standards. Development and Delaware's ever-changing landscape are significant sources of the emerging NPS problems. Non-urban land uses are shrinking but continue to produce chronic problems.

Since its inception, Delaware's NPS Program has strongly supported and promoted the collaborative efforts of private organizations and state, federal, and local agencies needed to achieve NPS pollution 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 assistance, financial incentives and regulation.

The Delaware NPS Program will use goals and related measures of success to assess and report on Program effectiveness. The NPS Program has established a series of environmental goals related to the restoration of impaired waters, protection of high quality waters and wetlands, and control of NPS pollution. The established goals of the Delaware NPS Program include:

- Establish NPS reduction targets;
- Secure additional funding for NPS related project implementation;
- Develop Nine Element Watershed Plans for Delaware's priority watersheds (Section 3.6);
- Prioritize, target, and restore designated uses of impaired waters;
- Protect or restore highly valued resource waters;
- Identify and implement the most cost-effective NPS management measures to improve and protect water quality;
- Coordinate efforts of the various NPS agencies within the State;
- Identify interagency programmatic deficiencies toward control of nonpoint sources of pollution, cultivate agencies' program capabilities to address these deficiencies, and develop new programs as needed;
- Integrate the NPS Program with related management studies; and
- Through designated milestones, monitor effectiveness of BMPs and management strategies in improving and protecting both surface and groundwater quality.

Delaware’s NPS Five-Year Management Plan is a statewide look at protecting Delaware's natural resources from nonpoint source pollution. It is a collaborative effort of a wide range of entities. This plan reflects current efforts and creative, practical new ideas from all our partners and interested citizens. The recommendations focus on how we can improve existing efforts by stronger implementation, increased funding, or doing something new.

The NPS Five-Year Management Plan represents the unified effort of many agencies and individuals to outline the various goals, objectives, and strategies in Delaware’s priority watersheds. Many activities are currently taking place or are proposed for future implementation in order to achieve Delaware’s water quality goals. In addition, watershed scale source reduction goals and implementation milestones are described in detail.

1 Introduction

Vision

The Department of Natural Resources and Environmental Control (DNREC) 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.

Mission

It's the mission of the 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.

1.1 Purpose of the Document

Delaware's Nonpoint Source (NPS) Five-Year Management Plan is designed to describe a holistic approach to controlling and remediating NPS pollution. This 2019 Management Plan incorporates programmatic changes since the submission of the last Management Plan in 2014, identifies current efforts, and looks forward to further program improvements over the next five year horizon. It is the intention that this document will serve as living guidance for the activities undertaken by the respective programs.

The Delaware NPS Program is the designated lead entity in developing this plan. The plan will describe the Delaware's NPS Programs, which loosely includes volunteer programs carried out by the general public and all nonpoint efforts by federal, state, tribal, and local governments. To compile this information and evaluate the needs has been a monumental endeavor, partly due to the incredible depth and diversity of work that is underway. The landscape of nonpoint initiatives has changed dramatically throughout the period of preparation, especially as the State wrestles with the needs of protecting and restoring Delaware's important watersheds.

In a broad sense, this plan has two purposes. The first purpose of the document, and of highest priority, is to assess the particular needs of Delaware regarding NPS pollution. While federal NPS targets and strategies address pollutants, pollutant loads, and pollutant reductions on a broad scale, many NPS issues are unique to the Mid-Atlantic Region. This plan looks specifically at the additional needs of protecting Delaware's unique resources and identifies needs beyond the current capacity. The second is continued compliance with federal Environmental Protection Agency (EPA) mandates. Delaware is required to update its NPS Management Plan so it can continue to receive grant funds under Section 319 of the Clean Water Act (CWA). Guidance from the EPA was used to evaluate current NPS efforts and determine where program upgrades are needed.

The NPS Five-Year Management Plan is intended to be used as a guide by local, state, and federal agencies as they develop projects and implement NPS reduction programs over the next five years. This Five-Year Management Plan outlines the NPS issues to be addressed and actions to be implemented over the planning period of 2019 through 2024.

1.2 Background

The 1972 federal CWA established a national framework for protecting and improving water quality. The overall goal of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The result of the CWA led to water quality improvements through the treatment requirements for point source wastewater discharges.

The CWA of 1987, Section 319, required each State in the nation to develop a program to control NPS pollution to both surface and ground waters. NPS pollution has been defined as "pollution caused by diffuse sources" and as such: "is associated with agricultural, silvicultural, urban runoff, runoff from construction activities, etc." In practical terms, NPS pollution does not result from a discharge at a specific, single location (such as a pipe), but generally results from land runoff, precipitation, atmospheric deposition, or percolation. NPS pollution occurs when the rate at which pollutant materials entering water bodies or ground water exceeds natural levels (U.S. Environmental Protection Agency, 1987). Such pollution results in the alteration of the chemical, physical, biological, and radiological integrity of water.

On August 4, 1988, Delaware's original NPS Pollution Management Program was approved by the EPA, making it one of the first programs in the nation to comply with Section 319 of the CWA.

From 1989 to 1997, the NPS Program relied on the development and implementation of Best Management Practices (BMPs), 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 2018, 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 other miscellaneous sources. Examples of past activities include funding Kent and Sussex County Conservation District planner positions, stream restoration, manure relocation, and tree plantings. 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 through the development of this document to ensure NPS activities are focused within watersheds that have approved watershed plans. Delaware's NPS Program will establish this prioritized approach to better align itself with State strategies in an effort to better utilize funding and complement efforts targeting water quality protection or improvement projects within priority watersheds.

1.3 Authority

Section 319(h) of the CWA of 1987 authorized specific funding for the purpose of implementing approved State NPS management programs. In order to be eligible for 319 funding, a State must have an approved NPS assessment report and management program. Final grant awards are based on management program priorities to assure that the funds will be used effectively to achieve the objectives of the NPS program. Whenever possible, 319 grant funds will be focused in sub-watersheds where NPS control activities are likely to have the greatest positive impact and/or have watershed based plans. Funded restoration activities will be implemented using the most effective measures and practices available in order to achieve water quality improvements. Eligible types of management program implementation activities include: non-regulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects.

In addition, monitoring to assess the success of specific NPS implementation projects is considered an eligible implementation activity, whereas general NPS surface water assessment activities are not eligible. Each Fiscal Year (FY), the EPA oversees the administration of 319 grant funds based on Congressional appropriations and issues regional guidance by which the grant funds are to be managed and allocated. The availability of annual 319 grant funds presents the opportunity and challenge for States and the EPA to work together to implement successful NPS management programs.

1.4 Delaware NPS Program's Strategic Pillars

The Delaware NPS Program has four Strategic Pillars, derived from DNREC's Eight Strategic Priorities. The four pillars are: ensuring clean water, improving Delaware's preparedness, organizational development, and providing core services. NPS Programs Strategic Plan (Appendix A) provides more detail on the specific short- and long-term goals and strategies that will be utilized to meet the four Strategic Pillars listed below.

The Strategic Pillars were based on the Strategic Plan and the NPS Program's overall goals:

1. *Support local conservation activities*
   The NPS Five-Year Management Plan is based on the premise that water quality solutions must be developed and implemented with the support of citizens who have an acknowledged interest in the watershed. The Department plays an important role in supporting local conservation activities. DNREC has structured its NPS program to assist local watershed groups. Planning and monitoring staff are assigned to help specific watershed groups within the State's priority watersheds.
2. *Better understand the impacts of land use activities as they relate to water quality*
   Using watersheds, drainages, or even sub-drainages as a management area increases DNREC's ability to collect and utilize information to prepare comprehensive assessments of the State's priority watersheds. Comprehensive assessments explain the complex interactions between land use practices, pollutant loads, watershed processes, and water body conditions. DNREC will create standard procedures for pooling information from numerous sources on a watershed basis.
3. *Improve collaboration with other programs, agencies, and organizations*
   A watershed approach strengthens existing intra-agency and interagency coordination and targeting of resources.
4. *Improve connections between assessment, planning, and implementation*
   A watershed approach will accelerate the trend within DNREC to link assessment and planning information to implementation grants. Delaware's Total Maximum Daily Load (TMDL) development process requires an explicit numeric connection between sources, impacts, control measures, and reduction strategies. This can only give priority to grant applicants who show that grant submission activities are supported by an approved watershed plan.

2 About Delaware

2.1 Introduction

Delaware, the second smallest state in the nation, is 96 miles long and varies from nine to 30 miles wide. Delaware covers 2,489 square miles, including 1,955 square miles of land area and 534 square miles of water. Delaware is bordered by Pennsylvania (north), Maryland (west and south), and the Atlantic Ocean (east). New Jersey is northeast of Delaware, but the two States are separated by the Delaware River and the Delaware Bay. Delaware is divided into three unique counties: New Castle, Kent, and Sussex. The state capital, Dover, is located in the middle of Kent County.

2.2 Land Use and Population

Delaware's population is approximately 970,000, making it the 45th largest State in the United States. The population seasonally swells during the summer months as people flock to coastal Sussex County's popular beaches and attractions. Delaware's urban areas are concentrated in the northern New Castle County. Other urban areas of the state and municipalities tend to be in close proximity to the two main roadways – Route 1 and Route 13 (Figure 1).

In spite of a growing urban population, Delaware's agricultural community continues to show a strong presence (Figure 2). Delaware's farms produce a diverse array of commodity products, including poultry broilers, soybeans, corn, and milk. Manufacturing operations throughout the State produce various chemical compounds, food products, paper products, rubber and plastics products, primary metals, and printed materials. The state also has a small but resilient fishing industry focused on the crab and clam markets. Mining in Delaware is limited to sand and gravel operations with a few magnesium compounds.

2.3. Geography

The highest point in Delaware is only 450 feet above sea level in a mobile home park just west of Ebright Road in Delaware's northernmost county, New Castle. The lowest point in Delaware at sea level in the southernmost county, Sussex, at the shore where Delaware meets the Atlantic Ocean. The mean elevation of Delaware is 60 feet above sea level.

Delaware shares the Delmarva Peninsula with parts of Maryland and Virginia. Delaware's small size doesn't leave much room for major or varied land forms and most of the state lies on a low, flat coastal plain. In general, Delaware slopes down from a piedmont plateau in the north to a near sea level coastal plain in the east and south. Delaware is situated such that it is part of two major land regions: the Atlantic Coastal Plain and the Piedmont.

Atlantic Coastal Plain: The Atlantic Plain runs over 2,200 miles from Cape Cod along the eastern seaboard of the United States and around the Gulf of Mexico to the Mexico border. Except for a small area in the north, most of Delaware's land area is part of the Atlantic Coastal Plain. This land is flat and not very high. It rarely reaches more than 80 feet above sea level. The southern boundary of Delaware is comprised of nearly 30,000 acres of swampland

Piedmont: The Piedmont stretches southward from New Jersey to Alabama. Crossing the northern edge of Delaware, the Piedmont is about 10 miles wide at its widest point within the State. The Piedmont is marked by rolling hills. Delaware's highest point, located near Ebright Road, is located in the Piedmont region.

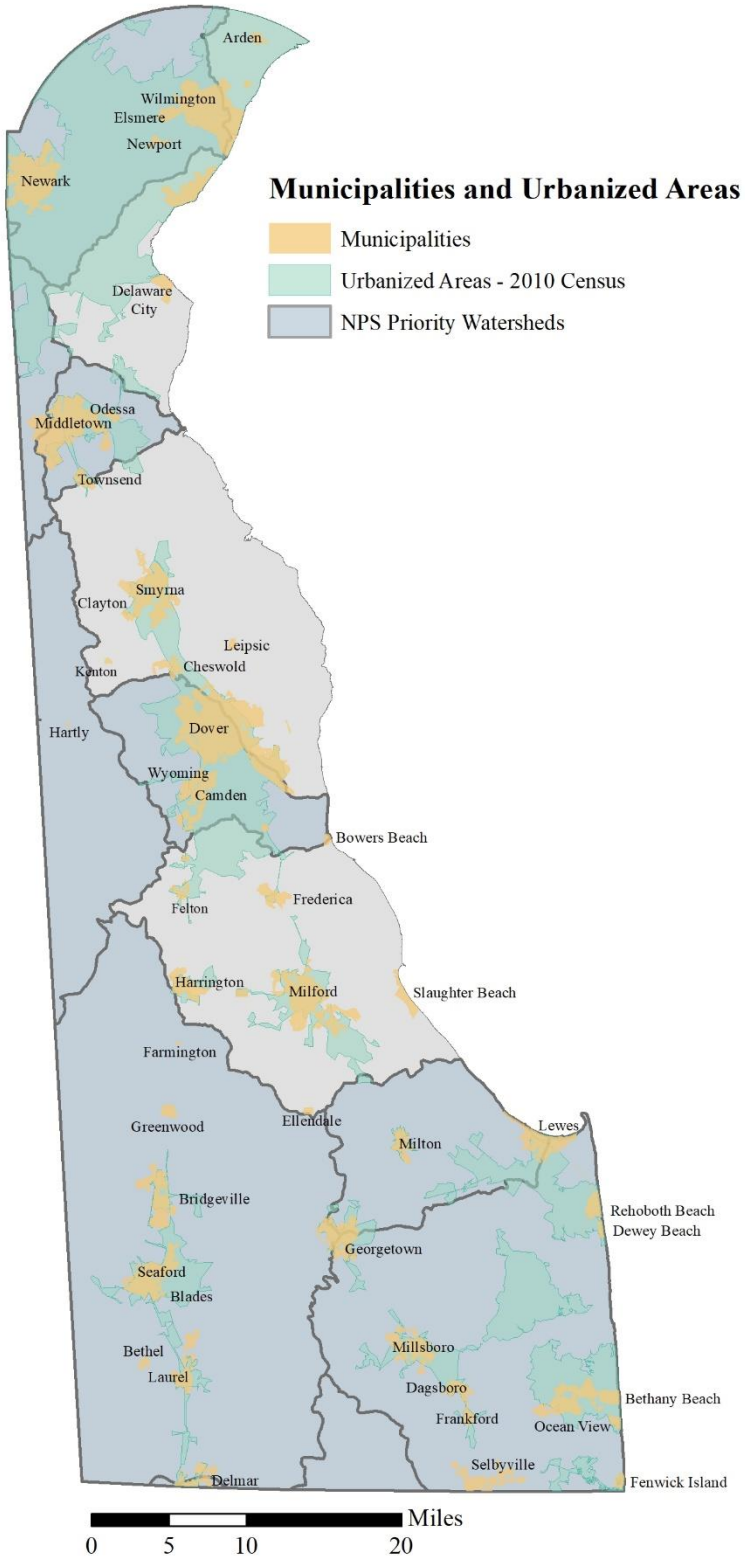


Figure 1. Delaware's urban areas and municipalities.

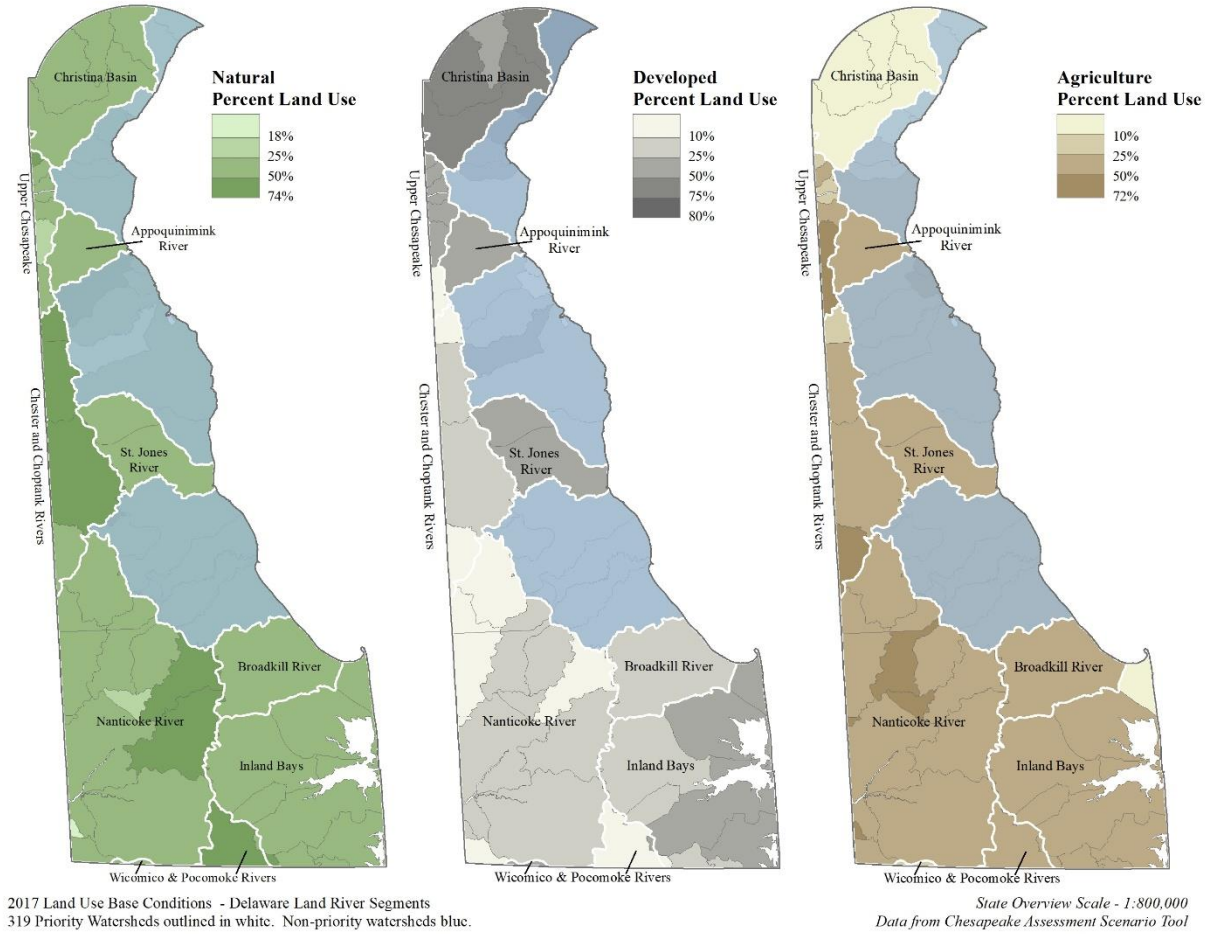


Figure 2. Each priority watershed has different percentages in agricultural, developed, and natural land uses.

2.4 Rivers and Streams

Delaware has classified more than 2,509 miles of rivers and streams and 2,954 acres of lakes and ponds using a rating system called for in the Federal CWA. The State has begun using EPA's Assessment TMDL Tracking and Implementation System (ATTAINS) tool to evaluate impaired waters. ATTAINS is an online system for accessing information about the conditions in U.S. surface waters. ATTAINS contains information on waters that are not supporting their designated uses, such as drinking water supply, recreation, and the propagation of fish, aquatic life, and wildlife. These waters are listed by the state as impaired under CWA Section 303(d). The database also tracks the status of TMDLs and actual TMDL reports.

Waterway designated uses serve as Delaware's water quality goals for specific watersheds. In order to protect those uses, a comprehensive set of chemical, biological, and habitat standards have been promulgated. Designated uses and standards are embodied in the state of Delaware Surface Water Quality Standards as amended on June 11, 2011.

The DNREC has found that 86% of Delaware's rivers and streams do not fully support swimming use and 94% do not fully support fish and wildlife use. Most of these waters do not meet the standards due to NPS pollution impacts.

2.5 Lakes and Ponds

Lakes and ponds in Delaware exhibit many of the same problems as rivers and streams. However, lakes and ponds also serve as "catch basins" for a variety of pollutants that are deposited from the land and air. Nutrient enrichment is an indicator that shows the tendency for lakes and ponds to accumulate pollutants. Nutrient enrichment can lead to excessive weed and algae growth, reduced water clarity, and lead to decreases in population of aquatic life and wildlife. DNREC has found that 41% of Delaware's freshwater lakes and ponds do not fully support the swimming use and 74% do not fully support the fish and wildlife use.

2.6 Wetlands

Wetlands have many important functions and values to society. They provide fish and wildlife habitat, help maintain water quality, and provide indirect socioeconomic values, such as flood and stormwater damage protection. With the implementation of federally mandated regulations, known as TMDLs, to reduce pollutants into water bodies, wetland preservation is considered one of the most important strategies for achieving the pollution reduction efforts necessary to meet water quality standards.

Wetlands comprise a significant portion of the water resources of Delaware, covering over 350,000 acres of the state (Figure 3). Throughout Delaware, a wide diversity of wetland types occur including both tidal and non-tidal wetlands. While some wetlands are directly connected or adjacent to other surface waters, such as salt marshes and floodplains, others occur as isolated areas surrounded by uplands, such as forested flats and the Delmarva Bays. Preserving the abundance, quality, diversity, and proportion of different types of wetlands in the landscape is essential to protecting the natural resources and waters of Delaware. Currently the state of Delaware is actively working in each of these areas to protect high quality wetland resources and restore degraded systems on the watershed scale.

2.7 Classified Uses

The state of Delaware Surface Water Quality Standards contains the following Designated Use categories:

- Public Water Supply;
- Industrial Water Supply;
- Primary Contact Recreation;
- Secondary Contact Recreation;
- Fish, Aquatic Life, and Wildlife;
- Cold Water Fish - Put and Take;
- Agricultural Water Supply;
- Exceptional Recreational or Ecological Significance (ERES) - applied to special state waters that are accorded a higher level of protection than other waters; and
- Harvestable Shellfish Waters.

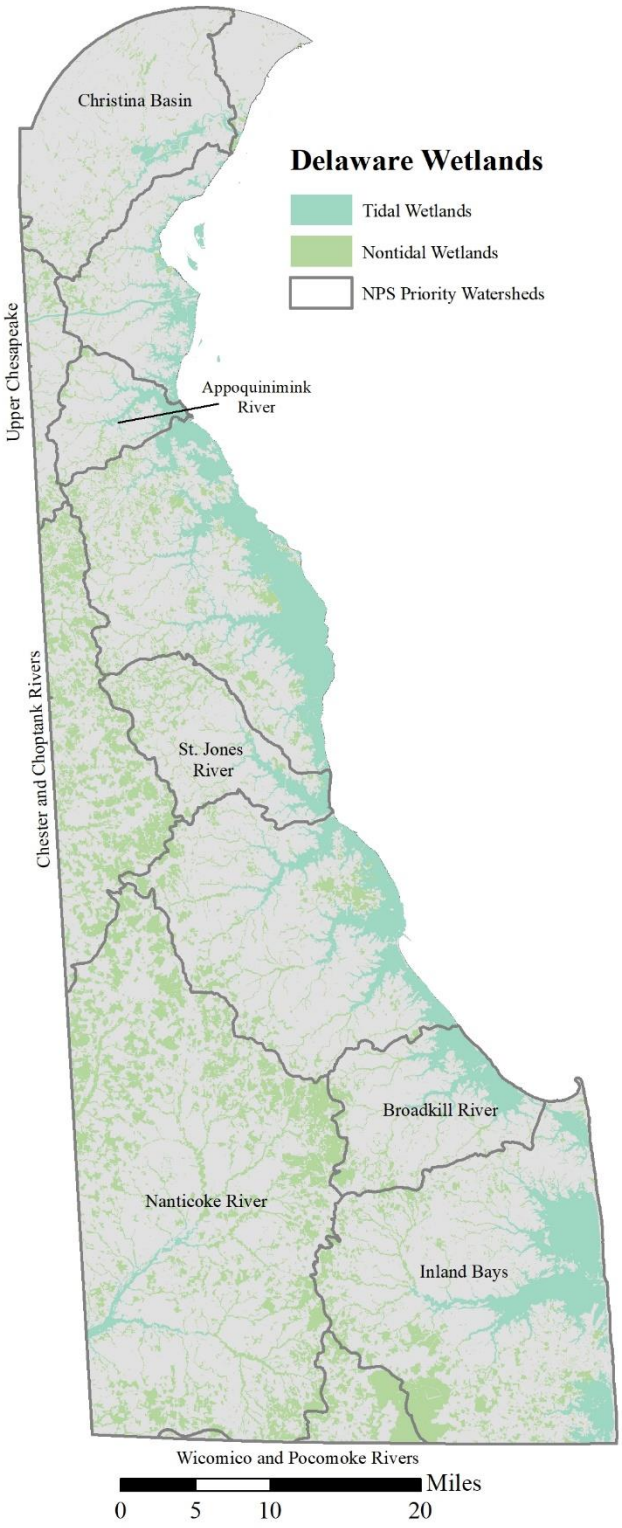


Figure 3. *Delaware's tidal and freshwater wetlands.*

3 Delaware's Water Quality

Water quality in Delaware has been monitored for more than 30 years by federal, state, academic, and citizen monitoring groups. Groundwater quality in much of the state has been highly affected by agricultural activities in addition to residential and commercial development, including on-site wastewater (septic) discharges.

The surface waters (rivers, streams, lakes, and ponds) have been routinely monitored for many years. Intensive monitoring was conducted prior to TMDL model development, and sampling continues on at least a monthly basis at several locations. Collected data from this monitoring has revealed both nitrogen and phosphorus enrichment in the rivers, streams, and ponds of Delaware. Although these nutrients are essential elements for plants and animals, their presence in excessive amounts can cause significant negative impacts to fish and other aquatic life.

3.1 Impaired Waters

Impaired waters 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.

More than 90% of Delaware's waterways are considered impaired. The state's list of impaired waters, filed with the EPA, includes 397 waterbodies and stream segments that suffer from 10 different impairments, the most common of which are pathogens and nutrients (nitrogen and phosphorus). Most impairment comes from nonpoint sources, which are harder to control.

3.2 Nutrient Enrichment

Eutrophication of surface waters is a natural process that takes place over hundreds or thousands of years, resulting from natural erosion and the breakdown of organic materials. Over these extended periods of time, many lakes and ponds under natural conditions would be expected to fill in with sediments and organic matter, eventually becoming marshes and meadows. Lakes and ponds in various stages of eutrophication are considered a natural feature of Delaware's environment. Activities linked to soil erosion, domestic waste disposal (on-site septic systems), and runoff can greatly increase the rate and amount of nutrients reaching lakes and ponds, accelerating the eutrophication process. Characteristic symptoms of nutrient enriched water bodies include murky green waters or nuisance plant growth. Delaware waters are generally considered to be negatively affected by nutrients (nitrogen and phosphorus).

3.3 TMDL Program Summary

Section 303(d) of the 1972 Federal CWA, as amended, requires states to develop a list of waterbodies that need additional pollution reductions beyond that provided by the application of existing conventional controls. These waters are referred to as "Water Quality Limited" (WQL) and must be periodically identified by the DNREC or the EPA.

WQL waters requiring the application of TMDLs are identified in a document commonly referred to as the "303(d) List." A TMDL is the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet water quality standards and thereby allow for designated uses, such as drinking water supply, swimming and fishing, or shellfish harvesting, to occur. A TMDL sets a limit on the amount of a pollutant that can be discharged into a waterbody such that water quality standards are met. A state's 303(d) List must be reviewed and approved by EPA by April 1st of every even-numbered year. Delaware is further required to develop TMDLs for all water quality limited waterbodies.

A full TMDL process determines the pollutants causing water quality impairments, identifies maximum permissible loading capacities for the waterbody in question, and assigns load allocations (TMDLs) to each of the different sources for each relevant pollutant, point and nonpoint, in the watershed.

The TMDL process is an effective and important tool for achieving water quality standards, but is time-consuming and labor-intensive. For this reason, TMDLs are currently pursued for high priority waters with the most severe water quality problems, including Delaware's Inland Bays, Nanticoke River, and the Appoquinimink River. These waters are typically affected by both point sources (e.g., sewage treatment plants, industrial facilities) and nonpoint sources (e.g., stormwater runoff from urban and agricultural lands).

It is Department policy to maintain water quality levels of surface waters within its jurisdiction to allow recreation, comply with public safety regulations, propagate and protect aquatic life, and encourage other beneficial water uses. Delaware currently has several waterbodies or segments thereof which carry the ERES designation. The factors that were considered in these designations and which will be considered in possible future ERES designations include the following factors:

1. Location (e.g., on federal lands such as national parks, national wilderness areas, or national wildlife refuges);
2. Previous special designations (e.g., wild and scenic river);
3. Existing water quality (e.g., pristine or naturally-occurring);
4. Ecological value (e.g., presence of threatened or endangered species during one or more life stages);
5. Recreational or aesthetic value (e.g., presence of an outstanding recreational fishery); and
6. Other factors that indicate outstanding ecological or recreational resource value (e.g., rare or valuable wildlife habitat).

The state of Delaware implemented an antidegredation policy. Antidegredation refers to policies and procedures designed to prevent or minimize the reduction of water quality below existing levels.

The Delaware NPS program feels that maintaining water quality from further degradation and/or ERES status designation is a positive and achievable goal. To "hold the line" on water quality should be as important as repairing water quality limited waters. Resources should not be taken away to neglect those waters that are environmentally significant.

3.4 Pollution Control Strategies

Since the early 1990's, EPA has urged states to adopt a watershed approach to water quality management. EPA issued a new TMDL guidance document in 1991 encouraging the development of TMDLs on a watershed basis. Delaware has implemented a watershed approach that includes the integration of the TMDL monitoring and assessment program for each watershed in accordance with DNREC's Whole Basin Management Program Schedule (Section 6). Delaware has completed final TMDLs for the Appoquinimink River, Nanticoke River, and Inland Bays (Indian River/Bay and Rehoboth Bay). Implementation of TMDL regulations will be achieved through development and implementation of Pollution Control Strategies (PCSs).

A PCS for reducing pollution to meet these limits will be developed for each watershed. An important step following the setting of new pollution limits is developing strategies to meet those limits. Delaware is obligated to write a formal PCS that includes numerous ways to reduce pollution levels.

The PCS includes a combination of multiple pollution-reducing methods. Methods could include:

- The removal of point source discharges from waterways;
- Better management of fertilizer and manure;
- Replacement of failing septic systems with environmentally safer sewer systems; and
- Protective agricultural practices, such as the planting of vegetative buffer strips between cropland and waterways.

A PCS will specify the necessary pollutant load reductions that need to occur such that loadings will be less than or equal to the TMDL. A PCS is likely to include the following elements:

- Identification of measurable environmental and programmatic goals;
- Identification of sources of water pollution and the relative contribution of sources;
- Implementation of pollution control and natural resource restoration measures (e.g., permit revisions, implementation of best management practices, and buffer strips) to achieve clean water and other natural resource goals, especially those measures which will achieve multiple environmental and public health benefits;
- Schedules for implementation of needed restoration measures and identification of appropriate lead agencies to oversee implementation, maintenance, monitoring, and evaluation;
- Implementation of TMDLs for pollutants exceeding state water quality standards;
- Implementation of source water assessment and protection programs;
- Needed monitoring and evaluation to assess progress towards achieving environmental and programmatic goals;
- Funding plans to support the implementation and maintenance of needed restoration measures;
- A process for cross-agency (federal, state, interstate, and local) coordination to help implement watershed restoration action strategies; and
- A process for public involvement.

Reductions are to be achieved through currently voluntary and regulatory actions. However, TMDLs will provide watershed-wide pollution reduction targets which DNREC (and EPA) will be legally obligated to meet. This obligation will require new approaches for addressing point and nonpoint sources of pollution.

3.5 Chesapeake Bay Watershed Implementation Plan

Delaware is among seven Chesapeake Bay Watershed jurisdictions, including Maryland, Virginia, West Virginia, Pennsylvania, New York, and the District of Columbia, committed to a federal-state initiative to develop plans to reduce pollution and help restore the water quality of the Bay and its tidal waters by 2025.

The Bay and many streams within the Bay's watershed suffer from excess pollution and must be cleaned up. The EPA is leading the effort by developing a TMDL for nutrients and sediment for the Bay and its tidal branches. Delaware has already established state TMDLs for impaired waters in the Chesapeake, but in many cases, the EPA TMDL will call for additional reductions.

As part of the TMDL, each jurisdiction is required to develop a Watershed Implementation Plan (WIP) that details how load goals will be achieved and maintained into the future. This work is being done in three phases. Draft Phase I WIPs were due to EPA on September 1, 2010, and final plans were turned in on November 29, 2010. Phase II WIPs in draft and final forms were due to EPA by December 15, 2011, and March 30, 2012, respectively. Draft Phase III WIPs were due to the EPA by April 12, 2019. Final Phase III WIPs must be received by the EPA by August 9, 2019. With each successive WIP, the detail of load goals and actions to achieve those goals will become increasingly more specific. Delaware will develop milestones every two years to support implementation of the WIPs. The NPS Five-Year Management Plan supports this effort and includes more detailed steps to achieve the TMDL goals.

Delaware's Phase I WIP was used to develop the EPA's Chesapeake Bay TMDL in 2010. The TMDL developed was a Bay partnership effort who asked EPA to write the TMDL. Phase II WIP work occurred in 2011 and early 2012. The Phase II WIP provided additional details about the partner organizations who will implement portions of the WIP, specified when actions will occur, and identified the resources necessary for success. Additionally, some of the implementation goals identified in the Phase I WIP were pared down to a smaller scale, such as at the County level. The Phase II plan established implementation goals for 2017, when 60% of the necessary nitrogen, phosphorus, and sediment goals must be achieved by all Bay jurisdictions.

Delaware's Phase III WIP outlines actions and actions through which Delaware will achieve the Bay TMDL and additional EPA Expectations. The Phase III WIP addresses the EPA's expectations (i.e., climate change, local engagement, co-benefits, accounting for growth, and the Conowingo Dam), provides revisions to available programs and funding sources for BMP implementation, and incorporates updated BMP implementation levels that meet Delaware's 2025 nutrient planning targets.

Work on the Phase III WIP was led by an Interagency Workgroup made up of representatives from DNREC, Delaware Department of Agriculture (DDA), Delaware Department of Transportation (DelDOT), Office of State Planning Coordination, County Conservation Districts, U.S. Department of Agriculture (USDA) agencies, U.S. Geological Survey (USGS), and other stakeholders, such as representatives from the farming and development communities. Nine subcommittees were formed for the Phase I and Phase II WIPs to address: agriculture, stormwater, wastewater, land use and comprehensive plans, restoration, public lands, funding, information technology, and communications. The Phase III WIP subcommittees were condensed to streamline the development process: agricultural sector, developed sector, and communications. Delaware submitted the Final Phase III WIP to EPA in August 2019.

3.6 Delaware NPS Program Watershed Plan Requirements

To ensure that projects funded with CWA Section 319 dollars make progress towards restoring or protecting waters impaired by NPS pollution, EPA requires watershed-based plans that are developed or implemented with Section 319 funds to address 303(d) listed waters. These plans must include at least the elements listed below. Where the watershed-based plan is designed to implement a TMDL, these elements will help provide reasonable assurance that the NPS load allocations identified in the NPS TMDL will be achieved. However, even if a NPS TMDL has not yet been completed, EPA believes that watershed plans that include the following nine elements (Nine Element Watershed Plans) are critical to ensure that public funds intended to address impaired waters are used effectively:

a. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in this watershed-based plan (and to achieve any other watershed goals identified in the watershed-based plan), as discussed in item (b) immediately below. Sources that need to be controlled should be identified at the significant subcategory level with estimates of the extent to which they are present in the watershed (e.g., X numbers of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded streambank needing remediation);
b. An estimate of the load reductions expected for the management measures described under paragraph (c) below (recognizing the natural variability and the difficulty in precisely predicting the performance of management measures over time). Estimates should be provided at the same level as in item (a) above (e.g., the total load reduction expected for dairy cattle feedlots, row crops, or eroded streambanks);
c. A description of the NPS management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above (as well as to achieve other watershed goals identified in this watershed-based plan), and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan;

d. An estimate of the amounts of technical and financial assistance needed associated costs, and/or the sources and authorities that will be relied upon, to implement this plan. As sources of funding, States should consider the use of their Section 319 programs, State Revolving Funds, USDA's Environmental Quality Incentives Program (EQIP) and Conservation Reserve Program (CRP), and other relevant federal, state, local and private funds that may be available to assist in implementing this plan;
e. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented;
f. A schedule for implementing the NPS management measures identified in each plan that is reasonably expeditious;
g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented;
h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised; and
i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) immediately above.

The Delaware NPS program develops watershed plans that fulfill the EPA's nine required elements for the restoration of impaired waters. Implemented projects go through a process of review and prioritization based upon watershed opportunities; inclusion within a watershed plan that outlines goals, objectives, and strategies to address priority issues; implementation of the plan; and tracking progress. These plans are watershed-based and stakeholder-driven, focusing on NPS pollution reductions and restoring water quality to address specific impairments.

As the Delaware NPS Program strategy was evolving during the development of the PCSs and the Chesapeake Bay WIP, many of these documents do not directly fulfill the obligations of the EPA Nine Element Watershed Plan requirements. As such, separate Watershed Management Plans have been developed, by the NPS Program, using the above documents as the foundation for Plan development. In most cases, further clarity or detail was added to ensure the nine elements were adequately fulfilled. In other instances, such as the Chesapeake Bay Phase III WIP, the scale was further refined so details could be broken out on a refined and smaller watershed scale.

4 Water Quality Impairments

Pollutant loads to surface waters fall into two categories: point sources and nonpoint sources. A point source is a specific source, such as an effluent pipe. Specifically for Delaware, point sources include wastewater treatment plants (WWTPs). NPS pollution is more diffuse and harder to track. In Delaware, NPS pollution occurs as a result of using land for agriculture or urban development, and includes runoff from fertilizers and leaching from septic systems. In these cases, nitrogen and phosphorus enter surface waters through groundwater discharges or overland runoff. The below sections identifies the common sources of NPS pollution in Delaware.

4.1 Agriculture

Delaware's 2,300 farms encompass approximately 530,000 acres of land (39% of the state's total land area). The poultry industry, the primary agricultural segment in the state, produces approximately 215 million broiler chickens annually. Sussex County is the single largest meat chicken producing county in the U.S., and Delaware ranks 11th nationwide in broiler and other meat-type chicken production. Animal production in Delaware also includes swine, dairy, beef cattle, and horses. Other agricultural products in Delaware include field crops - corn, soybeans, and small grains - and fruits and vegetables.

Agriculture has been identified as a NPS of pollution. Improvements in agricultural practices can help reduce NPS pollution; however, it is important to note that most of the NPS pollutants associated with agriculture cannot be completely eliminated for many reasons. For example, agricultural operations are inherently "leaky" systems, meaning that it is impossible to ensure that all of the nutrients applied to fertilize crops will be taken up in plants or retained in soils. Nitrogen efficiency, the percent of applied nitrogen that ends up in the harvested crop, can be as low as 40%. In addition, agricultural activities also impact water quality through physical disturbances caused by livestock or equipment.

It is important to note that many of the pollutants associated with agricultural production likely have additional sources, such as neighboring urban areas. A comprehensive strategy addressing NPS inputs must consider these sources as well.

The goal of this plan is to balance the economic realities of agricultural production with minimal negative environmental impacts. This goal can be achieved through a program of education, technical assistance, financial incentives, research and demonstration, and regulation. The following section identifies the important NPS pollutants from agriculture and the associated reduction strategies to address them.

4.2 Construction

The principle effect of land development activities on the erosion process is the exposure of disturbed soils to precipitation and surface stormwater runoff. Shaping of land for construction or development purposes alters the soil and soil cover, often detrimentally affecting on-site drainage patterns and eventually the off-site stream flow characteristics. Protective vegetation is reduced or removed, excavations are made, topography is altered, and the disturbed soil material is stockpiled, often without vegetative cover. These disturbances make the soil more susceptible to the actions of wind and water. Uncontrolled erosion from these areas often causes considerable environmental damage, such as surface water pollution, channel and reservoir siltation, and streambank erosion.

Although streams and rivers naturally carry sediment loads, erosion from land use, such as agriculture and construction sites, can elevate these levels to well above those in undisturbed watersheds. Soil erosion rates from construction activities can be 10 times that of crop land and 1000 times that of natural forest land erosion. Sediment is the largest NPS pollutant, by volume, in the US.

The biological damage from sediment itself includes clogging of fish gills, smothering bottom dwelling aquatic life, and reducing habitat by filling in pools. Fine soil particles like silt and clay stay suspended in the water column for much longer periods of time, reducing light penetration, abrading sensitive organs of aquatic animals, and reducing dissolved oxygen levels. In addition, the conveyance of sediment into a water body via stormwater runoff is the primary pathway for delivering other NPS pollutants, such as nutrients and metals.

Excessive quantities of sediment can cause costly damage to waters and to private and public lands. Obstruction of stream channels and navigable rivers by deposited sediment reduces their hydraulic capacity which, in turn, causes an increase in flood frequencies and costly property damage. The aesthetic attraction of many streams, lakes, and reservoirs used for swimming, boating, and fishing has been seriously impaired or destroyed. Many local and regional economies rely on dollars brought in by these recreational activities. Sediment also fills drainage channels and plugs culverts and storm drains necessitating costly dredging and maintenance.

Delaware's Sediment and Stormwater Program prioritizes the prevention of existing flooding and reducing further decline of water quality associated with new land development or other construction. The Sediment and Stormwater Program implements regulations requiring erosion and sediment control during construction, as well as post-construction stormwater quantity and quality control. These regulations cover the entire development process for any proposed land development project that disturbs more than 5,000 square feet of land, unless specifically exempted. The regulations have been revised since the previous NPS Five-Year Management Plan (2014) and will go into effect in February 2019. They now focus on new development and redevelopment projects and emphasize runoff reduction practices.

Projects that are greater than one acre must be permitted through the National Pollutant Discharge Elimination System (NPDES). To comply with the regulations, projects must employ stormwater BMPs as part of a Sediment & Stormwater Management Plan to address water quality and water quantity impacts. These plans are reviewed by local delegated agencies and are only approved if they meet minimum statewide regulatory requirements.

4.3 Urban Runoff

Rainfall events are key in the natural hydrologic cycle. However, in highly developed areas with greater impervious cover, rainfall results in flooding, erosion, and contamination. As the water moves over these impervious surfaces, such as rooftops, driveways, roads, and parking lots, it picks up pollutants, such as fertilizers, containing excess amounts of nitrogen and phosphorus, sediment, oil from parking lots, trash, and other potentially harmful contaminants.

Many areas of Delaware were developed prior to the implementation of sediment and stormwater regulations (pre 1990). These residential, commercial, industrial, and institutional developments were constructed without stormwater management (SWM) facilities and with little thought to control NPS pollution. An interim period in the state's regulatory history resulted in some development with rudimentary SWM basins intended to address flooding issues, but their effectiveness for even that purpose is questionable. To date, very few of these sites have been identified and even fewer have received attention. Even some developments that were constructed under the current regulations have water quality and quantity problems due to the lack of maintenance. For these reasons, addressing NPS pollution from existing development is just as critical as new construction.

Delaware's revised Sediment and Stormwater Regulations went into effect in February 2019 and require erosion and sediment control during construction and post-construction stormwater quantity and stormwater quality control. All new projects developed statewide under the revised Sediment and Stormwater Regulations are required to reduce their stormwater runoff from all storms up to the 99th percentile precipitation to an equivalent open space condition up to a maximum 1 inch of runoff management. Projects that are not able to use infiltrating or recharge practices must provide 48-hour detention of the equivalent stormwater runoff volume. Redevelopment projects are required to reduce their annual stormwater runoff and resultant pollutant loads to an equivalent of "15% of the existing effective imperviousness." This acts as a surrogate for more costly urban retrofits. Projects that cannot meet the minimum runoff reduction target are required to provide an offset. The revised regulations emphasize runoff reduction practices, which are expected to be adequate for minimizing new stormwater loads.

4.4 Hydrologic/Habitat Modification

One form of hydromodification is channelization or channel modification. These terms (used interchangeably) describe river and stream channel engineering undertaken for the purpose of flood control, navigation, drainage improvement, and reduction of channel migration potential. Activities such as straightening, widening, deepening, or relocating existing stream channels and clearing or snagging operations fall into this category. These forms of hydromodifications typically result in more uniform channel cross sections, steeper stream gradients, and reduced average pool depths. The term flow alteration describes a category of hydromodification activities that result in either an increase or a decrease in the usual supply of fresh water to a stream, river, or estuary. Flow alterations include diversions, withdrawals, and impoundments. In rivers and streams, flow alteration can also result from undersized culverts, transportation embankments, tide gates, sluice gates, and weirs.

Channel modification activities have deprived wetlands and estuarine shorelines of enriching sediments, changed the ability of natural systems to both absorb hydraulic energy and filter pollutants from surface waters, and caused interruptions in the different life stages of aquatic organisms (Sherwood et. al, 1990). Channel modification activities can also alter instream water temperature and sediment characteristics, as well as the rates and paths of sediment erosion, transport, and deposition. A frequent result of channelization and channel modification activities is a diminished suitability of instream and riparian habitat for fish and wildlife. Hardening of banks along waterways has eliminated instream and riparian habitat, decreased the quantity of organic matter entering aquatic systems, and increased the movement of NPS pollutants from the upper reaches of watersheds into coastal waters.

Channel modification projects undertaken in streams or rivers to straighten, enlarge, or relocate the channel usually require regularly scheduled maintenance activities to preserve and maintain completed projects. These maintenance activities may also result in a continual disturbance of instream and riparian habitat. In some cases, there can be substantial displacement of instream habitat due to the magnitude of the changes in surface water quality, morphology and composition of the channel, stream hydraulics, and hydrology.

Excavation projects can result in reduced flushing, lowered dissolved oxygen levels, saltwater intrusion, loss of streamside vegetation, accelerated discharge of pollutants, and changed physical and chemical characteristics of bottom sediments in surface waters surrounding channelization or channel modification projects. Reduced flushing, in particular, can increase the deposition of finer-grained sediments and associated organic materials or other pollutants.

The resulting changes to the distribution, amount, and timing of flows caused by flow alterations can affect a wide variety of living resources. Where tidal flow restrictors cause impoundments, there may be a loss of streamside vegetation, disruption of riparian habitat, changes in the historic plant and animal communities, and decline in sediment quality. Restricted flows can impede the movement of fish or crustaceans. Flow alteration can reduce the level of tidal flushing and the exchange rate for surface waters within coastal embayments, with resulting impacts on the quality of surface waters and on the rates and paths of sediment transport and deposition.

4.5 Septic Systems

Septic systems also contribute high amounts of nutrients in Delaware. From research done in the Nanticoke River watershed, a high priority watershed, a notable amount of nitrogen loading from septic systems was identified. Since the soil type and water-table depths in the Nanticoke River watershed are similar to much of Delaware, similar nutrient loads can be predicted throughout the state. Raw or inadequately treated sewage is also a severe contributor to the declining health of many Delaware watersheds. This sewage contains pathogens, which are disease-causing bacteria and viruses. The potential daily pathogen output from one person's untreated sewage can equal that of treated sewage from hundreds to even thousands of people, depending on the level of treatment.

DNREC's Groundwater Discharges Section revised the Regulations Governing the Design, Installation and Operation of On-Site Wastewater Treatment and Disposal System (OWTDS) in 2014 to ensure that local water quality is maintained and/or local TMDLs are complied with to address anticipated, new or increased nutrient loads from additional OWTDSs. Delaware's OWTDS regulations go above and beyond the recommendations identified in EPA's National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems. The design and level of treatment requirements in the 2014 OWTDS regulations are more stringent than the EPA recommendations.

5 The Watershed Approach

Water quality restoration requires dozens of individual decisions and actions. To restore and protect water quality, people not only have to change the way they do things, they often have to change the way they think about the land, water, and the world around them. Most of the time, an individual land owner's actions won't have a measurable impact on water quality (unless it is a large landowner in a small watershed). It is often frustrating for landowners to make extra investments in soil and water conservation measures while their neighbors do little or nothing. For 25 years, NPS programs had little quantifiable impact on water quality because individual efforts were dispersed across many watersheds.

The NPS Program's approach will rely on partnership organizations and grassroots groups to develop voluntary approaches to restoring water quality. This approach emphasizes local watershed planning and increased collaboration between federal, state, tribal, and local governments, the public, and the private sector. Managing water resource programs on a watershed basis makes sense for the community, the state, and the environment. Thus, this watershed-based approach enables communities to develop water pollution solutions that incorporate local economic and environmental concerns.

Local watershed planning and project implementation relies on the knowledge, wisdom, and experience of farmers, foresters, recreationists, and public employees who understand the watershed. When local people are involved in developing watershed plans, they have a vested interest in its success. Bringing citizens together to proactively address issues reduces conflicts. As a critical mass of the community commits to the plan, watershed protection becomes a community value. Therefore, the watershed approach is well suited to Delaware's rural and urban mix, where there is a strong historic tradition of developing community responses to local problems.

A coordinated watershed approach allows DNREC to leverage its resources through cooperation with other government agencies, private groups, and volunteers in monitoring, data collection, and water quality restoration. Broad-based collaboration and communication also prevent the duplication of efforts. Because many state and federal agencies (EPA, Farm Service Agency (FSA), and NRCS) fund programs on a watershed basis, this approach may increase Delaware's funding for watershed projects.

5.1 Watershed Prioritization

When resources are limited, it is often appropriate to prioritize where those resources should be directed to have the best chance of obtaining desired goals. Given the NPS Program's watershed approach to addressing NPS pollution problems, it makes sense to consider prioritizing watersheds for receipt of limited program resources. This is an important time to consider prioritizing watersheds for NPS Program assistance for a variety of reasons:

- The NPS Program identifies watershed prioritization as a critical tool, not only for the NPS Program, but for the watershed restoration/protection activity as a whole;
- Federal, state, and local financial resources for watershed protection and restoration efforts continue to decline; and
- Recent NPS Program emphasis on developing watershed plans for priority watersheds throughout Delaware. Much more detail is now known about NPS problems and their significance in particular watersheds, as well as the methods and costs of addressing many of these problems.

The following discussions address the concepts of identifying priority watersheds in Delaware. The process facilitates the designation of priority watersheds for overall focus, but allows for deviation from the priority designations for specific projects and/or actions with appropriate reasons. For instance, the NPS Program may designate certain watersheds as priorities for overall program focus, yet have another watershed where it might be very important to have a small scale and specific project plan developed (including BMP implement efforts, monitoring, etc.). If the reasons for doing work in that watershed were appropriate, justified, and can be accomplished under General Program funding, the work would not be precluded from being done just because it was not one of the priority watersheds. However, the priority watersheds would generally receive increased program attention over watersheds that were not priority watersheds.

5.2 State-Level Priority Watersheds

The NPS Program recognizes the benefits of distributing resources broadly in an effort to build local capacity and encourage partner efforts to restore and protect Delaware watersheds. In many cases, small investments can serve as seed money or catalysts for larger efforts with multiple benefits. Additionally, small investments to state-sponsored projects provide excessive match opportunities that can leverage additional funding in the same watershed on projects where such match may not exist. The NPS Program also acknowledges the benefits of targeting resources to simultaneously correct multiple threats in a single watershed. This approach may provide the best opportunity to obtain measurable on-site improvements in water quality.

There are a variety of issues that need to be considered when deciding which approach, or combination of approaches, will provide the best potential for protecting or restoring water quality throughout Delaware, including the following:

- Limited state and federal resources;
- Varying levels of local interest and participation;
- A wide spectrum of existing water quality conditions;
- Differences in the complexity and magnitude of water quality issues; and
- Specific local, state, and federal goals for many watersheds.

As a result, priorities are needed to not only guide where protection and restoration resources will be directed in the future, but to help decide how those resources will be provided. Again, it is important to note that watershed prioritization will not necessarily preclude conducting work in non-priority watersheds, but it will help focus overall efforts of the NPS Program.

Waters on the 303(d) List (Section 3.3) are always of high priority for implementation of comprehensive watershed projects and restoration activities. These projects are expected to improve water quality, particularly those with action plans that include all the components necessary for approval as voluntary TMDLs.

Presently there is a robust number of ecological metrics and fewer stressor and social metrics. The Program intends to further evaluate additional factors, including the following, to determine if usable metrics can be developed for them at the 8-digit, 10-digit, and/or 12-digit HUC scales:

- Ability to show water quality improvement;
- Water quality monitoring data;
- Uniqueness of a particular water body type in specific geographic areas of the state (i.e. water body with significance of the resource);
- Recreational use of the water body;
- Importance of the water body to the state;
- Importance of the water body to the local community;
- Local community interest and their ability to coordinate and implement protection or restoration actions;
- Type and number of other state and federal agencies currently participating, or anticipated to participate, in protection or restoration actions;
- Rate of ongoing land development and urban sprawl in a watershed, as well as the status and effectiveness of local programs underway to address these issues;
- Financial resources available;
- Technical resources available; and
- Geographic distribution of priority watersheds.

5.3 NPS Program Priority Watersheds

NPS Program priority watersheds include any watershed that has an EPA approved Nine Element Watershed Plan. Each watershed plan also prioritizes water bodies, and because each watershed plan is specific and unique, the priorities may be unique as well. The prioritized waters within each watershed plan will take precedence. Watershed plans can be found here.

Delaware's involvement in the Chesapeake Bay WIP (Section 3.5) has led the NPS program to mimic their Nine Element Watershed Plans after the WIP in order to achieve consistency of water quality improvement goals state-wide. On May 12, 2009, President Obama signed Executive Order 13508, placing increased focus and heightened emphasis on Chesapeake Bay restoration. In addition, draft legislation to reauthorize the Chesapeake Bay Program (CBP), calls for increased measures from federal, state, and local governments. If the state does not meet two-year milestones, then there are potential federal actions EPA can impose. Two-year milestones under the Chesapeake Bay TMDL accountability framework used to assess progress toward restoration goals while allowing jurisdictions to flexibly adapt their WIPs to meet those goals. As such, the sub-watersheds of the Chesapeake Bay will have the highest priority for NPS Program activity.

The next state-level priority watershed is the Little Assawoman Watershed located in the Inland Bays/Atlantic Ocean Basin. The high recreational use and economic impacts of this watershed on Delaware's tourism makes it an important priority watershed.

All other watersheds with approved Nine Element Watershed Plans will be considered for implementation of NPS activities as warranted.

5.4 Priority Pollutants

In addition to prioritizing specific Delaware watersheds, issues or pollutant categories are also highlighted. Nutrients and sediments are the major pollutants of concern throughout the State. Nutrients ultimately cause reductions in fauna abundance and diversity. Boating, fishing, and swimming are inhibited as a result of excessive plant growth. Sediments also affect fauna and flora populations due to increased turbidity and sedimentation of waterbody floor habitat. Cost is incurred when navigable waters must be dredged to remove sediment.

5.5 Approved Watershed Plans

The watershed approach is most effective when activities are conducted in a collaborative, partnership-driven effort. This coordination is often best provided through a comprehensive Watershed Plan that is developed and implemented jointly by interested and/or affected stakeholders. Consequently, the NPS Program addresses NPS issues primarily through watershed-specific Watershed Plans. The intent of NPS Program approved Watershed Plans is to define all water quality issues and threats within the priority watershed and to recommend specific BMP implementation actions to address those problems. Details of the plan must address priorities, responsible parties, costs, and schedules in order to restore degraded waters or protect priority watersheds. The NPS Program approves watershed plans using EPA's defined Nine Elements of Watershed Planning as guidance. Watershed Plans must include all nine elements as defined the federal CWA Section 319 program. These elements are described in the *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* and in Section 3.6.

Using the above stated criteria, the NPS Program approval process allows activities identified in a Nine Element Watershed Plan to be eligible for funding consideration under the federal Section 319 program in the following watersheds (Figure 4):

- Appoquinimink River
- Broadkill River
- Chester River/Choptank River
- Christina River
- Cool Run
- Inland Bays
- Little Assawoman Bay
- Nanticoke River
- Pocomoke/Wicomico River
- St. Jones River
- Upper Chesapeake Bay

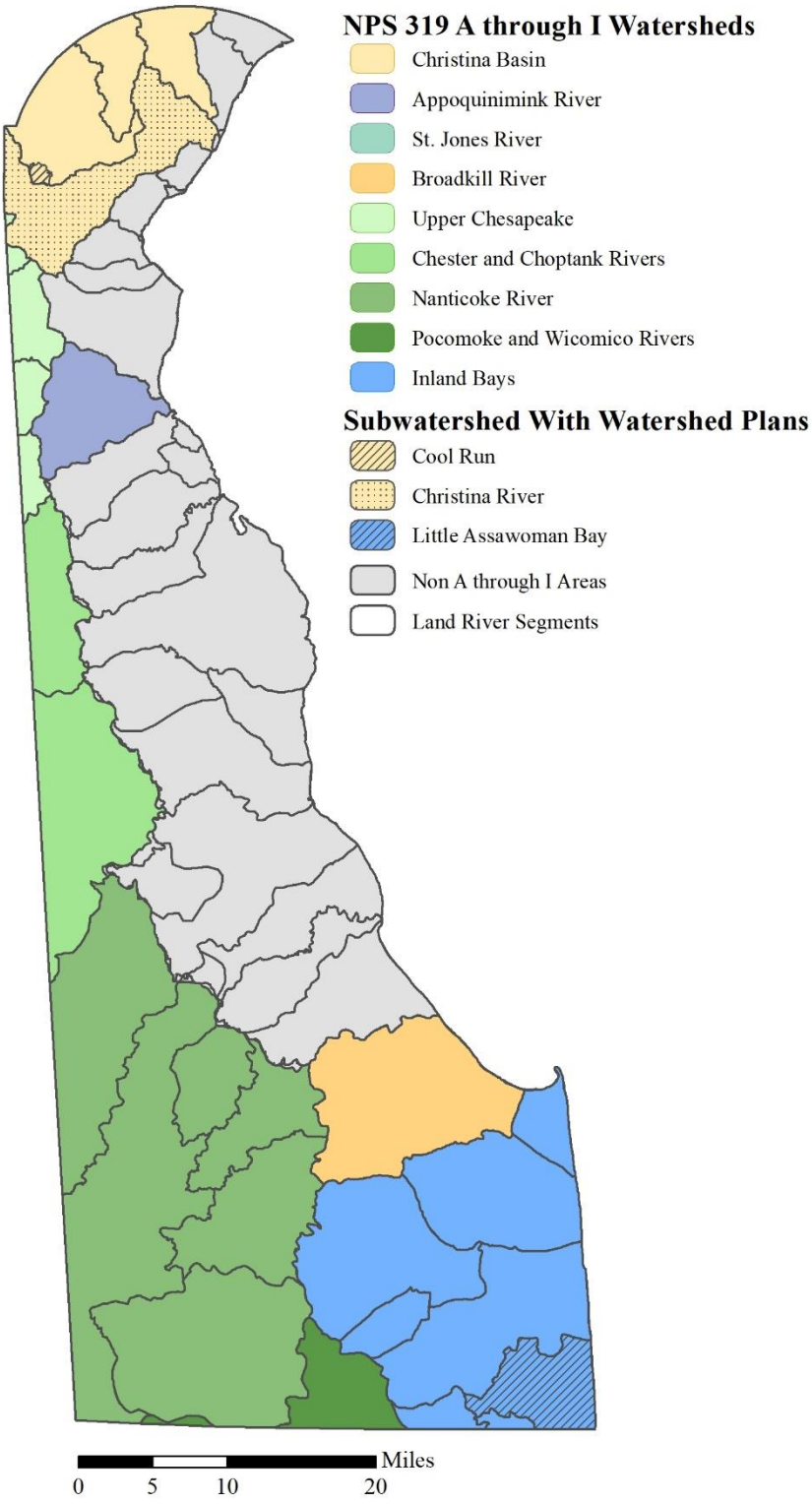


Figure 4. Delaware's Nine Element Watershed Plan priority watersheds

6 Monitoring

The NPS Program recognizes the need to use its personnel and financial resources efficiently and effectively. To that end, the NPS Program supports that DNREC's surface water quality monitoring is conducted in a manner which focuses available resources on the Whole Basin Management concept. The Whole Basin Management Program in Delaware operates on a five-year rotating basis and encourages DNREC programs to work in an integrated manner to assess different geographic areas of the state that are defined based on their drainage patterns (Section 6.4). This approach enables the DNREC to comprehensively monitor and assess the condition of the state environment with due consideration to all facets of the ecosystem.

Elements of Delaware's specific Surface Monitoring Program include:

- TMDL-Related Monitoring
- General Assessment Monitoring
- Toxics in Biota Monitoring
- Toxics in Sediment Monitoring
- Biological Assessment Monitoring

6.1 General Changes or Trends in Water Quality

According to the *State of Delaware 2016 CWA 305(b) and 303(d) Integrated Report*, approximately 50% of reporting water quality monitoring stations are experiencing lower nutrient loads for nitrogen while fewer than 10% of stations have shown increasing nitrogen trends. This generally positive trend is expected to increase in the 2018 report, which will be finalized in 2019. Impacts to waters are generally the result of past practices or contamination events, activities that are neither regulated nor otherwise managed, or changes that are occurring on a larger regional scale. For example, air pollutants from sources outside of Delaware contaminate Delaware's surface waters via rainfall.

The state has become more proficient at identifying water quality problems, due to amendments made to the state's water quality standards. As a result of these revisions, many state water quality criteria are stricter and call for higher quality waters. However, even though the state is improving water quality issue identification, watershed-level water quality improvements are still difficult to detect over short periods of time, especially in areas that are affected by historical contamination and NPS pollution. Thus, targeted monitoring over long time periods (years) is necessary to detect these minute changes.

There have been many improvements made in watershed assessment approaches and methodologies. Improvements include: significant investments in wastewater treatment technologies; public agencies, such as DelDOT, are investing revenues in improved SWM practices and wetlands creation to mitigate the impacts of maintenance and new highway construction activities; and private business interests are investing in practical and cost-effective NPS BMPs on farms, residential developments, and commercial and industrial sites. Indeed, improvements in water quality have been documented in localized areas where a point source discharge was eliminated or BMPs were installed.

6.2 Progress to Assess Impairments

6.2.1 State of Delaware TMDL Program

Section 303(d) of the Federal CWA requires states to develop a list of water bodies for which existing pollution control activities are not sufficient to attain applicable water quality standards (303(d) List) and to develop TMDLs for pollutants of concern.

The state of Delaware was operating under a court-approved Consent Decree that required establishment of nutrient, dissolved oxygen, bacteria, and zinc TMDLs for all impaired streams that were listed on the Delaware 1996 303(d) List by the year 2006. The Department met the requirements of the Consent Decree by December 2006 and completed TMDLs for all waters of the state that were impaired as the result of high nutrients, low dissolved oxygen, high bacteria levels, or high concentration of zinc.

The Department is currently developing TMDLs for toxics according to a schedule provided in the 303(d) List. Furthermore, the Department is taking the necessary steps to address habitat and/or biological degradation of the state's waters according to a schedule provided in the 303(d) List.

6.2.2 Pollution Control Strategies

PCSs are plans to achieve the nutrient and bacteria load reductions delineated by TMDLs (Section 3.4) and describe the specific actions that are needed to achieve water quality standards and provide a schedule for implementing those actions. PCSs have been developed for seven Delaware watersheds: Christina (Brandywine Creek, Red Clay Creek, White Clay Creek, and Christina River), Appoquinimink River, St. Jones River, Murderkill River, Mispillion River and Cedar Creek, Nanticoke River (including Broad Creek and their tributaries), and the Inland Bays (Rehoboth Bay, Indian River and Bay, Little Assawoman Bay, and their tributaries).

6.3 Monitoring Programs

6.3.1 Surface Water Monitoring Programs

Water quality and biological data for Delaware's surface waters are collected under Delaware's Ambient Surface Water Quality Monitoring Program and Biological Monitoring Program within DNREC. Several active citizen monitoring programs have also been developed throughout Delaware that augment the data collected by DNREC. These programs are discussed below.

DNREC has developed a list of WQL waters (303(d) List) and completed nutrient and bacterial TMDLs for all segments on the 1996 list over a ten-year period. The TMDL development schedule is coordinated with the Department's Whole Basin Management Program (Section 6).

The TMDL related monitoring is designed to provide the necessary information to develop, calibrate, and verify hydrodynamic and water quality models and/or to support the existing models. The Department uses the hydrodynamic and water quality models as management tools for establishing TMDLs, for allocating loads between point and nonpoint sources of pollutants, and for monitoring progress toward achieving water quality goals and standards.

6.3.2 General Assessment Monitoring

The General Assessment Monitoring Network (GAMN) consists of approximately 134 stations throughout the state and provides for routine surface water quality monitoring. Each station is monitored for conventional parameters such as nutrients, bacteria, dissolved oxygen, pH, alkalinity, hardness, and dissolved metals. The data from this monitoring is entered into the EPA's STORET database, reviewed, and then analyzed in assessing the water quality condition of each water body system.

6.4 Changes for Surface Water Quality Monitoring Plan

Over the past several years, a main objective of the DNREC Watershed Assessment and Management Section's (WAMS) Ambient Surface Water Quality Monitoring Program (SWQMP) was to collect water quality data that could be used for developing and calibrating hydrodynamic and water quality models. These models were used to establish TMDLs for nutrients and bacteria in impaired waters of Delaware.

Now, with the establishment of nutrient and bacteria TMDLs for most impaired waters of the state, a major objective of the Ambient SWQMP is to collect appropriate data that can be used to track water quality changes and to determine if TMDL requirements are being met.

Considering this (and other emerging) needs, and since the Department's monitoring budget is limited, surface water quality monitoring plan has been prepared with the following changes:

1. Monitoring stations in earlier monitoring plans were reviewed to determine which stations were critical to meet data needs and which could be dropped.
2. The 156 retained stations fall into 2 categories;
    a. C1 – Category 1 stations are high priority stations that will be used for calculating annual loads and/or long-term trends. These 22 stations are generally co-located with a USGS stream gage stations, or are located at the mouth of a tidal river. Because of the importance of these stations, monitoring at these stations will be conducted monthly, regardless of priority basin schedule.
    b. C2 – Category 2 stations are monitored monthly for two years and then bimonthly for three years, according to a five year rotating basin schedule (see below). There are 134 C2 monitoring stations in Delaware

A Rotating Basin Monitoring Plan is implemented. In this scheme of monitoring, the State is divided into Five Monitoring Basins. Every year, two of the Basins are considered "Priority Basins" and all stations in a Priority Basin are monitored monthly. Monitoring frequency for stations in other basins is conducted bimonthly. The SWQMP follows the TMDL and PCS programs. The Delaware NPS Program does not monitor or guide the SWQMP. The Delaware NPS Program uses the data of the SWQMP. The Delaware NPS Program cannot improve upon the SWQMP but can advise and ask for funding to monitor watersheds. Each of the approved EPA Nine Element Watershed Plans has a monitoring component. During the Rotating Basin Monitoring Plan, when funding becomes available, the Delaware NPS Program will request stations be selected/sited within approved watersheds to evaluate water quality.

6.5 Special Project Monitoring

Special project monitoring is needed from time to time in specific watersheds to address specific concerns. These projects are generally short-term in nature.

6.5.1 Special Surveys

The purpose of special survey monitoring is to collect data that are not obtained using other monitoring activities and are needed for modeling purposes as described above. Special surveys include deployment of continuous monitors and sediment sampling.

6.5.2 Continuous Monitoring

DNREC implements a network of continuous water quality monitoring stations to collect data for dissolved oxygen and other parameters several times each day using YSI (or similar) datasondes. DNREC in cooperation with the Delaware Geological Survey (DGS) and the USGS operates a number of continuous monitors in the state. The information from these continuous monitoring sites is available on real-time basis via the USGS website and via the Delaware Environmental Observing System (DEOS) website. DNREC also put into place a special highly sophisticated on-site monitoring station/automated lab device to collect and analyze samples for nutrients and other parameters at the outlet to Millsboro Pond. The data from this station were used to assess nutrient loads leaving the pond and entering the Delaware Inland Bays and thereby monitor TMDL implementation progress.

6.5.3 Biological Assessment Monitoring

The assessment of the quality of surface waters utilizes a multi-disciplinary approach involving physical, chemical, and biological measures. The biological monitoring program is a major tool used by the Department to assess the conditions of surface waters. It includes the assessment of indigenous biological communities and physical habitats of streams, ponds, estuaries, and wetlands. The goal of the program is to establish numeric biological criteria in state water quality standards to complement both existing chemical criteria and other assessments focused on fish tissue monitoring and bioassay testing. Standard methods have been developed and tested for assessing the biological community and habitat quality of nontidal streams, and draft numeric criteria are under development. Efforts over the next few years will focus on the development of methods for assessing estuaries and ponds and for assessing the quality and quantity of wetlands.

6.5.6 Partnership for the Delaware Estuary – Mussels for Clean Water Initiative

The Partnership for the Delaware Estuary (PDE), described further in Section 7.4.2.3, launched their Mussels for Clean Water Initiative (MuCWI) to restore native species of freshwater mussels to the upper mid-Atlantic region, specifically to the Delaware River Basin. The MuCWI aims to directly restore or enhance the ecosystem services that are provided by healthy beds of mussels, which are often comprised of both rare and common species. The main goal of MuCWI is to promote cleaner water and healthier aquatic ecosystems via the propagation, rearing, and reintroduction of mussels created from a central hatchery.

The hatchery will be housed at Bartram's Garden, located in Philadelphia. Pennsylvania will invest $7.9 million to build the hatchery, which will begin operating in 2023. PDE aims to produce 500,000 mussel spat annually for relocation to restoration projects in the Delaware and Susquehanna River watersheds. Restoration projects will prioritize locations where native mussel populations were historically known.

6.6 Citizen Monitoring Programs in Delaware

6.6.1 Delaware Nature Society

While their primary focus is on restoring and improving waterways, the Delaware Nature Society (DNS) also strives protect wildlife and natural lands (Section 7.4.2.2). They accomplish this by working to gain funding, advocating for improved environmental policies, educating the public and stakeholders about the importance of a healthy ecosystem, and encouraging participation in citizen science. The following successful citizen science programs encourage local citizens to become environmental stewards.

6.6.1.1 Stream Watch Program

Delaware's waterways are vital to all who live in or visit the state. These waterways provide drinking water, recreational opportunities, irrigation, and various ecosystem services. Thus, it is very important to protect and improve their overall health and function. DNS's Stream Watch Program relies on local, engaged citizens to monitor water quality and advocate for cleaner environments. The following programs are all aimed at educating local citizens, gathering critical water quality data, and reducing water pollution from urban and suburban properties.

6.6.1.1.1 Adopt-A-Stream Program

The Adopt-A-Stream Program educates volunteers, concerned individuals, families, community organizations, businesses, youth groups, and school groups about stream ecology, the threats to stream health, and their individual role in protecting Delaware's water quality. By adopting a waterway, volunteers make a commitment to survey, learn about, and care for that stream.

Volunteers choose Level 1 or Level 2 survey options based on their time, resources, and experience. Level 1 Stream Adoption requires only a few materials and is most suitable for those with limited time or working with elementary-aged children. Adults, or those working with older students, may choose the more detailed options in Level 2.

Stream Adopters measure for:

- *Visual Survey*: Watch for signs of visible pollution including litter, water discoloration, and discharging pipes;
- *Water Chemistry*: Measure chemical parameters, including temperature, pH, nitrate, and oxygen; and
- *Macroinvertebrates*: Survey the aquatic insects, worms, and crustaceans that indicate the health of the water.

6.6.1.1.2 Technical Monitoring Program

Established in 1995, Technical Monitoring is a nationally recognized example of the acceptance and use of citizen science data by the state and the EPA. Technical Monitoring was developed to supplement the state's monitoring efforts in other locations by providing reliable baseline values for several different chemical and physical parameters. Volunteers monitor assigned sites on a monthly basis, testing for dissolved oxygen, pH, alkalinity, nitrates, phosphates, conductivity, salinity in tidal reaches, temperature, and flow. Quality control is ensured through additional procedures. The monthly sampling frequency, strategic site selection, rigorous quality assurance and control measures, and technical equipment allow for more subtle trend analysis.

Technical monitoring data is collected at 37 sites in the Christina River Basin. Thirty of those sites are in Delaware and have been monitored since 1995. They are primarily located in northern New Castle County (Brandywine, Red Clay, and White Clay Creeks) and on the Mispillion River (four sites) in Kent and Sussex counties. Technical Monitoring volunteers started monitoring five sites on the Appoquinimink River in southern New Castle County in 2008. The data from the program is used by DNREC in their efforts to develop and implement a PCS for the Christina Basin.

The Christina Basin Technical Monitoring data is being incorporated into a NPS pollution water quality model used by DNREC's Division of Water and the USGS for the Delaware – Pennsylvania TMDL effort for the Upper Christina Watershed. Data collected in the Mispillion Watershed is providing supplementary data to the Division of Water. The data is also published every two years as part of DNREC's Watershed Assessment Report (305(b)). In addition, data from the Brandywine Creek, Red Clay Creek, White Clay Creek, Christina River, and Christina Basin watersheds are published every five years in DNS's Watershed Reports.

6.6.1.2 Gardening for Water and Wildlife Program

DNS encourages citizens and landowners to incorporate sustainable gardening practices into their landscaping. The Gardening for Water and Wildlife Program, conducted through a partnership between DNS and the National Wildlife Federation, provides official recognition for properties that meet five criteria necessary for wildlife: food, water, cover, places for wildlife to raise young, and wildlife-friendly landscaping practices. DNS encourages landowners to meet these criteria to decrease need for routine mowing and increase local populations of pollinators, birds, and wildlife that are threatened by pesticides and habitat loss. Additionally, urban lawn runoff can contain high levels of herbicides and pesticides if managed incorrectly.

Properties that meet the five criteria can become certified as Certified Wildlife Habitats™. Landowners who meet the criteria can apply for certification and request that a trained DNS Habitat Steward volunteer visit the property. Volunteers can become certified Habitat Stewards after completing DNS's training course. They can then assist Delaware landowners with meeting the five criteria by recommending appropriate native plants, teaching wildlife-friendly practices, and improve landowners' gardening skills.

6.6.2 Nanticoke Watershed Alliance's CreekWatchers

The Nanticoke Watershed Alliance (NWA), described further in Section 7.4.2.4, created the CreekWatchers Citizen Monitoring Program in 2007. The program's primary goal is to accumulate long-term, scientifically credible data and to monitor the health of the Nanticoke River and its tributaries. CreekWatchers monitor 35 sites throughout the watershed, surveying every other week from late March to early November. Volunteers measure water clarity, dissolved oxygen, conductivity, and temperature while in the field and collect samples for nutrient, bacteria, and chlorophyll-a analyses by NWA staff. In 2017, the NWA CreekWatchers became the first volunteer program to obtain the Tier 3 certification for their quality assurance plan. Data produced by the program's trained volunteers can be used with confidence by state and federal agencies.

6.6.3 University of Delaware's Citizen Monitoring Program

The University of Delaware's (UD) Citizen Monitoring Program, previously the Inland Bays Monitoring Program, was established in 1991 to support the CIB and its efforts to monitor and improve the water quality of Delaware's Inland Bays. Since its inception, the Citizen Monitoring Program has expanded beyond the Inland Bays. The Program now includes the Broadkill River Monitoring, Bacteria Monitoring, and the Harmful Algae Monitoring Programs. The Program is managed by UD's Sea Grant Marine Advisory Service and is housed on UD's campus in Lewes, Delaware.

Trained program volunteers survey sites on a weekly basis from April to October. Sites are located throughout the Broadkill and Inland Bays watersheds. They collect samples for bacteria, algae, nutrients, and chylorophyll-a analyses, which are run by Program staff, as well as measurements for site observations, water clarity, dissolved oxygen, salinity, and temperature. Additionally, DNREC personnel bring Delaware beach water samples to the Program's lab for algae and bacteria testing.

6.6.4 Partnership for the Delaware Estuary's Mussel Survey Program

Freshwater mussels, while once abundant in Delaware's waterways, are threatened by pollution and habitat loss throughout the state and in the Delaware Estuary's watershed. Most freshwater mussel species are currently endangered or threatened. PDE's mussel survey program trains volunteers to survey local streams in conjunction with other local watershed organizations in the Delaware Estuary watershed for the presence of freshwater mussels. The data collected by volunteer monitors is used by those organizations to monitor the health of local mussel populations, the locations of existing populations, and identify areas for potential restoration projects.

6.7 Future Needs and Activities to Improve Water Quality Monitoring in Delaware

The state of Delaware continues to focus on NPS pollution problems, such as urban and agricultural runoff, erosion, sedimentation, and ground water contamination. DNREC emphasizes pollution prevention, education, and both voluntary and regulatory efforts to improve the quality of surface and ground water resources. However, additional research, assessment efforts, and management of biological health and physical habitat quality are necessary to better understand the response of aquatic systems to certain pollutants.

Short Term Need: The health of Delaware's aquatic systems and ground water resources will be assessed and managed within the framework of DNREC's Whole Basin Management Program (Section 6). This program calls for the Department, in partnership with other governmental entities, private interests, and all stakeholders, to focus its resources on specific watersheds and basins within specific time frames.

Long Term Need: Five basins and 45 watersheds have been delineated. The Whole Basin Management activities in the State, started within the Piedmont Basin in 1996, and were followed by the Chesapeake Basin in 1997, the Inland Bays in 1998, and the Delaware Bay Drainage Basin started in 1999 with similar activities for the Delaware Estuary. In addition to the planning and preliminary assessment steps, Whole Basin Management included intensive basin monitoring, comprehensive analyses, management option evaluations, and resource protection strategy development. Public participation and ongoing implementation activities occurred throughout the Whole Basin Management process. As a result, of monitoring whole basins, the SWQMP collects water quality data for status and trends assessment on all basins within Delaware (Section 6.4). The data is compared to water quality standards to assess designated use support, as mandated by Section 305(b) of the CWA. In addition, the data is used to calculate annual nutrient loads and to track progress toward achieving TMDL targets.

7 Partnerships and Collaboration

7.1 Partnerships

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 NPS Program also provides important partnership roles in many implementation projects, including local initiatives, which are generally larger in scope than watershed grant projects and may not be limited to solely NPS Program funding. Local implementation partnerships are important and can differ greatly among watersheds depending on watershed, pollutants of concern and their sources, and the specific participating organizations. The NPS Program seeks to enhance cooperation and partnerships with stakeholders in priority watersheds to the maximum extent possible in order to best utilize available expertise, interest, and funding.

The statewide NPS Program's interaction with watershed management decision makers and advocates at all levels provides staff with a diverse network from which to foster partnerships with local watershed efforts.

NPS Program staff will maintain an active presence in ongoing watershed management efforts for each priority watershed. This may often include participation in one of the following types of meetings:

- Technical or restoration committee;
- Local government planning committee;
- Project committee for a specific BMP implementation activity;
- Internal meetings of involved organizations;
- Watershed outreach and education events; and
- Educational forums.

Due to limited NPS staff time, it is not always possible to attend meetings of all active partner groups. In those cases, where possible, staff should attempt to stay involved by reading related newsletters or project updates, talking with participants by phone, and commenting on documents or watershed actions as appropriate.

Long term efforts will be made to identify opportunities to build and sustain partnership capacity at the watershed scale. Capacity in this sense is critically dependent upon the number of people and organizations involved in addressing NPS issues in priority watersheds and the available funding, technical support, public expectations, political will, and commitment to continual improvement and protection of Delaware's water quality. The NPS Program will focus on the following:

- Work with partners to develop sustainable funding strategies and mechanisms for priority watershed management;
- Encourage partners that develop or conduct volunteer water quality monitoring to seek coordination and guidance assistance;
- Assist partners with assembling diverse, representative steering committees as needed;
- Participate in partner technical/steering committee meetings;
- Continue to serve on the committees of NPS-funded grant projects/activities;
- Provide networking assistance related to NPS pollution control and establishing working partnerships;
- Where no watershed planning effort exists and the NPS Program has identified a need, bring together key partners and facilitate a discussion to promote a watershed planning effort; and
- Encourage interstate partnerships and participation on multi-state watershed projects.

7.2 Federal Partners

7.2.1 Natural Resources Conservation Service

Originally established by Congress in 1935 as the Soil Conservation Service, the National NRCS has expanded to become a conservation leader for all natural resources, ensuring private lands are conserved, restored, and more resilient to environmental challenges, like climate change.

Seventy percent of the land in the United States is privately owned, making stewardship by private landowners absolutely critical to the health of the Nation's environment. NRCS's natural resource conservation programs help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters.

Delaware's NRCS Program provides technical consultation and planning assistance to help landowners make beneficial decisions about natural resource management. They assist in "conservation implementation" by helping landowners install conservation practices and systems that meet established technical standards and specifications. They also provide "natural resource inventory and assessment" and "natural resource technology transfer." By collecting, analyzing, and providing landowners with natural resource data, the program helps establish the best conservation plans and resource-use decisions for all landscapes. The Delaware NRCS develops and distributes a wide array of technology pertaining to resource assessment, conservation planning, and conservation system installation and evaluation. This also includes training, and certification in standards and procedures. The Delaware NRCS also provides financial assistance. The Delaware Office provides financial assistance to encourage the adoption of beneficial land-treatment practices that conserve and protect our nation's valuable natural resources.

Financial assistance is awarded to those who voluntarily enter into contracts, easements, and agreements to conserve natural resources. Financial assistance is provided through cost-share/ incentives, easements, grants and stewardship payments.

The Delaware NRCS Program works closely with the NPS Program and the Conservation Districts within Delaware to assist in the implementation of NRCS programs and BMPs. The types of BMPs available for implementation through the NRCS and the types of BMPs available by each NRCS program are listed in Table 1 and Table 2, respectively. Annually, the NPS Program funds District Planners to work with landowners and farmers to assist volunteers in participation of NRCS programs. Implementation of these programs serves to

reduce nutrients within the Delaware watersheds. The NPS Program assists in the implementation of NRCS programs by offering guidance and technical assistance at a programmatic level. The NPS Program attends NRCS Technical Committee meetings to provide such guidance. Additionally, the NPS Program leverages funding and resources available through the collaboration of cost share programs that result in the implementation of agriculture related BMPs. Examples of such programs include cover crop programs, structural BMP programs, and soil health initiatives.

NRCS provides financial, technical, educational, monitoring, assessment, and policy and planning support to the NPS Program.

Table 1. The BMP types offered by the NRCS for implementation in Delaware

Amendments for Treatment of Ag Waste	Forest Stand Improvement	Seasonal High Tunnel System for Crops
Animal Trails and Walkways	Heavy Use Area Protection	Shallow Water Management
Atmospheric Resource Quality Management	Integrated Pest Management	Tree and Shrub Establishment
Composting Facility	Irrigation (sprinkler)	Upland Wildlife Habitat Management
Comprehensive Nutrient Management Planning	Irrigation Management (micro irrigation)	Waste Recycling
Conservation Cover	Irrigation Water Conveyance	Waste Storage Facility
Conservation Crop Rotation	Irrigation Water Management	Waste Transfer
Cover Crop	Nutrient Management	Waste Treatment (windrowing)
Fence	Pipeline Installation	Water Well
Filter Strip	Prescribed Burning	Watering Facility
Forage and Biomass Planting	Residue and Tillage Management	Wetland Restoration
Forage Harvest Management	Roof Runoff Structure	Windbreak/Shelterbelt Establishment

Table 2. BMPs under each NRCS program that are available for NPS program funding.

BMP	Program				
	AMA	RCPP	EQIP	WHIP	WRP
Agricultural Enhanced Nutrient Management	X	X	X		
Agricultural Nutrient Management Applications	X	X	X		
Ammonia Emissions Reductions (Litter treatments)	X	X	X		
Barnyard Runoff Control/ Loafing Lot Management	X	X	X		
Carbon Sequestration/ Alternative Crops	X	X	X		
Conservation Plans	X				
Conservation Tillage	X	X	X		
Continuous No-Till	X	X	X		
Cover Crops and Commodity Small Grain Enhancement	X	X	X		
Forest Conservation				X	
Forest Harvesting Practices	X	X	X		
Horse Pasture Management	X		X		
Manure transport	X	X	X		
Mortality Composters	X	X	X		
Precision Agriculture	X	X	X		
Riparian Forest Buffer	X	X	X	X	X
Riparian Grass Buffer	X	X	X	X	X
Stream Protection with Fencing and Prescribed Grazing (Grazing Management Systems, Exclusion plus Upland Grazing Management)	X	X	X		
Stream Protection with Fencing	X	X			
Stream Protection without Fencing (Grazing Management Systems, Watering system alone)	X	X	X		
Tree planting (Agricultural and Urban)	X	X	X		
Upland Rotational or Prescribed Grazing	X	X	X		
Wetland Restoration and Creation	X	X	X	X	X

7.2.1.1 Agricultural Management Assistance Program

Type of program: Financial (cost share) and technical assistance

The Agricultural Management Assistance (AMA) Program provides cost-share assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations. Producers are encouraged to manage risk and solve natural resource issues using those conservation methods. USDA's NRCS has leadership for the conservation provisions of AMA. Additionally, the Agricultural Marketing Service (AMS) is responsible for an organic certification cost-share program and the Risk Management Agency (RMA) is responsible for mitigation of financial risk.

7.2.1.2 Wetland Reserve Program

Type of program: Financial (cost share) and technical assistance

The Wetland Reserve Program (WRP) provides an opportunity for landowners to receive financial assistance to protect, restore, and enhance wetlands on their property. These wetlands provide food and shelter for migratory birds and other wetland dependent species, including state and federally listed species and species of concern. In addition to providing wildlife benefits, WRP helps to reduce flooding, improve water quality by filtering sediment and chemicals, recharge groundwater, and more.

The program offers three enrollment options:

1. *Permanent Easement*: A conservation easement in perpetuity. USDA pays 100% of the easement value and up to 100% of the restoration costs.
2. *30-Year Easement*: An easement that expires after 30 years. USDA pays up to 75% of the easement value and up to 75% of the restoration costs. For both permanent and 30-year easements, USDA pays all costs associated with recording the easement in the local land records office, including recording fees, charges for abstracts, survey and appraisal fees, and title insurance.
3. *Restoration Cost-Share Agreement*: An agreement to restore or enhance the wetland functions and values without placing an easement on the enrolled acres. USDA pays up to 75% of the restoration costs.

7.2.1.3 Wildlife Habitat Incentives Program

Type of program: Financial (cost share) and technical assistance

The Wildlife Habitat Incentives Program (WHIP) is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land. The Food, Conservation, and Energy Act of 2008 reauthorized WHIP as a voluntary approach to improving wildlife habitat in the United States. The NRCS administers WHIP to provide both technical assistance and up to 75% cost-share assistance to establish and improve fish and wildlife habitat. WHIP cost-share agreements between NRCS and the participant generally last from one year after the last conservation practice is implemented and no more than 10 years from the date the agreement is signed.

Priorities of this program are:

1. *Restoration and management of upland grassland habitat to benefit ground-nesting birds and associated wildlife*
   The loss of undisturbed herbaceous cover (grasses and other non-woody plants) has resulted in declining populations of grassland nesting birds, such as quail, meadowlarks, field sparrows, goldfinches, and pheasants, as well as other small animals, such as rabbits. Since 1975, for example, the Delaware Breeding Bird Survey has shown a 72% and 95% decrease in bobwhite quail and ring-necked pheasant populations, respectively. These declines have been attributed to habitat loss through urbanization and more intensive agricultural production. Practices eligible for cost-sharing include field borders as well as whole-field plantings of grasses, legumes, and wildflowers, with management schedules that will benefit ground-nesting birds and other wildlife. Additional practices may include plantings of trees and shrubs where needed for woody cover.

2. *Controlling invasive species*
   Thousands of acres of Delaware's wildlife habitat have been affected by invasive species. These species are replacing Delaware's native plant species that provide quality wildlife habitat. One of the biggest invasive species problems in Delaware is phragmites (common reed), a fast growing and hardy plant covering over 20,000 acres of fresh and tidal wetland in the state. Phragmites displaces native flora that provide better wildlife food and cover, and may present a fire hazard due to its root systems that hold dormant reeds in place during the winter.

7.2.1.4 Environmental Quality Incentives Program (EQIP)

Type of program: Financial (cost share) and technical assistance

The Environmental Quality Incentives Program (EQIP) was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) to provide a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement BMPs on eligible agricultural land to improve water and air quality, protect ground and surface waters, reduce erosion and sedimentation, and improve or create wildlife habitat.

EQIP offers contracts with a minimum term that ends one year after the implementation of the last scheduled practices and a maximum term of ten years. These contracts provide incentive payments and cost-shares to implement conservation practices. Landowners and operators who are engaged in livestock or agricultural production on eligible land may participate in the EQIP program. EQIP activities are carried out according to an environmental quality incentives program plan of operations. The plan is developed in conjunction with the producer and identifies the appropriate conservation practice or practices to address the resource concerns. All EQIP conservation practices are subject to NRCS technical standards in the Field Office Technical Guide (FOTG) that are adapted to Delaware conditions.

EQIP provides payments up to 75% of the incurred costs and income foregone of certain conservation practices and activities. However certain historically underserved producers (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers, etc.) may be eligible for payments up to 90% of the estimated incurred costs and income foregone. Farmers and ranchers may elect to use a certified Technical Service Provider (TSP) for technical assistance needed for certain eligible activities and services. The new Farm Bill established a new payment limitation for individuals or legal entity participants who may not receive, directly or indirectly, payments that, in the aggregate, exceed $300,000 for all program contracts entered during any six year period. Projects determined as having special environmental significance may, with approval of the NRCS Chief, have the payment limitation raised to a maximum of $450,000.

EQIP applications are accepted throughout the year at Delaware USDA Service Centers. The following are State Resource Priorities and Management Systems offered under the Delaware State EQIP Program:

- Reduction of NPS pollutants, including nutrients, sediment, and pesticides, in impaired watersheds consistent with TMDLs and the reduction of groundwater contamination
    - Agricultural Waste Management Systems - Nutrients, Sediments
    - Integrated Crop Management Systems - Nutrients, Pesticides
    - Planned Grazing Management Systems - Nutrients, Sediments
- Conservation of ground and surface water resources
    - Irrigation Water Management Systems - Water conservation

- Reduction of emissions, such as particulate matter and volatile organic compounds, that contribute to air quality impairment
    - Agricultural Waste Management Systems - Volatile organic compounds
    - Poultry House Windbreak Management Systems - Particulate matter
- Reduction in soil erosion and sedimentation from erodible land
    - Erosion Control Systems - Sediments
- Promotion of at-risk species habitat recovery
    - Biodiversity Management Systems - Habitat recovery

7.2.1.4.1 National Water Quality Initiative

The National Water Quality Initiative (NWQI), an initiative under EQIP, is a partnership among NRCS, state water quality agencies and the U.S. Environmental Protection Agency to identify and address impaired water bodies through voluntary conservation. The goal of NWQI is to concentrate conservation practices within select watersheds to maximize gains in the effort to improve water quality. NRCS and state water quality agencies partner together to provide targeted funding for financial and technical assistance in small watersheds most in need and where farmers can use conservation practices to make a difference. In 2016, Delaware targeted NWQI efforts in the Clear Brook-Nanticoke watershed located in the Chesapeake Bay drainage basin. DNREC and USGS have been extensively monitored water quality in the Clear Brook-Nanticoke watershed and continue to look for new strategies to address agricultural related water quality issues.

7.2.1.5 Regional Conservation Partnership Program (RCPP)

Type of program: Financial (cost share) and technical assistance

The Regional Conservation Partnership Program (RCPP) encourages partners to join in efforts with producers to increase the restoration and sustainable use of soil, water, wildlife and related natural resources on regional or watershed scales. Through the program, NRCS and its partners help producers install and maintain conservation activities in selected project areas. Partners leverage RCPP funding in project areas and report on the benefits achieved.

NRCS implements RCPP conservation program contracts and easement agreements through four existing NRCS programs. Agricultural Conservation Easement Program (ACEP), Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CSP), and the Healthy Forests Reserve Program (HFRP).

NRCS also may utilize the authorities under the **Watershed and Flood Prevention Program** (except for the Watershed Rehabilitation Program) in designated critical conservation areas. RCPP connects partners with producers and private landowners to design and implement conservation solutions. These conservation solutions benefit natural resources, agriculture and local economies.

7.2.1.6 NRCS Conservation Reserve Program and FSA Conservation Reserve Enhancement Program

Type of program: Funding, outreach, and education

The NRCS Conservation Reserve Program (CRP) is a voluntary program available to agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in CRP plant long-term, resource-conserving covers to improve the quality of water, control soil erosion, and enhance wildlife habitat. CRP is a major contributor to increased wildlife populations, helps to protect groundwater, and helps improve the condition of lakes, rivers, ponds, and streams by reducing water runoff and sedimentation.

Participants and the offered land must meet certain eligibility requirements for land to be enrolled. FSA provides participants with payments on contracts with durations of 10 to 15 years. CRP payments consist of an annual rental payment that is based on the relative productivity of the soils and the average dry land cash rent, cost-share assistance of no more than 50% of the participants' costs in establishing approved practices, and other incentives where the payment amount is based on the practice.

The FSA Conservation Reserve Enhancement Program (CREP) is a part of CRP and is administered under the same statutes and federal regulations. The primary goal of CREP is to establish a unique CRP program initiative to address specific high priority conservation and environmental objectives. Delaware's CREP was established to facilitate nutrient and sediment reduction, provide conservation buffers on Delaware's waterways and drainage systems, increase wildlife habitat, and restore natural conditions for water temperature and dissolved oxygen in areas protected by riparian forested buffers. CREP provides enhanced rental rates, enhanced cost share rates, and enhanced incentives based on the practice.

There are two signup types:

1. *General Signup*: This is a designated sign-up period and is a competitive bid process during which producers may offer eligible land to be enrolled into CRP. Each offer is ranked in comparison to all other offers and selections made from that ranking. FSA uses Environmental Benefits Index factors to assess the environmental benefits for the land offered. Producers may offer land at the calculated rental rate or offer a lower rate to increase the likelihood that the offer will be accepted.
2. *Continuous Signup*: Environmentally desirable land devoted to certain conservation practices may be enrolled at any time under CRP continuous sign-up. Offers are not subject to competitive bidding. All CREP practices are continuous signup.

7.2.2 US Environmental Protection Agency

The EPA provides funding for implementation of Delaware's NPS Management Program through an annual CWA Section 319 grant. EPA personnel also provide program guidance and implementation assistance through review of 319 project implementation plans for subgrants to local project sponsors. The EPA provides financial, technical, educational, monitoring, staffing, grant allocation, assessment, and policy and planning support.

7.2.3 US Geological Survey

The USGS provides water quality monitoring and assessment data that is available for public use. Streamflow, groundwater levels, and water quality data are collected at numerous locations, and water-use data are collected throughout the area in cooperation with other federal, state and local agencies, universities, and research centers. This information is vital to tracking changes in water conditions throughout the state.

7.2.4 US Fish and Wildlife Service

The US Fish and Wildlife Service (USFWS) is housed within the Department of the Interior and is primarily responsible for managing fish and wildlife through conservation and preservation practices. The USFWS provides guidance and support to partner organizations for various programs designed to improve and restore water quality. The USFWS strives to protect wildlife and recreational activities in the two National Wildlife Refuges in Delaware, Bombay Hook and Prime Hook, manages the Delaware Bay Estuary Project, and supports the Delaware River Basin Restoration Program.

7.3 State NPS Program Partners

The NPS Program will strengthen its working partnerships with appropriate state partners to consolidate and update watershed plans in priority watersheds where there is a clear water quality improvement benefit. The following sections provide descriptive summaries of state partner agencies and programs that have significant NPS Program responsibilities.

Described below are all NPS statewide partners helping to restore and protect water quality within the state. The partners work independently with the common interest of reducing NPS pollutants to waters of the state. The NPS Program assists in the implementation of partner programs by offering guidance and technical assistance at a programmatic level. In return, the partners provide the NPS program with support in key areas (Table 3).

Table 3. Areas where NPS State Partners Provide Support

Area of Support	DDA	DelDot	DNREC Divisions					
			Coastal, Climate, and Energy	FAB	Fish and Wildlife	Parks and Recreation	Water	Watershed Stewardship
Financial	X	X	X	X			X	X
Technical	X	X	X	X	X	X	X	X
Educational	X	X	X	X	X	X	X	X
Monitoring	X	X	X				X	X
Staffing	X	X					X	X
Grant Allocation	X	X		X			X	X
Assessment	X						X	X
Policy and Planning	X		X					X

7.3.1 DNREC Divisions

7.3.1.1 Division of Climate, Coastal, and Energy

The Delaware Coastal Management Program (DCMP), administered by the Division of Climate, Coastal, and Energy's Coastal Programs Section, is designed to protect, develop, and, where possible, enhance the coastal resources of the state. Specifically, DCMP:

- Manages coastal resources through innovative research projects, education and grant programs, and policy development;
- Administers the Coastal Zone Federal Consistency Certification program;
- Provides special area management planning;
- Provides assistance to state and local governments for local land use planning; and
- Offers other special on-the-ground projects related to Delaware's coastal resources.

Additionally, the DCMP is responsible for the Coastal Nonpoint Pollution Control Program (CNPCP) and works cooperatively with the 319 NPS Program and other state agencies to implement this program. In accordance with Section 6217 of the federal Coastal Zone Management Act Reauthorization Amendments of 1990, states with approved coastal management programs to develop and implement a CNPCP. A state's CNPCP should build on existing state coastal management and NPS pollution programs to reduce and prevent coastal water quality problems. Congress charged the National Oceanic and Atmospheric Administration (NOAA) and the EPA with oversight of the CNPCP's development and implementation. The DCMP now coordinates the network of state agencies with regulatory authority over coastal nonpoint pollution control.

The CNPCP has oversight and management responsibilities and relies on DNREC divisions, sections, and programs for implementation of rules, regulations, and programs. This program is made possible by the cooperation of multiple state partners, including the DCMP and other DNREC divisions, who assist with implementation and fulfillment of the management measures. Partners include: County Conservation Districts, Site Remediation Program, Pesticide Control Program, Delaware Sea Grant Education and Outreach Program, Stormwater Management and Permitting Program, Dam Safety Program, programs within the DelDOT, and others.

The CNPCP must be coordinated with specific sections of the Federal CWA. These are: Section 208 (Water Quality Management Planning Program); Section 303(d) (TMDL); Section 319 (Delaware NPS Program); and Section 320 (National Estuary Program). Various sections within DNREC are responsible for carrying out these programs. For example, the Division of Watershed Stewardship (DWS) implements the Water Quality Management Program, TMDLs Program, and section 319 grants through the NPS Program.

7.3.1.2 Division of Watershed Stewardship

The DWS, in which the NPS Program in housed, manages and protects the state's soil, water and coastlines using a comprehensive array of watershed-based programs. DWS protects and maintains the state's shoreline and navigable waterways; regulates changes to coastal and urban lands; develops and implements innovative watershed assessment, monitoring, and implementation activities; promotes wise land use, water quality, and water management practices; and works closely with Delaware's Conservation Districts to manage stormwater and assist farmers.

7.3.1.3 Division of Water

The Division of Water manages and protects Delaware's water resource by providing technical assistance, performing applied research, laboratory services, educational services, and regulatory guidance and implementation to other DNREC Divisions and partners. Within this division are the following sections: Water Supply, Surface Water Discharges, Groundwater Discharges, Wetlands and Subaqueous Lands, and the Delaware Environmental Laboratory.

7.3.1.4 Division of Fish and Wildlife

The Division of Fish and Wildlife (DFW) provides for the conservation and wise use of the state of Delaware's fish and wildlife resources, such as the protection of wild living resources and habitats. DFW strives to prioritize the following:

1. *Administration:* DFW works to administer its programs and activities effectively and efficiently. Funding is used to promote the highest return on the investment of state, federal, and constituent based fees and funds. Administrative and management framework is specifically designed to facilitate DFW's complex and interrelated programs, projects, and activities while ensuring compliance with state and federal programmatic, financial, and accounting practices and procedures. The development of policy and the documentation of program accomplishments provide the basis for evaluating the success of Division programs.

2. *Applied Habitat Research, Management and Restoration:* DFW is committed to promoting and practicing the conservation of biological diversity by protecting against the unnecessary threat to or extinction of living species. DFW conducts research, and develops and implements policies that contribute to the maintenance, enhancement, restoration, and management of natural habitats. DFW habitat management practices benefit many fish and wildlife species and control undesirable species, like mosquitoes or invasive vegetation, that degrade wildlife and fisheries habitats.
3. *Species Research, Monitoring, and Management:* The Division promotes the understanding of fish and wildlife stocks and populations through species-specific research and monitoring programs. DFW recognizes the diversity of state fisheries and wildlife constituencies and strive to actively involve these groups in policy development and public decision-making processes. DFS works to balance human concerns with the need to prevent over-harvesting and exploitation of species to maintain and, if necessary, rebuild species stocks and populations to sustainable levels for both commercial and recreational users. DFW also works to provide Delaware's citizens and visitors with an environment that minimizes nuisance or health impacts from pest species, as well as undesirable or invasive vegetation, in an environmentally-sensitive manner.
4. *Enforcement:* The Division provides public safety services in the areas of boating, hunting, fishing, shell fishing, and disaster response. The intent of these programs is to protect the public's safety, as well as that of the states' wildlife, finfish, shellfish, and non-game and endangered species, including marine mammals, within the state's lands and waters.
5. *Education and Training:* DFW administers education and training programs to improve awareness, appreciation, and conservation of Delaware's natural resources. Through coordinated programs like hunter education, aquatic resource education, and boating safety, DFW aims to encourage sportsmanship, instill an environmental ethic, and promote public safety among Delaware's citizens.
6. *Acquisition, Facilities Development and Construction:* The Division develops and maintains public areas and facilities to ensure access to Delaware's natural resources. DFW's intent is to provide public hunting, fishing, and wildlife viewing areas and boating access sites that are environmentally sensitive, modern, safe, clean, and convenient so that Delaware's natural resources are available to all.

7.3.1.5 Division of Parks and Recreation

The Division of Parks and Recreation protects and manages Delaware's State Parks. Its mission is to protect valuable natural resources within the State Parks and to provide for the wise use of lands appropriate for outdoor recreation. The Division also provides park acquisition financial assistance to municipal and county agencies.

7.3.1.6 Financial Assistance Branch

The Financial Assistance Branch (FAB) provides planning, engineering, and financial assistance in the form of low-interest loans and grants to eligible applicants that request assistance to promote water quality projects and reduce NPS pollution. Projects include all types of NPS, watershed protection, restoration, estuary management projects, and more traditional municipal wastewater treatment projects. Financing is available to municipalities for community wastewater management facilities, individuals for the rehabilitation of failing septic systems, dairy and poultry farmers for the implementation of manure management practices on their farms, and individuals and businesses for underground storage tank sites that need groundwater cleanup. Financial assistance in the form of determining the economic feasibility of a project is also provided to communities with water utilities.

7.3.1.6.1 Wastewater Matching Planning Grant

The Wastewater Planning Matching Grants (WPMGs) are designed to assist municipal and county wastewater utilities to prepare wastewater projects for funding. Only municipal and county wastewater utilities are eligible to obtain a WPMG. Funding can be used to assist with general wastewater planning and for specific project planning. The grant can also be used to assist with and continue the process of updating wastewater facility plans, prepare preliminary engineering reports, or conduct planning studies. Grant applications will be solicited four times per year (January, May, August, and November) based on funding availability.

7.3.1.6.2 Community Water Quality Improvement Grants

Community Water Quality Improvement Grants (CWQIGs) are designed to assist municipalities, government agencies, and nonprofit organizations with implementing projects or programs within Delaware's developed landscape to improve water quality. Programs and projects selected will demonstrate innovative and sustainable methods, techniques, and/or practices for water quality improvements with cost effective and measurable results. CWQIG Workshops are advertised in advance of Request for Proposal (RFP) announcements.

Applicants may be any Delaware state or municipal government, agency, program, nonprofit organization, educational institution, community organization, and/or homeowner's association within the state of Delaware. Agricultural operations and private for profit firms are not eligible for these funds. Preference is given to projects involving cooperative partnerships and sponsors without a dedicated source of funds for repayment of Clean Water State Revolving Fund (CWSRF) loans.

While not limited to the following list, all proposals should address one or more of the following goals:

- Provide benefits to water quality within an impaired watershed;
- Implementation of non-regulatory projects listed in a watershed management plan. Examples of plans include voluntary elements of PCSs, watershed based restoration plans, a Whole Basin Management Preliminary Assessment, or community-based stormwater permits;
- Installation of community stormwater management improvements in existing developments and municipalities; and
- Restoration for water quality benefits.

7.3.1.6.3 Clean Water State Revolving Fund

Funding opportunities through the CWSRF are available to municipalities, private organizations, nonprofit organizations, and private individuals. The CWSRF provides planning, engineering, and financial assistance in the form of low-interest rate loans with flexible terms and grants to eligible applicants that request assistance to promote water quality projects. Projects include all types of NPS, watershed protection, restoration, and estuary management projects, as well as more traditional municipal wastewater treatment projects. Project Notice-Of-Intent (NOIs) are solicited twice per year (January and August).

CWSRF programs combine the federal and state capitalization funds with other program resources including tax-exempt revenue bond proceeds, fund investment earnings, and loan repayments to provide low-interest loans for eligible projects. Other programs include Wastewater Infrastructure Loans and NPS Program Loans.

Wastewater Infrastructure Loans prioritize energy and water efficiency through the implementation of improved technologies and practices, green infrastructure practices, and environmentally innovative projects that demonstrate new approaches to managing water resources sustainably. Additionally, Green Project Reserve educed CWSRF Interest Rates are used as incentives to encourage borrowers to submit projects for funding consideration

The NPS Loan Program includes the following loan programs:

- Septic Rehabilitation Loan Program: provides financial assistance to moderate to low income homeowners to replace failing septic systems.
- Agricultural NPS Loan Program: program funds are leveraged with federal and state Cost-Share assistance from Conservation Districts to provide loans to poultry and dairy producers for manure storage/management, dead bird composters, and front end loaders.
- Leaking Storage Tank Remediation Loan Program: provides loans to remove, retrofit, clean up contaminated sites, and corrosion protection for leaking underground storage tanks.

7.3.1.6.4 Drinking Water State Revolving Fund

The Drinking Water State Revolving Fund (DWSRF) provides infrastructure improvement loans and grants to eligible water systems. All community water systems, including both publicly and privately owned and nonprofit, non-community water systems are eligible. Federally-owned and state-owned systems are not eligible to receive assistance. The entity applying for the loan must own the system, if the water system is currently in operation. If the application is for a proposed water system, the entity applying for the loan must hold the Certificate of Public Convenience and Necessity for the area. Set-aside funds from the grant support Safe Drinking Water Act goals through technical assistance, training, state program management, capacity development, public water system supervision, underground injection control, and water source protection functions. DWSRF accepts pre-applications in August of each year with full applications due the following March.

7.3.2 Delaware Department of Agriculture Programs

The DDA is a NPS statewide partner that helps to restore and protect water quality within the state. DDA works independently with the common interest of reducing NPS pollutants to waters of the State. The NPS Program assists in the implementation of DDA programs by offering guidance and technical assistance at a programmatic level. The NPS Program invites many attendees from DDA to the NPS Annual meeting to solicit guidance and input regarding further collaboration of NPS targeted programs.

7.3.2.1 Delaware Nutrient Management Program

The Delaware Nutrient Management Program (DNMP) was established in June 1999 as a result of the Delaware Nutrient Management Law. The DNMP provides the NPS Program with both technical and educational support. The Delaware Nutrient Management Commission (DNMC), described further in Section 7.6.2, was established to direct the DNMP and develop regulations pertaining to nutrient management, waste management for animal feeding operations (AFOs), and NPDES permits for concentrated animal feeding operations (CAFOs). The DNMP provides financial reimbursement to farmers and property managers for the writing of nutrient management plans (NMPs) for farms, golf courses, and urban turf facilities. The application process validates eligible nutrient applicators and plan writers.

The DNMP also administers the Nutrient Relocation Program (Section 7.3.2.2), the NMP Cost Assistance Program, certification of landowners and consultants, and education programs. Currently, 100% of Delaware farmland is required to have a NMP written by a certified plan writer. The DNMC is the certifying entity.

Oversight of AFOs and CAFOs: The Delaware CAFO regulations and program are promulgated and implemented under the authority of DNREC (7 Del.C. 60) and the DNMP (3 Del.C. 2200). DNREC is the EPA delegated agency charged with NPDES CAFO oversight and administration. The DDA, through a Memorandum of Agreement (MOA) signed in 2010 with DNREC, primarily manages the CAFO program under the supervision of DNREC. In accordance with the MOA, the DDA is the initial point of contact with the regulated community, reviews and makes initial permit determinations, performs most inspections and enforcement actions if warranted, and reviews and makes NMP determinations. In accordance with the MOA, among other activities, DNREC retains supervision and enforcement authority, jointly promulgates

CAFO regulations, approves final permit issuance and is the Delaware point of contact with EPA. DDA and DNREC are committed to maintaining and updating an MOA to address the roles and responsibilities of both parties as appropriate for programmatic oversight.

DDA and DNREC, along with NRCS and other stakeholders, worked collaboratively to evaluate federal requirements for state CAFO permits and update state CAFO regulations. Delaware's regulations were first revised in 2010, but EPA expressed concerns as related to definitions and inspection protocols in the 2010 version of the regulations. Delaware's newly revised CAFO regulations were published in the State Register of Regulations on November 1, 2011 and became effective on the same date. As a result of the modified regulations, medium-sized CAFOs and poorly managed AFOs of any size will also be covered under the CAFO regulations. Animals confined by CAFOs that currently do not have NPDES permits will be permitted. Permits will be reviewed once every five years, with the attached NMP required to be reviewed every three years at a minimum.

In accordance with the new state CAFO regulations, AFOs include any operation in which animals have been, are, or will be stabled or confined, fed, or maintained for a total of 45 days or more in any twelve month period. The confinement area must not sustain crops, vegetation, or forage growth, and post residues, such as corn stubble left over after a crop is harvested, cannot be sustained in the normal growing season. Two or more animal feeding operations under the same ownership are considered to be one operation if the production areas adjoin each other or if they use a common area or system for the disposal of manure or wastes. Initially, animal feeding operations determine their need to obtain permit coverage in accordance with the state's CAFO regulations. Through inspections, DDA and/or DNREC may also require an AFO to seek a CAFO permit. DNREC and DDA have also made *EPA's CAFO Duty to Apply Guidance* available to the regulated community to help owners and operators assess their need to apply for a CAFO permit. Guidance provided to Delaware's agricultural community will be adjusted as EPA adjusts their published guidance documents.

To verify that controls are installed and maintained, CAFO permits will be monitored at a frequency that will be agreed upon between EPA and Delaware through the 106 work plan process. It is anticipated that (1) compliance inspections of all permitted CAFOs will occur at least once every five years, (2) CAFO determination inspections of all unpermitted large CAFOs and all medium AFOs will be conducted as complaints warrant, and based on the Secretary of Agriculture's yet to be determined schedule and (3) on-site visits of AFOs for the purpose of evaluating criteria for designation will be conducted as warranted.

Goals and Objectives (2019-2024): Delaware will identify the number of animals confined in CAFOs by county. Almost the entire population of animals in CAFOs has NPDES permits; there are 382 currently being permitted statewide, and 61 of them are large poultry farms. (At the time of this update, there are actually over 400 NOIs with more coming in every week.)

The DNMC, dependent upon staffing levels, has a goal to inspect every facility with a NMP at least once during its lifecycle, therefore, at a minimum, once every three years. It is important to note that most nutrient management programs in Delaware are one year plans and assessed annually. With current staffing levels in place, this is a reasonable and achievable goal. The DNMP staff will perform all compliance inspections of AFOs and most inspections of permitted and unpermitted CAFOs as warranted. Like DNREC, the DNMP staff follows an education program before regulating the compliance strategy. When fines and or penalties are warranted and appropriate, Del. C., Title 7, Chapter 60 sets out the schedule.

7.3.2.2 Nutrient Relocation Program

The Nutrient Relocation Program provides financial reimbursement to farmers, brokers, and trucking businesses for the transportation cost of relocating litter from a Delaware farm to other farms for land application or to an alternative use project. The application process validates eligible senders, receivers, truckers, and alternative use projects. Excess litter continues to be transported for land application throughout Delaware as well as Maryland, New Jersey, and Virginia. The NPS Program provides financial support to the Nutrient Relocation Program.

7.3.2.3 Delaware Agricultural Lands Preservation Program

Delaware's Agricultural Lands (Aglands) Preservation Program was established in 1991 and is managed by the DDA. Through this program, landowners are able to voluntarily preserve their farms by selling their "development rights" to the state, thus preserving the land for agricultural use. Although the program allows very limited residential use on the land, by purchasing the development rights, the state has effectively purchased any rights to develop the land for a residential subdivision or commercial/industrial use.

While the permitted residential uses on land in the Aglands Program are limited, there are multiple benefits for participating landowners. First, unimproved land in the district is exempt from real estate transfer, county, and school taxes. Second, landowners are still able to use the land for various agricultural uses, including, but not limited to: crop production, herd animal and poultry operations, horse operations, forest production, non-commercial hunting, trapping and fishing, agricultural eco-tourism operations, farm markets and roadside stands. Third, an easement that is either sold at less than appraised value or donated to the Foundation may qualify the owner for a deduction for income, gift or estate tax purposes.

There are two phases in the Aglands Program. The first phase, known as an Agricultural Preservation District, consists of a 10-year, voluntary agreement wherein the landowner agrees to continue using their land for agricultural purposes only. The second phase, Agricultural Conservation Easement, allows the landowner to permanently preserve their farmland by selling its developmental rights. If enacted, phase two replaces the 10-year agreement of phase one. Each year, funding permitting, the Aglands Program selects one round of farms to preserve. Landowners are eligible to submit a bid to sell their farm's development rights the year after they enroll their farm into a District Agreement.

The NPS Program assists in the implementation of the Aglands Program by offering guidance and technical assistance at a programmatic level. The Aglands Program then provides the NPS Program with educational and technical support. The NPS Program invites many attendees from the Aglands Program to the NPS Annual Meeting to solicit guidance and input regarding further collaboration of NPS targeted programs.

7.3.2.4 Delaware Forest Service

Annually, the Delaware Forest Service (DFS) has state funds available for forestry practices statewide. Half of these funds are allocated toward urban forestry practices, including tree planting and tree maintenance sub-grants, and half is allocated to rural forestry projects. Sub-grant recipients are required to match with non-state funds at a 1:1 ratio. The program is available statewide, with no special considerations based on watershed location. The NPS Program provides financial support to DFS; while the DFS provides the NPS Program with technical, educational, and planning support. Additionally, the DFS assists the CREP program with facilities and staff during planting for CREP projects.

7.3.3 Delaware Department of Transportation Stormwater Quality Program

The mission of DelDOT's Stormwater Quality Program is to minimize the run off of pollutants from the roadway drainage system into Delaware surface waters. DelDOT is committed to engaging the public in stormwater pollution prevention.

Additionally, DelDOT has been delegated by DNREC to administer its own Sediment and Storm Water Management Program. The program requires all construction activities and development that disturbs over 5,000 square feet to develop a stormwater management and sediment control plan to be submitted for review and approval. The submission requires a summary of field conditions, hydrologic and hydraulic computations, a plan checklist and details for sediment control and storm water management practices. During construction DelDOT inspects the site regularly for compliance with the approved plans.

To assure programmatic compliance, DelDOT focuses of the following monitoring programs:

- *Illicit Discharge Detection and Elimination Program*
  A "dry weather condition" is the period following at least 72 hours after the most recent precipitation event measuring at least 0.10 inches or more. Dry weather screening involves locating, marking, and testing all stormwater outfalls in the NPDES Phase I and Phase II permitted areas of the state. Stormwater outfall coordinates are recorded with a Global Positioning System (GPS), uploaded into a Geographic Information System (GIS) and the data is used to create a map of the system.

  Screening involves recording physical characteristics of the outfall such as size, shape and location, and testing for the presence of pollutants if flow is present in the outfall during a dry day. The purpose of the dry weather screening is to identify any potential illicit discharges into stormwater drainage system and to investigate and eliminate the sources of the illicit discharge.

- *Storm Event Monitoring*
  "Wet weather sampling" is the collection of stormwater samples following a dry weather condition, commencing within 20 minutes of the start of precipitation with continued precipitation for 3.0 hours. The purpose of wet weather monitoring program is to collect stormwater samples for use in estimating stormwater pollutant loads in New Castle County. This program is conducted jointly with New Castle County government.

  Five sites in New Castle County were selected for monitoring: two in residential areas, one in an industrial area, one in a commercial area, and one along a highway. Samples are collected twice a year during representative rain events. The stormwater samples are analyzed to determine the concentrations of various pollutants present in the stormwater. This concentration data is used to estimate the amount of pollutants being discharged to waterbodies in New Castle County annually via stormwater.

- *BMP Performance Monitoring*
  Stormwater BMPs are used to reduce pollutants typically present in stormwater runoff, prior to the runoff entering streams and rivers. DelDOT has a long-term BMP performance monitoring and research program. This includes wet weather monitoring of stormwater outfalls and BMPs, as well as chemical and biological monitoring of streams that receive stormwater discharges from DelDOT maintained BMP's. Long-term objectives of DelDOT's BMP monitoring program include the following:

- Quantifying pollution removal abilities of BMPs;
- Identifying types and amounts of pollutants present in stormwater discharges from DelDOT maintained roads;
- Determining potential impact of stormwater discharges on water quality;
- Assuring compliance with regulatory standards;
- Provide design engineers with additional treatment options for difficult site-specific situations;
- Evaluating emerging stormwater treatment technologies;
- Determining unique problems, and solutions to problems, that occur with structural BMP retrofits; and
- Integrating DelDOT monitoring with watershed monitoring already being done by DNREC and others in an integrated biological, physical, and chemical monitoring and assessment approach.

The DelDOT is a NPS statewide partner that helps to restore and protect water quality within the state. DelDOT works independently with the common interest of reducing NPS pollutants to waters of the state. The NPS Program assists in the implementation of DelDOT programs by offering guidance and technical assistance at a programmatic level. The NPS Program invites many attendees from DelDOT to the NPS Annual meeting to solicit guidance and input regarding further collaboration of NPS targeted programs.

7.4 Local NPS Partners

The NPS Program will strengthen its working partnerships with appropriate local partners to consolidate and update watershed plans in priority watersheds where there is a clear water quality improvement benefit. The following sections provide descriptive summaries of local partner groups, agencies and programs that have significant NPS Program responsibilities.

7.4.1 Conservation Districts

The Conservation Districts are NPS county partners active in their respective counties helping to restore and protect water quality within the state. The Conservation Districts work independently with the common interest of reducing NPS pollutants to their respective county's waters. The NPS Program assists in the implementation of Conservation District programs by offering guidance and technical assistance at a programmatic level. The Conservation Districts then provide the NPS Program with financial, technical, educational, monitoring, staffing, cost-share, policy and planning, and assessment support. The NPS Program invites many attendees from the Conservation Districts to the NPS Annual Meeting to solicit guidance and input regarding further collaboration of NPS targeted programs.

7.4.1.1 New Castle Conservation District

The New Castle Conservation District (NCCD) Cost-Share Program assists landowners and land managers to design and install site-specific conservation practices on their property within New Castle County. A site visit by a NCCD planner, a completed application, and approval from the Board of Supervisors is required prior to construction. The cost-share rates and limitations vary according to the practice, with rates ranging from 30-75%. NCCD's cost-share program can provide financial and/or technical assistance for any agricultural BMP (Table 4) as approved by the NCCD's Board of Supervisors.

Goals and Objectives (2019-2024): The Board of NCCD and its Agricultural Advisory Committee continue to allocate conservation cost-share funds to their Cover Crop Program. As agricultural land decreases and urbanization increases, in New Castle County, progress will continue to decrease. The NCCD continues to make the best use of cover crop funding and leverages 319 funding 3:1 with other alternative sources (FY19).

7.4.1.2 Kent Conservation District

The Kent Conservation District (KCD) Cost-Share Program assists landowners and land managers with design and installation of site-specific conservation practices on their property within Kent County, Delaware. A site visit by a KCD planner, a completed application, and approval from the Board of Supervisors is required prior to construction. The cost-share rates and limitations vary according to the practice; cost-share rates range from 25-75%. KCD's cost-share program can provide financial and/or technical assistance for any agricultural BMP (Table 4) as approved by the KCD's Board of Supervisors.

Goals and Objectives (2019-2024): KCD will continue to promote its Cost-Share Program to all of Kent County, including the Chesapeake Bay watershed. Currently, cover crops are the number one priority of the KCD Cost-Share Program. Sign-ups for cover crops are offered for two weeks in August, as they are only planted during the fall. All other cost-share applications are accepted throughout the year. These producers go on a waiting list and once all cover crop requests are funded, if there is cost share funding remaining, District staff call the producers on the waiting list to determine if they are still interested in the BMP. Due to this process, it is difficult to quantify the funding gap(s) for the KCD Cost-Share Program, but this waiting list, which has been present for at least the past seven years, demonstrates that more BMPs are requested than funding allows for installation. This list and BMP requests varies and, at any given time, the waiting list can contain total cost-share requests for $3,500 to $425,000. If additional funds are available, the time spent on the waiting list will shorten and more implementation will occur. The KCD continues to make the best use of cover crop funding and leverages 319 funding, 5:1 with other alternative sources (FY19).

7.4.1.3 Sussex Conservation District

The Sussex Conservation District (SCD) Cost-Share Program provides financial assistance to landowners to implement BMPs to improve or enhance water quality and other natural resource concerns. A conservation planner will conduct an on-farm visit to assess the resource concerns on the farm. The planner will then develop a conservation plan and make recommendations on how to address those concerns. The SCD holds an annual sign-up for usually two weeks during the month of August. Once the applications for cost-share assistance are received, the applications are ranked and presented to the Board of Supervisors for approval. Cost-share approval must be received before construction or implementation of the conservation practice can begin. When the practice is completed, the landowner will bring in the bills for reimbursement. The cost-share rates range from 50% to 75%, depending on the practice. The SCD can provide financial assistance for agricultural BMPs (Table 4) as approved by the SCD Board of Supervisors and the Director of the Division of Watershed Stewardship.

Compliance Rates: The SCD has a compliance inspector on staff to conduct inspections of all BMPs in the county. Since hiring this inspector, program compliance has increased significantly. An estimate of the compliance rate is about 85% for those conservation practices within the lifespan of the contract. When a landowner is found to be out of compliance, the inspector begins an education process. If the landowner refuses to bring the practice into compliance, then a series of letters are sent out requiring repayment of cost-share and informing the participant that they will not be able to participate in future programs.

Goals and Objectives (2019-2024): SCD will continue to promote its Cost-Share Program to all of Sussex County, with priority given to targeted watersheds. Currently, cover crops are the number one priority of the SCD Cost-Share Program. Sign-ups for cover crops are offered annually in the early fall. The SCD continues to make the best use of cover crop funding and leverages 319 funding, 7:1 with other alternative sources (FY19).

Table 4. Agriculture BMPs Offered by Conservation District.

New Castle	Kent	Sussex
Composters	Animal & Agricultural Waste Handling Equipment	Access Roads
Critical Area Treatment Manure Storage Ponds	Critical Area Treatment	Additions to Existing Structures
Fencing	Dairy Waste Systems	Ag Composting Facilities
Filter Strips	Drainage Ditch Impoundments	Agricultural Waste Control Systems
Grade Control Structures	Equine Manure Dump Wagons	Constructed Wetlands
Grassed Waterways	Equine Manure Storage Structure	Cover Crop
Hedgerows	Erosion and Sediment Control Practices	Critical Area Plantings
Manure Storage Structures	Erosion and Sediment Control Structures	Diversions
Ponds construction (agricultural only)	Heavy Use Area Protection (Concrete Pads) for Poultry	Field Terraces
Riparian Forest Buffer	Heavy Use Area Protection for Dairy	Field Windbreak
Roof Water Management	Land Grading and/or Smoothing	Grade Stabilization Structures
Streambank Protection	Open Ditching	Grassed Waterways
Terraces	Ponds – NRCS Type 3 CRP, CP3A & CP23	Heavy Use Area Protections
Tree planting	Poultry Composter	Permanent Vegetative Cover
Upland Wildlife Habitat Plantings	Poultry Manure Storage Structure	Poultry Incinerators
Water and Sediment Control Basins	Sod Waterways	Poultry Windbreaks
Wetland Creation	Spray Irrigation Equipment	Roof Runoff Structure
Wetland Creation or Restoration (agricultural only	Tile Drainage	Roofed Animal Waste Structures
Wetland Wildlife Habitat Plantings (agricultural only)	Water and Sediment Control Basins	Shoreline Stabilization
Windbreaks	Windbreaks	Water and Sediment Control Basins
Winter Cover Crops		Water Control Structures
Woodland Improvement		Wildlife Plantings
		Wildlife Ponds

7.4.2 Nonprofit Organizations

The following nonprofit organizations are NPS watershed partners active in the Chesapeake Bay, Delaware Bay, and Inland Bays watersheds. They work independently with the common interest of reducing NPS pollutants to their respective watersheds. The NPS Program assists in the implementation of their programs by offering guidance and technical assistance at a programmatic level. These nonprofit organizations then provide the NPS program with financial, technical, educational, monitoring, policy and planning, and assessment support. The NPS Program invites many attendees from these nonprofits to the NPS Annual Meeting to solicit guidance and input regarding further collaboration of NPS targeted programs.

7.4.2.1 Center for the Inland Bays

The Delaware Center for the Inland Bays (CIB) was established in 1994 and was the culmination of more than 20 years of active public participation and investigation into the decline of the Inland Bays and the remedies for the restoration and preservation of the watershed.

The CIB was created to oversee the implementation of the Delaware Inland Bays CCMP, and to promote the wise use and enhancement of the Inland Bays watershed by conducting public outreach and education, developing and implementing restoration projects, encouraging scientific inquiry and sponsoring needed research, and establishing a long-term process for the protection and preservation of the inland bays watershed.

The CIB has three main goals:

1. To sponsor and support educational activities, restoration efforts, and land acquisition programs that lead to the present and future preservation and enhancement of the Inland Bays watershed;
2. To build, maintain, and foster the partnership among the general public, the private sector, and local, state, and federal governments, which is essential for establishing and sustaining policy, programs, and the political will to preserve and restore the resources of the Inland Bays watershed; and
3. To serve as a neutral forum where Inland Bays watershed issues may be analyzed and considered for the purposes of providing responsible officials and the public with a basis for making informed decisions concerning the management of the resources of the Inland Bays watershed.

7.4.2.2 Delaware Nature Society

The Delaware Nature Society (DNS) was founded in 1964 as a state affiliate for the National Wildlife Federation and focuses on educational programming, advocacy, and conservation. Their core mission is to connect people with the natural world and improve the environment through education, advocacy, and conservation. DNS manages over 2,000 acres of land, including four nature preserves, and operates four educational sites across the state. Their educational priorities consist of Three Pillars of Engagement that focus on working with natural lands, healthy waters, and protecting wildlife and habitats. Currently, DNS has over 1,000 volunteers and thousands of members.

7.4.2.3 Partnership for the Delaware Estuary

The Partnership for the Delaware Estuary (PDE) is a nonprofit organization established in 1996 to take a leadership role in protecting and enhancing the Delaware Estuary, where fresh water from the Delaware River mixes with salt water from the Atlantic Ocean. It is one of 28 congressionally designated National Estuary Programs throughout the coastal United States working to improve the environmental health of the nation's estuaries. The PDE leads science-based and collaborative efforts to improve the tidal Delaware River and Bay. Its staff works with partners in three states; Delaware, Pennsylvania, and New Jersey, to increase awareness, understanding, and scientific knowledge about the Delaware Estuary, the region's most important cultural, economic, and recreational resource.

7.4.2.4 Nanticoke Watershed Alliance

The Nanticoke Watershed Alliance (NWA) was originally established in 1992 when two conservation organizations in Maryland and Delaware merged across state lines. Then in 1995, the NWA established itself as a nonprofit and became a consortium of nearly 40 other organizations, including foresters, industries, small business owners, government agencies, environmental groups, land trusts, realtors, academicians, fishermen, restoration groups, farmers, and citizen groups. Currently, NWA's Board consists of representatives of different organizations working towards common goals for the Nanticoke River and its watershed.

NWA has the following core values:

1. Conservation;
2. Collaboration;
3. Communication;
4. Scientific integrity; and
5. Education.

7.5 Additional Funding Sources

Funding for the implementation of the NPS related BMPs comes from a variety of sources, including those described in Section 7.2 and Section 7.3. Additional funds are obtained by various partners and agencies from nonprofit partners and local government partners in the form of grants, in-kind, and cash match (Section 7.4). Any reduction of state and/or federal funding for programs related to NPS BMP implementation will affect the NPS Program's ability to implement the NPS Five-Year Management Plan and achieve the goals therein.

7.5.1 Clean Water Act, Section 106

Delaware and the EPA have historically developed work plans for the Section 106 NPDES Permit/Enforcement activities under this grant. These work plans seek to initiate a closer coordination and integration of EPA and state permitting/enforcement activities. It is anticipated that these activities will continue through the active period of the NPS Five-Year Management Plan.

7.5.2 Clean Water Act, Section 319

The Delaware NPS Program administers a competitive grant made possible through Section 319 of the federal CWA. The grant provides funding for projects designed to reduce NPS pollution in Delaware. Reduction of NPS pollution may often be achieved through incorporation of specific BMPs into project work plans. Projects may target any source of NPS pollution, but most frequently involve agriculture, silviculture, construction, marinas, septic systems, and hydromodification activities.

Eligible projects can be sponsored by both public and private entities, including local governments, tribal authorities, cities, counties, regional development centers, local school systems, colleges and universities, local nonprofit organizations, state agencies, federal agencies, individuals (limited to demonstration projects), watershed groups, and for-profit groups.

Priority will be given to those projects whose goal is to improve the water quality of priority watersheds with approved watershed management plans. The NPS Program may also prioritize funding according to additional environmental factors, such as land use and existing BMPs, especially if those factors indicate that certain projects will be more effective at reducing NPS pollution. Projects are usually one to three years in length, and grant recipients that failed to meet program requirements in the past may be ineligible to receive additional project funding.

7.5.3 Chesapeake Bay Funding Sources

7.5.3.1 Chesapeake Bay Implementation Grant

Chesapeake Bay Implementation Grant (CBIG) funding will be used by all of Delaware's Chesapeake Bay watersheds to manage a wide range of nutrient and sediment sources. These activities include bringing stakeholders together, evaluating progress through water quality monitoring and BMP data tracking, accelerating implementation of nutrient and sediment reducing activities, and contributing knowledge of new approaches to reduce nutrients and sediment with BMPs that are cost effective and sustainable. Technical support and cost share funding will be provided for more traditional agricultural BMPs, such as manure relocation and cover crops, while the effectiveness of targeting irrigation to reduce nutrient loadings will be investigated. Efforts will also be expended in the urban sector to install nutrient reducing practices like rain gardens on existing developed lands. Further education and outreach will also be done to promote the use of new green development practices.

7.5.3.2 Chesapeake Bay Regulatory and Accountability Program Grant

The Chesapeake Bay Regulatory and Accountability Program (CBRAP) grant aids Delaware in implementing and expanding regulatory, accountability, assessment, compliance, and enforcement capabilities in support of reducing nitrogen, phosphorus, and sediment loads delivered to the Bay to meet the Water Quality Goal of the 2014 Chesapeake Bay Watershed Agreement and the Bay TMDL. These grants are awarded non-competitively. CBRAP awards may support the implementation of the Chesapeake Bay WIP and related programmatic milestone commitments, including addressing EPA's evaluation of the WIPs and milestones, and comparable actions that support nutrient and sediment load reduction goals.

7.5.3.3 National Fish and Wildlife Foundation Chesapeake Bay Stewardship Fund

Annually, the National Fish and Wildlife Foundation's (NFWF) Chesapeake Bay Stewardship Fund has $8 - $10 million in grants and technical assistance available for projects in the Chesapeake Bay Watershed. Projects focused on green infrastructure improvements, conservation on private lands, urban stormwater management, improving local government capacity, and citizen based stewardship will be funded. DNREC intends to work with local government, state, federal, and non-governmental partners to submit proposals for this funding in the future.

In 2010, DNREC was awarded a $100,000 grant through the NFWF's program. This funding would support a proposal that aims to reduce nutrients and sediment from urban and rural nonpoint sources in the headwaters of the Delaware portion of the Chesapeake Bay watershed. Specifically, projects would be implemented in priority sub-watersheds: the Nanticoke, Chester, and Choptank Watersheds. BMPs utilized to achieve these reductions included innovative storm water retrofits and riparian, channel, and wetland restoration techniques.

7.5.4 Resource Conservation and Development Fund

The 21st Century Resource Conservation and Development (RCD) fund is available to finance major and minor flooding and drainage projects throughout the state. While these funds are limited, there should be a concerted effort to integrate water quality management in a retrofit manner into projects funded through this revenue stream.

7.6 Collaborations

Several mechanisms exist for facilitating program coordination and collaboration. The following sections describe coordination mechanisms commonly utilized for NPS management in Delaware.

7.6.1 Planning Process

The Preliminary Land Use Service (PLUS) provides for state agency review of major land use change proposals prior to submission to local governments.

The PLUS process involves reviews by all applicable state agencies at the start of the land development process, adding value and knowledge to the process without taking over the authority of local governments to make land use decisions.

Land use change proposals are submitted to state agencies through the Office of State Planning Coordination and are the subject of monthly PLUS meetings at which applicants meet with state agency resource experts to discuss their plans and identify possible problems and solutions.

The process has a three-fold purpose:

1. To identify and mitigate potential impacts of development which may affect areas beyond local boundaries;
2. To fully integrate state and local land use plans; and
3. To bring state agency staff together with developers and local officials, early in the process.

PLUS review meetings are generally held on the fourth Wednesday of each month. The NPS Program assists in the implementation of the PLUS program by offering guidance and technical assistance at a programmatic level.

7.6.2 Delaware Nutrient Management Commission

The mission of the Delaware Nutrient Management Commission (DNMC) is to manage those activities involving the generation and application of nutrients in order to help maintain and improve the quality of Delaware's ground and surface waters, and to help meet or exceed federally mandated water quality standards, in the interest of the overall public welfare (Section 7.3.2.1).

DNMC meetings are held on a monthly basis**.** The NPS Program assists in the implementation of DNMC programs by offering guidance and technical assistance at a programmatic level.

7.6.3 NRCS Delaware State Technical Committee

The Delaware State Technical Committee (DSTC) serves in an advisory capacity to the NRCS and other agencies of the USDA on the implementation of the natural resources conservation provisions of the Farm Bill legislation. The DSTC provides recommendations on a number of issues within a variety of conservation programs. Although the DSTC has no implementation or enforcement authority, USDA gives strong consideration to the DSTC's recommendations.

The DSTC is composed of individuals and groups who represent Delaware's diverse agricultural and environmental communities with interests in a variety of natural resource sciences and occupations, such as soil, water, air, plants, wetlands, and wildlife.

The DSTC meetings are held twice a year as needed. The NPS Program assists in the implementation of NRCS programs by offering guidance and technical assistance at a programmatic level during the DSTC meetings.

7.6.4 CIB Scientific and Technical Advisory Committee

The primary responsibility of the CIB Scientific and Technical Advisory Committee (STAC) is to provide objective scientific and technical advice and guidance to the Board of Directors of the CIB and other cooperating agencies with interests in the Delaware Inland Bays and their watersheds on matters of developing public understanding, interest, and participation in the implementation of the Delaware Inland Bays Comprehensive Conservation and Management Plan (CCMP). The STAC is a standing committee of the CIB and works under the authority of the Board of Directors and is subject to the bylaws of CIB. The STAC also serves to provide advice concerning the scientific and technical merit of proposals submitted to the CIB and by the CIB to other agencies.

The STAC serves as the primary advisor to the Board on scientific and technical matters and considers all relevant scientific and technical issues brought to its attention. In all roles, the STAC strives to receive the concerns from, and to build consensus among the user groups, local, state, and federal agencies, private industries, environmental groups, the scientific community, and general public, concerning the identification of strategies and projects to implement the CCMP and to increase public participation in the work of the CIB.

At a minimum, the STAC meets four times each year. The committee may meet more frequently, if deemed necessary. The NPS Program assists in the implementation of CIB programs by offering guidance and technical assistance at a programmatic level during the STAC meetings.

7.6.5 PDE Science and Technical Advisory Committee

The PDE STAC is a diverse body of scientists and resource managers who lend their technical expertise to enhance the health of the Delaware Estuary and its resources. The PDE STAC works collaboratively to provide expert advice and peer review for scientific and technical matters related to the National Estuary Program's (NEP) activities and goals. The PDE STAC is responsible for identifying and prioritizing science and technical needs, and it assists in PDE's efforts to raise awareness and funding resources. PDE STAC members assist PDE by serving on other technical committees and representing the needs of the Delaware Estuary. In addition to general quarterly meetings, PDE STAC sub-committees may meet more frequently to work on pressing issues.

The PDE STAC has many roles and functions such as providing advice and peer review, advancing the Delaware Estuary's CCMP, advancing needs elevated in the 2006 White Paper, developing issues papers and identifying emerging issues, assisting with refreshing the Partnership's estuary science needs assessment, integrating the needs of the Delaware Estuary across physical, chemical, and biological dimensions of the system, acting as the Steering Group for the Delaware Estuary Science Conference, facilitating communication and collaboration among other specialized science and technical committees, helping to raise awareness for the unique qualities and environmental importance of the Delaware Estuary, and assisting with identifying funding opportunities to address scientific needs to advance the overall NEP science agenda.

Meetings of the PDE STAC are held approximately each quarter. The NPS Program assists in the implementation of PDE programs by offering guidance and technical assistance at a programmatic level during the PDE STAC meetings.

7.6.6 Delaware NPS Program Advisory Committee

The NPS advisory committee brings together key stakeholders from numerous agencies and organizations with special interests in reducing NPS pollution in Delaware. Stakeholders represent the following entities: CIB; DDA; DFS; Other DNREC Divisions; DNS; EPA; Maryland Coastal Bays Foundation, Inc.; NWA; PDE; NCCD; KCD; SCD; Resource Smart, LLC.; UD; USFWS; DSU; USDA; and USGS.

From those stakeholders, special issue groups would be convened to determine the most appropriate way for the NPS Program to support initiatives associated with key issues, including project evaluation for grant funding. Additionally, based upon a comprehensive review of the NPS Program, a group of representatives may be formed to identify and develop projects that will directly address gaps in the essential activities of the program.

The Delaware NPS Program hosts a biennial advisory committee meeting for the purpose of providing major program, federal, and local updates, discussing the program's direction for the coming year, and presenting results from completed projects.

7.6.7 Delaware Association of Conservation Districts

The Delaware Association of Conservation Districts (DACD) is an organization comprised of the three Delaware Conservation Districts who jointly deal with resolving conservation issues by working with the public and state, county, and federal agencies. DACD hosts an annual meeting to facilitate collaboration between the districts and partners, develop and conduct conservation education programs for youth and adults, build the fiscal independence of the districts, develop marketing strategies, enhance Legislative support, and develop long term plans.

The NPS Program assists in the implementation of DACD programs by offering guidance and technical assistance at a programmatic level during the annual meeting.

7.6.8 Water Infrastructure Advisory Council

The Water Infrastructure Advisory Council (WIAC) initiates, develops, and recommends to the Delaware General Assembly projects for the planning, construction, repair, renovation, or expansion of drinking water and wastewater facilities. The council provides guidance and policy advice to the Governor and Secretaries of DNREC, Delaware Health and Social Services, and Finance along with assistance in developing funding options for capital and maintenance programs related to drainage, stormwater management, and flood control throughout Delaware. The Council is also charged with providing assistance in the development and evaluation of criteria for watershed-based plans for surface water management.

Meetings are held monthly. The NPS Program assists in the implementation of WIAC programs by offering guidance and technical assistance at a programmatic level during the monthly meetings.

7.6.8 Chesapeake Bay Interagency Workgroup

To ensure that Delaware adheres to EPA's expectations for developing the Chesapeake Bay WIPs, the DNREC convened the state's Chesapeake Bay Interagency Workgroup to address the situation. The group was made up of representatives from the departments of Natural Resources and Environmental Control, Agriculture, and Transportation; the Office of State Planning Coordination; county conservation districts; the U.S. Department of Agriculture; and other key stakeholders. For the Phase III WIP, the workgroup was reconfigured into the overarching Chesapeake Bay WIP Steering Committee and two sector steering committees—the Developed Sector WIP Steering Committee and the Agricultural Sector WIP Steering Committee—to address the issues involved in developing the Phase III WIP. Each committee brought together stakeholders with interests and expertise in specific areas of the WIP to streamline the development process. Committees were tasked with recommending, reviewing, and sub-allocating methodologies to the various point and nonpoint sources within the sectors, assessing current data tracking and reporting systems, determining maximum implementation goals and methods to fill program and funding gaps, and assisting with providing input and writing sections of the WIP. The committees also communicated proposed actions to the respective stakeholder groups and solicited their input on WIP elements.

8 Goals and Milestones

8.1 The Delaware NPS Program

The Delaware NPS Program has established a series of environmental goals that aim to restore impaired waters, protect high quality waters and wetlands, and control NPS pollution.

The NPS Program will use these goals and measures of success (milestones) to assess and report on the NPS Five-Year Management Plan effectiveness. The goals listed in Table 7and Table 11correspond with items the Delaware NPS Program aim to achieve in the NPS Five-Year Management Plan (short-term) or by 2030 (long-term). Strategies represent methods that will be utilized to meet the NPS Program's goals and milestones are checkpoints used to assess and/or evaluate the progress towards achieving the goals.

The goals and measures of success cover two main categories:

1. General NPS Program activities (statewide)
2. Watershed-Specific Program activities (priority watersheds)

Other extended-term milestones (Table 5), in addition to short- and long-term goals (Table 7 and Table 11), will be used to evaluate and assess the overall success of the NPS Five-Year Management Plan. These milestones do not align with individual short- or long-term goals. Rather, these milestones will be completed based on the cumulative success of all goals. Furthermore, corresponding strategies necessary to achieve each extended-term milestone are listed. These milestones will be revisited and revised, as needed, during each five year review.

Table 5. Extended-term milestones, timelines, and corresponding strategies.

Milestone	Strategy	Timeline
Show water quality improvement in 50% or more of the high priority watersheds and monitored priority watersheds as reported within the NPS Annual Report. Water quality will be improved and demonstrated through a measure of increased load reductions. Load reductions will be calculated via Delaware's nutrient reduction calculation table.	Implement Nine Element Watershed Plans to fund programs/projects in targeted, high priority watersheds and model/calculate load reductions achieved.	FY 2019 – 2030
Remove one water bodies currently listed for nutrient pollutants from the 2030 303(d) list per year	Implement Nine Element Watershed Plans to fund programs/projects in targeted, priority watersheds. Partner with DNREC Watershed Assessment Section to demonstrate priority watershed is worthy of 303(d) List removal.	FY 2019 – 2030

8.1.1 General Delaware NPS Program

The General NPS Program component consists of activities used to address NPS pollution issues on a statewide scale. Key elements of this component include:

1. *Information, Education, and Technical Assistance Programs*
   Water quality information and education programs are funded across the state through a variety of outreach efforts. These programs are essential in providing education that highlights the importance of restoring and protecting water resources for current and future generations. In addition, local agencies, such as conservation districts, NRCS field offices, county extension offices, and other DNREC offices, provide technical assistance for implementing a wide variety of water quality BMPs.

2. *Integration with Existing Programs*
   A variety of local, state, and federal programs have established planning activities that address NPS and/or water quality improvement objectives. Integration of water quality protection considerations early in ongoing land use planning, management, and development processes can help ensure that impacts to the state's bays, ponds, streams, and rivers are avoided or minimized.

8.1.2 Watershed-Specific Delaware NPS Program

The Watershed-Specific NPS Program consists of activities used to address NPS pollution issues on a watershed scale. NPS practices targeted to priority watersheds are instrumental in both restoration and protection efforts. Priorities of watershed-specific NPS plans and programs include:

1. Restoring priority watersheds that have been listed as impaired on the 303(d) List of Impaired Waters and have an EPA-approved Nine Element Watershed Plan;
2. Protecting source water protection areas for public water supplies and high value resources, such as special aquatic life use waters, Exceptional State Waters, and high quality wetland and riparian areas.

Implementation of water quality restoration and protection measures to address targeted NPS priorities will be accomplished through:

1. *The development of targeted NPS watershed plans*
   Targeted watershed plans fall into two categories: Source Water Protection Plans and EPA-approved Nine Element Watershed Plans (Section 3.6). Source Water Protection Plans are focused on protecting surface and groundwater sources that provide public water supply. They can be implemented through local, state, or federal assistance programs, depending on the specific protection measures included in the plan.

2. *Integrating targeted areas with existing program and plan implementation*
   Local, state, and federal programs are encouraged to prioritize watersheds and target areas in existing plans.

   The local level includes Conservation Districts, the Delaware Nutrient Management Commission (DNMC), urban storm water programs, local comprehensive plans, and other applicable local programs. Local plans developed by county conservation districts and protection plans developed by local environmental groups are examples of local plans and programs that can be utilized to address the restoration of impaired waterbodies and target resources to priority water quality watersheds.

   State partners, such as Conservation Districts and the DNMC, are encouraged to consider prioritizing watersheds and NPS related practices and projects for their cost share funding allocations and program prioritization. DelDOT is encouraged to consider BMP implementation above and beyond those required by MS4 coverage.

Restoration and protection are included as factors in the ranking criteria for funding applications for Federal USDA Farm Bill Programs, primarily EQIP. State water quality priority areas were also considered in selecting Conservation Priority Areas for the CRP. Other federal agencies, such as the USGS, conduct a number of assessment and monitoring studies addressing TMDLs and other water quality issues through cooperative agreements with state and local partners.

3. *Water quality monitoring*
   Water quality monitoring provides evidence of changes in water quality and necessary data to develop models and TMDLs to meet the CWA goals for restoring the physical, chemical, and biological properties of Delaware's waters. Monitoring will be needed to document changes as the priority watershed plans are implemented. In order to assess the quality of Delaware's surface waters, the state's bays, ponds, streams, and rivers are monitored on a regular basis.

   Currently, Delaware has access to an array of water quality monitoring components from multiple partners. The USGS maintains a National Water Information System (NWIS) and has several active stations within Delaware where stream flow, tidal stage, and chemical and physical data are collected. Additionally, DNREC Divisions and multiple citizen science-based programs throughout the state collect and report water quality data (Section 6).

   The state Water Quality Monitoring Network is used for the tracking water quality improvements in impaired water bodies for 303(d) delisting purposes, as water bodies that meet water quality standards will be removed from the 303(d) List of Impaired Waters. Achievement of water quality protection goals will also be determined via this network through maintenance of water quality conditions. Additional listing of water bodies on the 303(d) List may also occur in the future, if water quality data indicates impairment of designated uses.

8.2 Short-Term NPS Program Goals

The Delaware NPS Program will work towards achieving key short-term goals (Table 7) for the NPS Five-Year Management Plan. Short-term goals will be achieved utilizing a diverse set of strategies (Section 8.2.1) and assessed with milestones (Section 8.2.2). Achievement of these goals will help Delaware's NPS Program meet its load reduction targets (Table 6).

General NPS Program goals listed in Table 7 are statewide in nature and account for waterbodies that do not have EPA approved watershed plans. These waters remain valuable and should not be discounted form NPS targeted activities. Watershed-Specific goals are on a watershed-scale for waterbodies that do have approved watershed plans (e.g. Nine Element Watershed Plan).

Table 6. Delaware NPS Program's Annual load reduction targets, divided by watershed. DNREC model used for calculations. For more information, see Appendix B.

Watershed	**NPS Program Annual Report Load Reduction**	
	Nitrogen (lb/year)	**Phosphorus (lb/year)**
Chesapeake Bay	741,792	14,820
St. Jones River	13,306	675
Inland Bays	144,638	5,019
Broadkill River	46,414	1,195
Appoquinimink River	11,273	584
Christina Basin	1.15	1.77
Total	**957,424**	**22,295**

Table 7. Delaware NPS Program short-term goals on either a statewide or watershed-wide scale.

Goal	Type	Strategies To Meet The Goal	Milestones Used to Evaluate
Support local and state programmatic capacity to address NPS issues and priorities	General NPS Goal	Strategies 1 - 23	Milestones 1 - 2
Enhance collaboration among local, state, and federal agencies and private sector organizations addressing NPS pollution	General NPS Goal	Strategies 1 - 23	Milestones 1 - 2
Implement statewide pollutant-specific strategies to reduce nutrient and sediment pollutants originating from NPS pollution	General NPS Goal	Strategies 1 - 23	Milestones 1 - 2
Enhance targeting of federal, state, and local programs that provide technical and financial assistance for the implementation of BMPs in priority watersheds	Watershed-Specific NPS Goal	Strategies 24 - 34	Milestones 3 – 7
Establish continuous monitoring for selected parameters at key points in priority watersheds to collect important data for future modeling efforts	Watershed-Specific NPS Goal	Strategies 24 - 34	Milestones 3 – 7
Over the next two years, reduce annual load reductions of total nitrogen and total phosphorous in Delaware's priority watersheds (watersheds that have Nine Element Watershed Plans) as reported within the NPS Annual Report.	Watershed-Specific NPS Goal	Strategies 24 - 34	Milestones 3 – 7
Target the implementation of BMPs in priority watersheds, as described within EPA-approved Nine Element Watershed Plans, to prevent the occurrence of pollution problems affecting quality water to avoid future impairment of state waters	Watershed-Specific NPS Goal	Strategies 24 - 34	Milestones 3 - 7
Improve BMP data tracking by developing a comprehensive data management system to capture BMPs not funded by the NPS Program. Additionally, incorporate BMP information similar in format to Chesapeake Bay reporting to capture and assess future load reductions in Chesapeake Assessment Scenario Tool (CAST).	Watershed-Specific NPS Goal	Strategies 24 - 34	Milestones 3 - 7

8.2.1 Short-Term NPS Program Strategies

Strategies are the methods that will be used to work towards and achieve the goals. The following strategies correspond with the short-term goals listed in Section 8.2 above.

Table 8. Short-term strategies and corresponding completion timelines.

	Strategy	Timeline
1	Coordinate with Delaware agencies through the State Land Use Planning Process to assure NPS priorities are included	FY2019 - 2021
2	Participate on the NRCS State Technical Committee and work with NRCS and FSA to ensure federal funding is being directed to address NPS priority issues to the extent possible through applicable federal programs (i.e. EQIP, WRP, CRP, CREP)	FY2019 - 2024
3	Support the development of source water protection plans, PCSs, and the implementation of water quality BMPs for activities and projects not addressed through other programs that could adversely affect water quality	FY2019 – 2021
4	Provide adequate technical assistance to implement water quality BMPs through collaborative partnerships among local, state, and federal agencies and conservation organizations	Implement in FY2019 - 2024
5	Maintain a statewide monitoring program (e.g. Watershed Assessment Program) to assess water quality conditions and determine fulfillment of water quality standards. As the NPS Program relies on the Watershed Assessment Program to conduct Delaware's water quality monitoring, additional collaboration and support will be provided	FY2019 - 2024
6	Inform local and state decision-makers of program accomplishments through publication and dissemination of NPS Program Annual Reports, targeted fact sheets, and other media during budget development (June), Delaware State Fair (July), and other outreach events (four events annually)	Annually FY2019 - 2024
7	Support youth and adult NPS education by participating in event, such as the Delaware Envirothon (April), Delaware State Fair (July), and Coast Day (October)	FY2019 - 2024
8	Support youth education through programs that instill an understanding and appreciation for water resource protection, restoration, and conservation in future generations	FY2019 - 2024
9	Include information and education components in all local NPS plans (e.g. PCSs, NPS Watershed Plans, etc.)	FY2019 - 2024
10	Coordinate with local extension and other outreach programs at the community level that address water quality education for youth and adults	FY2019 - 2024
11	Support community efforts to recognize individuals involved in local water quality restoration and protection projects and celebrate local project successes	FY2019 - 2024
12	Continue to actively utilize existing coordination mechanisms, including: Delaware PCSs Implementation; DACD; DE State Technical Advisory Committee; and DNMC.	FY2019 - 2024
13	Expand opportunities for enhanced collaboration with NPS partner organizations	FY2019 - 2024
14	Establish more direct interaction with state agricultural, urban, and environmental organizations on NPS issues and management needs at annual meetings, conferences, etc.	Initiate in FY2019 - 2024
15	Conduct biennial NPS Program meetings to enhance collaboration with existing and potential NPS partners	FY2020, 2022, 2024
16	Improve information sharing among existing programs to track the status of NPS program implementation	FY2019 - 2024
17	Identify information needs shared by multiple agencies and organizations	FY2019 - 2022

18	Establish a mechanism to efficiently report and share program information among interested parties (e.g. NEIEN Process)	Completed annually
19	Continue to utilize the Delaware Water Pollution Control Revolving Fund for NPS projects and explore opportunities to expand use of this program in the future	FY2019 - 2024
20	Seek opportunities to collaborate with other agencies and organizations to leverage funding that can accomplish multiple environmental objectives in addition to NPS pollution control, water quality improvement, wildlife habitat protection, and stormwater/flood management	FY2019 - 2024
21	Develop and implement pollutant-specific strategies for sediment and nutrients to restore impaired waters and protect Delaware's Watersheds that have a draft or approved PCS	FY2019 - 2022
22	Work collaboratively with agencies and stakeholder groups in Delaware to facilitate implementation of PCSs	FY2019 - 2020
23	Integrate pollutant-specific strategies with ongoing programs including the DDA, Delaware Conservation Districts, FSA, NRCS, and other applicable programs to facilitate PCS implementation	FY2019 - 2020
24	Implement approved Nine Element Watershed Plans in an effort to fund programs and projects in targeted, priority watersheds	FY2019 - 2022
25	Track progress of water quality improvements in priority watersheds through targeted monitoring and/or modeling programs	FY2019 - 2022
26	Target technical and financial assistance to implement BMPs in priority watersheds	FY2019 - 2022
27	Establish NPS Program priorities and ranking criteria that focus BMP implementation to priority watersheds for the purpose of restoration or protection	FY2019 - 2022
28	Enhance NPS Program coordination to address BMP Implementation priorities in partnership with applicable federal, state, and local programs	FY2019 - 2022
29	Develop an inventory of NPS BMP needs in priority watersheds	FY2019 - 2024
30	Support targeted BMP implementation efforts in partnership with Delaware Conservation Districts, DDA, FSA, NRCS, and other applicable programs, agencies, or organizations	FY2019 - 2024
31	Work with the NPS Program partners to explore opportunities and mechanisms to protect priority watersheds	FY2019 - 2022
32	Continue interagency support for watershed, wetland, and riparian area protection including inventory, assessment, prioritization, and planning projects through Delaware's Watershed Assessment Program	FY2019 - 2022
33	Support a statewide monitoring program (e.g. Watershed Assessment Program) to assess water quality conditions and determine fulfillment of water quality standards. As the NPS Program relies on the Watershed Assessment Program to conduct Delaware's water quality monitoring, additional collaboration and support will be provided. The Department will work with the partners to identify Federal and state funding sources that can be used to develop and implement a comprehensive monitoring plan for headwater streams and continuous monitoring programs at key locations	Continuous
34	The Department will work with stakeholders, including volunteer monitoring organizations, to address current gaps in water quality monitoring	Continuous
35	Review and update watershed based plans every 10 years or sooner as land use or water quality conditions may change.	Continuous

8.2.2 Short-Term NPS Program Milestones

Milestones are checkpoints and criteria intended to assess progress made towards the goals. The following milestones correspond with the short-term goals in Section 8.2 and reference the baseline loads in Table 10.

Table 9. Short-term milestones for the 2019 NPS Five-Year Management Plan

	Short Term NPS Program Milestones	Timeline
1	Increase annual load reductions in Delaware watersheds and priority watersheds by 2% annually from baseline	FY2019 - 2024
2	Increase number of outreach and education interactions by 10% over FY 2018 baseline (approx. 8,500 and 3,500 interactions, respectively)	FY2019 - 2024
3	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	FY2019 – 2024
4	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. DNREC maintains delisting records and are included in this report.	FY2019 - 2024
5	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.	FY2019 - 2024
6	Remove an identified impairment from a Land River Segment currently included on Delaware's list of impaired waterways	FY2019 - 2024

Table 10. Baseline loads for priority watersheds developed by DNREC's Watershed Assessment Section.

WATERSHED	BASIN	Condition	Period of Estimation	TN Baseline Load or TMDL Load (lb/yr)	TP Baseline Load or TMDL Load (lb/yr)
Brandywine Creek	Piedmont	NPS Baseline	10/1/94 - 10/1/98	162,920	11,109
Red Clay Creek	Piedmont	NPS Baseline	10/1/94 - 10/1/98	141,586	11,340
White Clay Creek	Piedmont	NPS Baseline	10/1/94 - 10/1/98	222,761	11,896
Christina River	Piedmont	NPS Baseline	10/1/94 - 10/1/98	291,932	16,008
Appoquinimink River	DE Bay	NPS Baseline	(5/91--7/91) / (8/91-- 10/91)	181,326	23,300
Lums Pond Sub-Watershed within C&D Canal East Watershed	DE Bay	NPS Baseline	7/2009 - 6/2011	18,250	708
C & D Canal West/Elk Creek/Perch Creek	Chesapeake Bay Drainage	NPS Baseline	2006-2009	72,380	2,628
Bohemia Creek /Sassafras River	Chesapeake Bay Drainage	NPS Baseline	2006-2008	156,012	2,303
Chester River	Chesapeake Bay Drainage	NPS Baseline	2001 - 2003	258,420	19,929
Choptank River	Chesapeake Bay Drainage	NPS Baseline	2001 - 2003	496,035	46,355
St. Jones River	DE Bay	NPS Baseline	2002/2003	523,374	38,336
Broadkill River	DE Bay	NPS Baseline	2002/2003	1,353,055	57,597
Nanticoke River (including Broad Creek)	Chesapeake Bay Drainage	NPS Baseline	1992	1,829,745	43,435
Pocomoke River	Chesapeake Bay Drainage	NPS Baseline	1997-2003	82,636	4,928
Rehoboth Bay and Indian River Bay	Inland Bays	NPS Baseline	1988 - 1990	1,623,155	59,495
Little Assawoman Bay	Inland Bays	NPS Baseline	1998 - 2000	217,266	18,025
Wicomico River	Chesapeake Bay Drainage				

8.3 Long-Term NPS Program Goals

The long-term goals of the Delaware NPS Program (Table 11) prioritize the restoration of high priority TMDL watersheds, the protection of high value waterbodies designated for exceptional state waters (e.g. ERES designation) and wellhead areas/public water supply watersheds, and the restoration and protection of watersheds designated under Federal Executive jurisdiction (e.g. Chesapeake Bay Watershed.). Long-term goals, like short-term goals, will be assessed and achieved by using the milestones and strategies listed in Section 8.3.1 and Section 8.3.2, respectively.

In addition to the long-term goals, the NPS Program will strive to continuously comply with the following annual grant commitment responsibilities, as amended (FY 2019-2024):

1. Implementation of the NPS Five-Year Management Plan;
2. Administration of the CWA Section 319 grant program;
3. Projects funded wholly or in part with CWA Section 319 funding will be spatially located and tracked. All other locatable projects will be entered at the HUC-12 scale;
4. Complete Grant Reporting and Tracking System (GRTS) data entry for EPA annual Winter data pull;
5. Complete semi-annual performance report;
6. Hosting the biennial NPS Program meetings;
7. Development of the NPS Annual Report;
8. Maintain EPA's watershed plan tracker; and
9. Assist in the development of Watershed Plans and/or PCSs.

Table 11. The long-term goals of the Delaware NPS Program.

Goal	Type	Strategies To Meet The Goals	Milestones Used to Evaluate Goals
All the state's bays, ponds, streams, and rivers that are adversely affected by NPS pollutants shall be restored to all designated uses.	General NPS Goal	All strategies	All milestones
Delaware will use monitoring and a targeted watershed approach to identify, prioritize, and initiate restoration of impaired waters.	General NPS Goal	All strategies	All milestones
Delaware will use monitoring and a targeted watershed approach to identify, prioritize, and initiate protection from further degradation of water quality or "hold the line" on impaired waters of the state.	General NPS Goal	All strategies	All milestones
Delaware surface and ground water is protected from all NPS pollutants through the implementation of water quality BMPs.	General NPS Goal	All strategies	All milestones

8.3.1 Long-Term NPS Program Strategies

Strategies are the methods that will be used to work towards and achieve the goals. The following strategies correspond with the long-term goals listed in Section 8.3 above.

Table 12. Long-term strategies that will be utilized to meet the long-term goals.

	Strategy
1	Utilize a watershed approach for restoring and protecting priority watersheds using a method that engages stakeholders within the affected watersheds
2	Integrate the management of surface and ground water to achieve comprehensive environmental protection and restoration, including full support of designated uses of water
3	Target financial and technical resources to priority watersheds for restoration of impaired waters and protection of high value waters
4	Protect public water supplies and surface and ground water through the development and implementation of Delaware source water protection plans
5	Encourage proper management of the state's bays, ponds, streams, and rivers to help achieve and maintain properly functioning watersheds
6	Promote voluntary, locally-led, and incentive-based strategies to address NPS issues while ensuring that regulatory requirements are adhered to when applicable
7	Establish and strengthen partnerships among stakeholders at local, state, and federal levels that play a role in the management of NPS pollution sources

8.3.2 Long-Term NPS Program Milestones

Milestones are checkpoints and criteria intended to assess progress made towards the goals. The following milestones (Table 13) correspond with the long-term goals in Section 8.3 and will be achieved using the following additional strategies:

1. Implementing Nine Element Watershed Plans to fund programs/projects in targeted, priority watersheds (all long-term milestones);
2. Support monitoring efforts to demonstrate improvements (milestone 2);
3. Model/calculate load reductions achieved (milestone 3);
4. Research, apply, and secure additional funding for BMP implementation in Delaware's priority watersheds (milestone 3); and
5. Partnering with DNREC Watershed Assessment Section to demonstrate priority watershed is worthy of 303(d) List removal (milestone 4).

Table 13. Long-term milestones are listed with a timeline and corresponding progress updates. Milestone deliverables ensure a measureable result to assess completion/improvement.

Milestone		Deliverable	Timeline	Progress to Date
1	Show significant progress towards completion of implementation activities for all Delaware's priority watersheds with approved Nine Element Watershed Plans	Water quality will be improved and demonstrated through a measure of increased load reductions. Load reductions will be calculated via Delaware's nutrient reduction calculation table	By FY2030	Assessment will be complete in 2019 as part of Management Plan update.
2	Demonstrate water quality improvement in 20% or more of the priority and monitored priority watersheds as reported in the NPS Annual Report		By FY2030	DNREC maintains delisting records and are included in this report.
3	Show annual increases in funding and quantities of BMPs implemented in priority watersheds	BMP implementation rate increases annually compared to previous year's implementation rate	Annually through FY2030	DE's NPS Program has leveraged funding on a project through the NRCS Regional Conservation Partnership Program (RCPP) for buffers around stormwater management ponds in poultry headquarters. Additionally, NPS worked with the Maryland Environmental Finance Center and the NWA on a project funded by the NFWF. The goal of the project is to develop a stormwater management strategy that targets programming for a variety of regulated and unregulated landowners in the region to meet Chesapeake Bay Phase III WIP 2025 goals. In 2019, NPS will collaborate with agricultural partners to submit another RCPP grant application through NRCS.
4	Remove one water body currently listed for nutrient pollutants from the 303(d) List	One waterbody removed from 303(d) List annually	Annually through FY2030	High priority TMDLs are monitored closely by the State and are reviewed in 303(d) Lists created by WAMS. DE NPS Program's GIS coordinator worked with closely with WAMS and EPA in 2018 to update the ATTAINS database.

8.4 Funding Milestones

In addition to the above NPS Five-Year Management Plan milestones, funding milestones will be utilized for plan evaluation (Table 14). The available funding sources for the NPS Five-Year Management Plan are described in Section 7. These milestones will be revisited during each five-year review period and revised as appropriate.

Overall, federal CWA 319 funding has decreased over the years for the NPS Program. The level of funding from the 319 Program has decreased -14.95% since 2009 (Table 15). With a constant level of funding from the 319 Program, it is anticipated that the level of BMP implementation also will remain constant leading to a plateauing of NPS pollution reductions. Increased funding would accelerate Delaware's reductions in NPS pollution controls. Despite decreases in core 319 funding the NPS program has worked with partners across the state to leverage funding from several other pollution control funding programs. For example, NPS has worked with the County Conservation Districts and NRCS to procure over $4 million in NRCS RCPP funding within the past five years. Creating access to more conservation practices for rural landowners.

Table 14. Milestones associated with funding and funding sources.

Milestone	Timeline	Progress to Date
DNREC and DDA will continue to coordinate with the NRCS State Conservationist to develop a plan to better leverage USDA Farm Bill funding with existing state cost share programs	Ongoing	DNREC and DDA continue to meet with the NRCS State Conservationist to evaluate and expand cost share programs. Since the inception of the Regional Conservation Partnership Program, the State has procured approximately $4M for 6 projects targeting implementation of cover crops, nutrient management, stream restoration, and animal waste management systems. In 2016, additional funding was provided in support of DE's NWQI. In 2019, approximately $3M was appropriated for cover crops in the State Operating Budget.
CB WIP Implementation: Delaware will review EPA's analysis and further develop and refine the estimate of the annual and total costs associated with achievement of the TMDL goals and milestones through 2025 and 2017 according to the approved WIP	Ongoing	Ongoing – the draft CB WIP was submitted to the EPA and available online.
Coordinate and leverage restoration expenditures with the DFS, NRCS, DelDOT, mitigation funds, in-lieu funds, penalty funds, etc.	Ongoing	Ongoing – NPS continues to work with partners to expand funding opportunities for local partners and provide opportunities for citizens of the State.
Develop a comprehensive list of funding sources including grants, loans, etc. for partners.		DNREC hosts funding opportunities on webpages and has compiled a list of sources for local governments.
Work with partners, including	Ongoing	The NPS Program works with local partners to

local governments, nonprofit partners, and partner agencies to develop and submit grant applications for implementation of water quality projects.		advertise and assist with grant preparation and procurement when possible. All grants administered by the Program are provided online with submission instructions.

Table 15. Level of funding from the USEPA 319 program and change over time. For more information, see Appendix B.

Fiscal Year	Dollars	Percent Change
2009	1,381,151	N/A
2010	1,525,448	-10.45
2011	1,244,384	-18.43
2012	1,123,000	-9.75
2013	1,825,000	+62.51
2014	1,934,346	+5.99
2015	1,907,844	-1.37
2016	1,154,706	-39.48
2017	1,265,500	+9.59
2018	1,174,612	-7.18
2019	1,174,612	0
2020 (Projected)	1,174,612	0

9 Assessing Progress

The short- and long-term goals identified within the NPS Five-Year Management Plan (Section 8) will be used to determine the success of the program over the next five years and will result in actual, measurable changes in water quality at the watershed scale. Short-term improvements in water quality are difficult to demonstrate (i.e., within the five-year timeframe) given the variability of geology, natural systems, resources available to address the problems, and the extent and nature of the NPS pollution problem.

The NPS Program currently has four main mechanisms for assessing the overall progress and success of the Program beyond water quality monitoring:

1. The NPS Program uses EPA's GRTS to document project-level information that addresses progress that is achieved through funding provided by the Federal CWA Section 319 Grant;
2. The NPS Program documents progress in achieving NPS Program goals within annual reports, submitted annually to EPA;
3. The NPS Program requires sub-grantees to complete project-specific annual reports to track progress of water quality restoration efforts in priority watersheds; and
4. Chesapeake Bay Accountability Framework.

While tracking progress made toward achieving NPS Program goals is relatively straightforward for the responsible party (the NPS Program), there are significant challenges in attempting to track progress in addressing NPS pollution by other organizations. For example, other organizations, such as the NRCS, Conservation Districts, DDA, etc., undertake a multitude of efforts to reduce NPS pollution and improve water quality. Future Program efforts will focus on tracking progress similarly to the scale of the Chesapeake Bay data in specific priority watersheds of interest.

EPA also evaluates Delaware's NPS Program using its own strategic targets and program activity measures and works with the NPS Program in reporting on the progress toward accomplishing those measures. These measures include:

- Number of waterbodies partially or fully supported;
- Number of watershed-based plans supported by the Section 319 Program;
- Estimated pounds of nitrogen reduced from Section 319 projects in nitrogen-impaired waters;
- Estimated pounds of phosphorus reduced from Section 319 projects in phosphorus-impaired waters;
- Estimated tons of sediment reduced from Section 319 projects in sediment-impaired waters; and
- Watershed trends toward meeting water quality standards.

9.1 Measuring Progress

In addition to the milestones listed in Section 8, the milestones and program indicators in Table 16 and Table 17, respectively, were utilized to measure the programmatic success of Delaware's NPS Five-Year Management Plan Program. Indicators were measured on a state fiscal year basis (June 30 – July 1). Some program milestones have been completed while future interim goals and milestone updates are listed along with each program indicator.

Table 16. A summary schedule of goals, objectives, strategies, and program indicators.

Short-, Mid-, and Long-Term Milestones	
Short- and Mid-Term Milestones (2019 – 2024)	**Estimated Due Date**
Establish baseline conditions for program indicators	COMPLETE
Complete approval of all existing watershed plans	COMPLETE
Complete baseline sampling for initial priority watersheds	COMPLETE
Remove NPS-related impairments from stream segments	2024
Assess interim and 2020 progress milestones	2024
Review and update plan as needed	2024
Show relative progress towards BMP implementation activities for all the EPA approved Nine Element Watershed Plans	2024
Demonstrate water quality improvement in the priority watersheds resulting from plan implementation activities	2024
Show a 10% decrease of pollutant loadings in 50% or more of the priority watersheds	2024
Show annual increases in funding and quantities of BMPs implemented in priority watersheds	Annual through 2024
Remove one stream segment per year from the 303(d) List through 2019	Annual through 2024
Long-Term Milestones (2019-2030)	**Estimated Due Date**
Complete BMP implementation for 75% of the EPA approved Nine Element Watershed Plans	2030
Remove 50% or more of high priority TMDLs from 2010 303(d) List	2030

Table 17. Program indicators and their associated interim goals and milestone updates.

Indicator	Interim Goal	**Milestone Update**
Amount of state and federal BMP funding spent in priority watersheds	Establish baseline in FY2015	Increase by 5% from FY2015 baseline funding
Amount of estimated pollutant load reductions achieved for sediment, phosphorus, and nitrogen from state and federal funded BMPs in high priority TMDL and WRAPS watersheds, including priority sub-watersheds	Establish a FY2015 load reduction baseline for nitrogen, phosphorus, and sediment in priority watersheds	Increase load reductions annually in non-Chesapeake Bay priority watersheds by 2% from FY2015 baseline Increase annual load reductions in Chesapeake Bay priority watersheds by 20% annually from the FY2015 baseline
Number of EPA approved watershed plans	50% of NPS Program approved projects active in 2019 address priority watershed activity	Eleven priority watershed plans approved in Delaware by FY2015
Number of priority watersheds identified in EPA approved watershed plans showing water quality improvement based on water quality milestones identified within in the watershed plans	Initiate targeted monitoring in priority watersheds to establish baseline conditions (FY2015)	Characterize baseline conditions and establish timeframe for subsequent monitoring following BMP implementation in priority watersheds
Number of stream reach segments containing previously impaired water bodies that show water quality improvement as a result of BMP implementation.	By December 2015, one stream segment will be identified as having improved water quality baseline assessment.	A total of five stream segments will be identified as having improved water quality baseline assessment.
Reductions in nutrient loads to Delaware's priority watersheds	Establish baseline of load reductions from BMP implementation in FY 2015 for the following priority watersheds: Little Assawoman Bay, St. Jones River, Appoquinimink River, Christina River, Upper Chesapeake Bay, Chester River/Choptank River, Nanticoke, Lower Chesapeake, Broadkill River, and Cool Run	Increase estimated nutrient load reductions from implementation of NPS BMPS in the priority watersheds by 10% or greater
Trends in water quality data for priority watersheds	Complete trend analysis for nitrogen, phosphorus, sediment, and bacteria (where applicable) in priority watersheds in FY2015	Show stable or improving water quality trends for 50% of the eleven priority watersheds relative to established baselines

9.1.1 Future BMP and Load Progress

As part of the NPS Program's ongoing assessment, Devereux Consulting was hired to evaluate load reductions using BMP implementation progress in GRTS and other data sources from 2010-2018 (using 2009 as a baseline year). Scenarios were developed using the Chesapeake Assessment Scenario Tool (CAST). Progress was evaluated against numerical targets established in the 2014 NPS Five-Year Management Plan. Anomalies, illogical, and missing data presented complications for completing the assessment. In addition, some BMPs had ambiguous or erroneous fields. The assessment revealed multiple discrepancies and, therefore, an evaluation for load reductions across impaired watersheds could not be conducted. The unevenness of records in the GRTS data system indicate that a high priority in moving forward is to better track BMP implementation. With better tracking, the change in loads over time can be more accurately assessed. This assessment (Appendix B) highlighted the need to more effectively track BMP implementation for records other than 319 funded sources.

To effectively track BMP implementation and the associated load reductions, a comprehensive data management system should be developed. Improved tracking and reporting would allow a quantitative assessment of progress toward achieving the Watershed Management Plan goals for NPS. A data management system also would improve planning. Such a system would show where implementation has been concentrated in the past, and so implementation could be focused where most needed and effective. Such a system would need to include data from outside agencies/organizations that do not receive 319 funding.

9.2 NPS Program Administration

The Delaware NPS Program provides support for the administration of the Federal CWA Section 319 funds, including evaluation of proposals, budget work, quality control, tracking, and reporting. A work plan/grant application will be submitted annually to EPA for the request of CWA Section 319 funding. The annual work plan/grant application will outline the specific components of the NPS Program Management Plan, to be accomplished during that fiscal year. Adjustments to strategies and timelines may be made on an annual basis, as needed.

Applications for Federal CWA Section 319 funding will be solicited annually for sub-grantee projects to implement the strategies outlined in this document. Sub-grantee work plans will be developed and approved for sub-grant projects that outline the project objectives, tasks, deliverables, and timeframes.

The following grant commitment responsibilities are included:

- Implementation of the NPS Five-Year Management Plan;
- Administration of the CWA Section 319 grant program;
- All on the ground projects that are funded wholly or in part with CWA Section 319 funding will be spatially located and tracked. All other locatable projects will be entered at the HUC-12 scale;
- Complete GRTS data entry for EPA annual Winter data pull;
- Complete semi-annual performance report;
- Hosting the biennial NPS Program meetings;
- Development of the NPS Annual Report;
- Maintain EPA's watershed plan tracker; and
- Assist in the development of Watershed Plans and/or PCSs.

Federal CWA Section 319 funds used for the implementation of BMPs will be administered by the Delaware NPS Program. All accounting and financial transactions are conducted in accordance with the state of Delaware accounting procedures and guidelines. Grant management utilizes automated financial management systems titled First State Financial Systems.

9.3 Plan Evaluation and Revisions

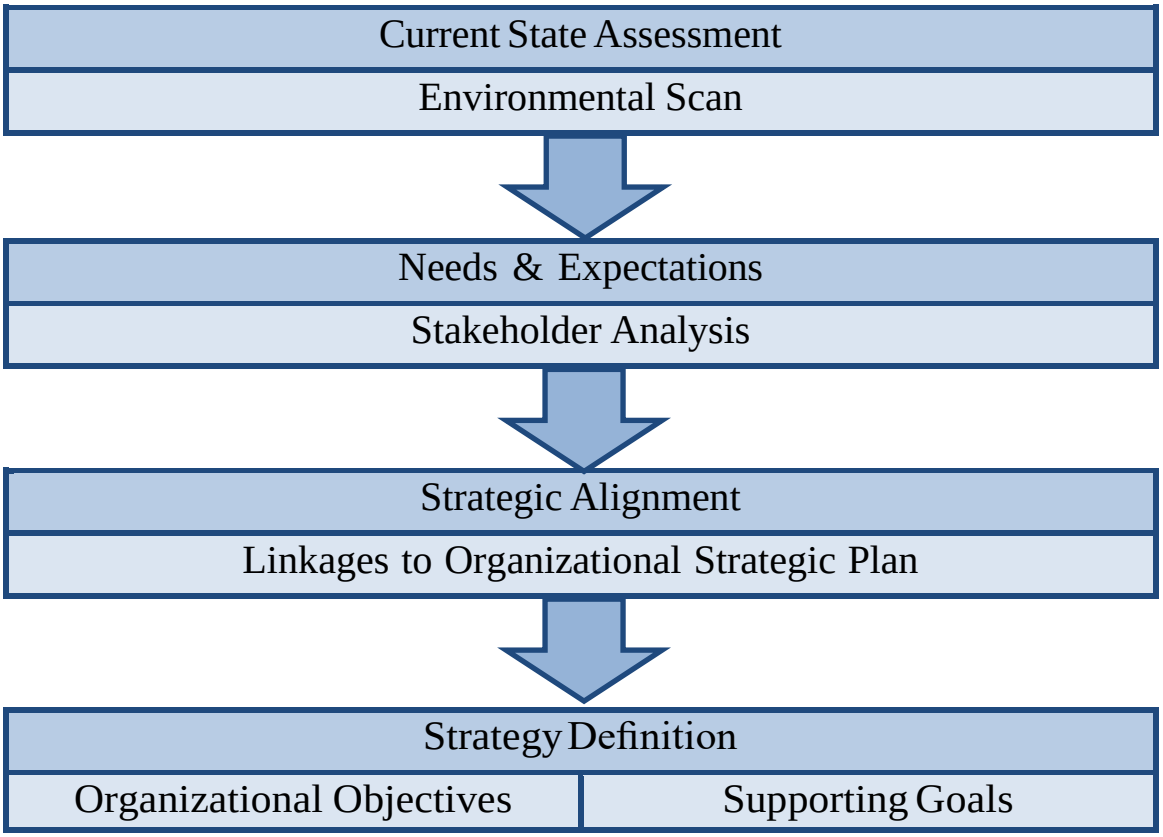
The progress made in implementing this NPS Five-Year Management Plan will be reviewed in 2024 by an ad hoc committee consisting of representatives from Delaware's Nonpoint Source Advisory Committee. The primary purpose of the review will be to consider the current status of goals, strategies, and milestones outlined within the NPS Five-Year Management Plan. Representatives will be tasked with identifying areas that may need additional emphasis, additions, corrections, or amendments. This will include a review of the above references milestones to determine the level of program success achieved during the preceding five year period. Results of the ad hoc committee review will be considered by the NPS Program and adjustments will be made as needed.

Appendix A

Department of Natural Resources & Environmental Control
Division of Watershed Stewardship
Conservation Programs Section
Nonpoint Source Program

Strategic Plan 2019-2025

Organization Strategic Planning Process



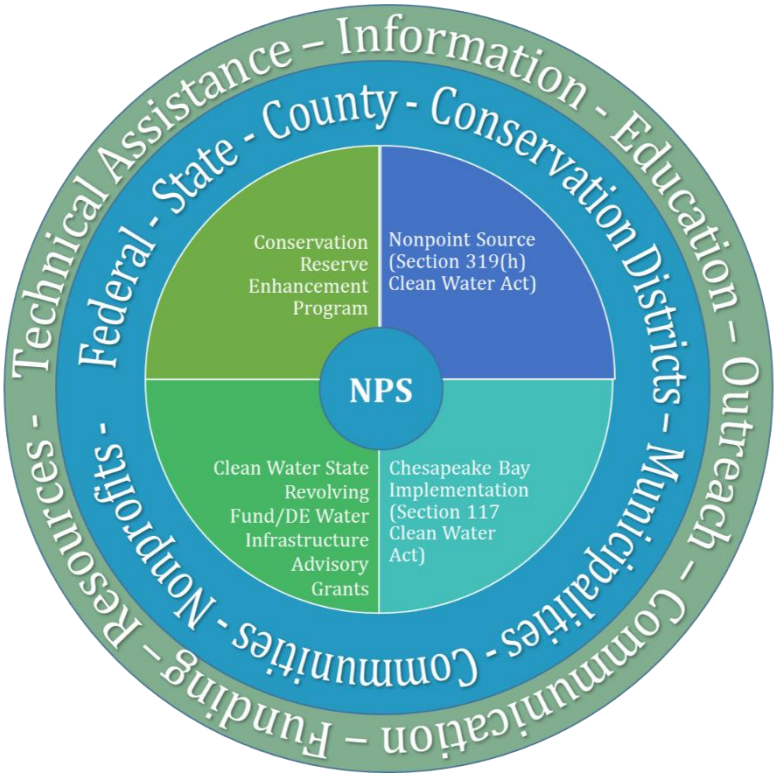
Background

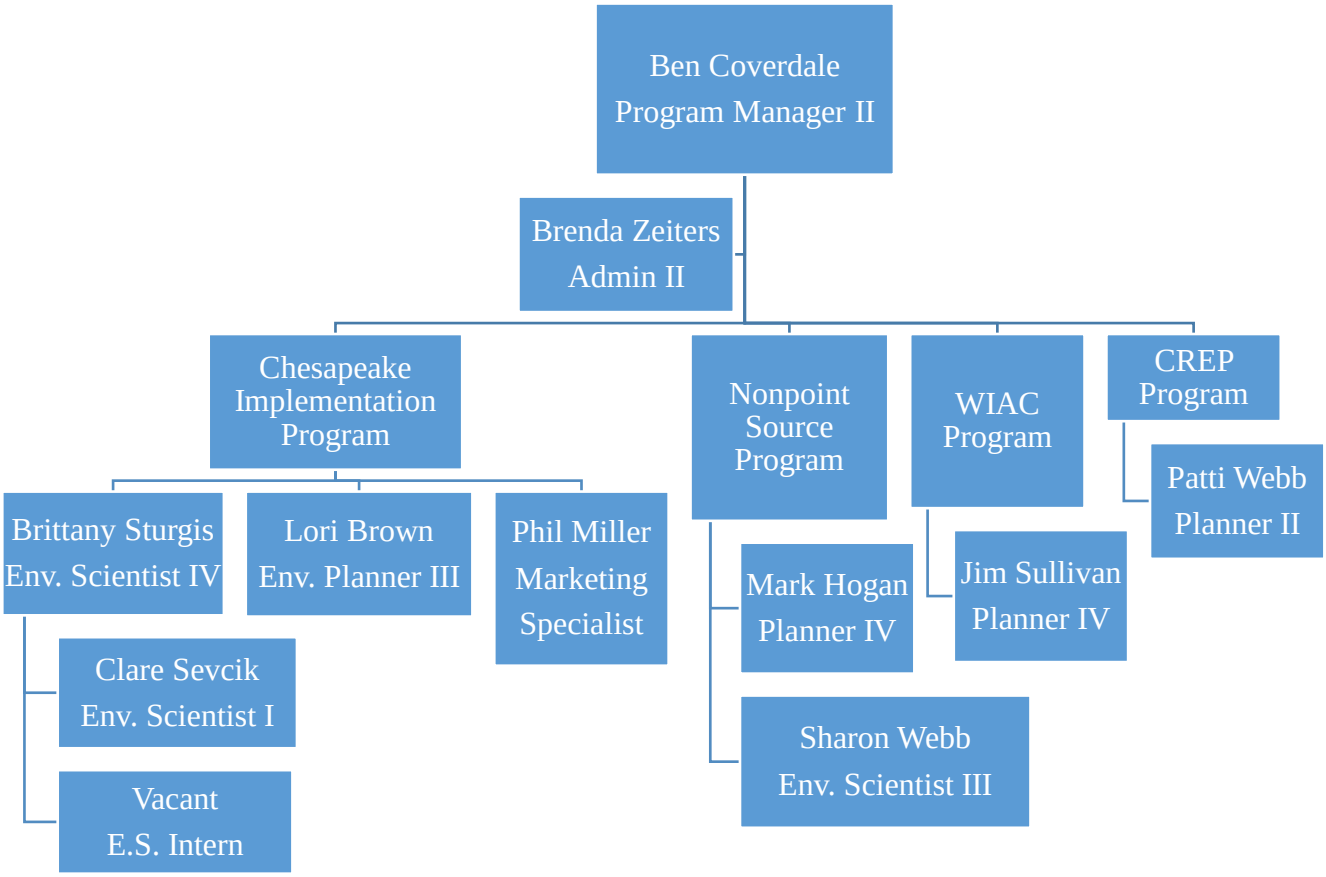
Nonpoint Source (NPS) pollution constitutes the nation's largest source of water quality problems. In Delaware, more than 90% of the State's waterways are considered impaired with most of the impairments coming from nonpoint sources like excess nutrients (nitrogen and phosphorus), sediment, bacteria, and toxic substances. The DNREC's Nonpoint Source (NPS) Program is committed to addressing the issue of NPS pollution as it affects Delaware's numerous waterbodies by providing financial and technical resources that encourage and support best management practice (BMP) installation.

The DNREC Nonpoint Source Program administers competitive grants made possible through the Environmental Protection Agency (EPA) Section 319 of the Clean Water Act (CWA), EPA Chesapeake Bay funding (Section 117 of CWA), and manages the Water Infrastructure Advisory Council's (WIAC) Surface Water Matching Planning Grant and Community Water Quality Improvement Grant. These grants provide funding for projects designed to reduce nonpoint source (NPS) pollution in Delaware.

In addition to funding projects that achieve reductions in NPS pollution, the Delaware NPS Program is committed to addressing nonpoint source pollution through a program that balances education, partnerships, and technical assistance and financial assistance. The Program follows a non-degradation guiding principle 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. The NPS Program continues to use a coordinated approach for implementation and maintain an open ended framework to reduce nonpoint source pollution in a cost-effective manner, incorporate new initiatives, and support interactive approaches based on the effectiveness of existing policies and implementation mechanisms.

Organization Chart




Ben Coverdale
Program Manager II
Brenda Zeiters
Admin II
Chesapeake Implementation Program
Nonpoint Source Program
WIAC Program
CREP Program
Brittany Sturgis
Env. Scientist IV
Lori Brown
Env. Planner III
Phil Miller
Marketing Specialist
Clare Sevcik
Env. Scientist I
Vacant
E.S. Intern
Mark Hogan
Planner IV
Sharon Webb
Env. Scientist III
Jim Sullivan
Planner IV
Patti Webb
Planner II

OUR VISION

Cleaner water for Delaware's future.

OUR MISSION

Delaware's Nonpoint Source Program supports and promotes the collaborative efforts of state, federal, and local organizations using a balance approach of education, research, technical, and financial assistance to improve water quality.

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Environmental Scan

What external and internal factors can impact the Nonpoint Source Program? Which of these factors are can be considered challenges and which can be considered opportunities?

	Challenges	Opportunities
External	Lose funding/grant Climate Change Lawsuits Negative Public Opinion Unpredictable/fluctuating market Political environment Poor leadership Climate change/More frequent storm events Stricter Environmental Laws Influx of residents used to high level of service/higher taxes Lack of local Government Support	Strengthening Partnerships Non-traditional Partnerships Develop New BMPs Shared Maintenance (SW and Tax Ditches) Sea Level Rise Seek different funding sources Clean Water Funding Stormwater Facility Maintenance Districts New Legislators Leveraging Resources New Division Director Infrastructure investment New Technology
Internal	Losing staff/not filling positions Unmotivated staff Lack of vision/decision making by leadership Stability of contractual positions Leadership not supporting (understanding) our work Lack of information & communication Workload High turnover rate/retirements/loss of institutional knowledge	Drone Inspections Keeping up with technology Advanced Training Cross-training Single database Mentoring/knowledge transfer Co-op/Intern Programs New talent, staffing Collaboration & breaking down silos Work more efficiently Communication & understanding what everyone does

Services Analysis

Program Level

SERVICES

- What are the key tasks for the Nonpoint Source Program?
  - These are the programs, activities and actions that make up the program.

EXPECTATIONS

- What are the key activities in the Nonpoint Source Program?
  - These are the prioritized, measurable activities of the program.

Services

Education and Outreach

EXPECTATIONS

- Provide presentations and hold workshops for public engagement.
- Attend and participate in events with a water quality focus.
- Engage the public through activities and events.
- Educating the public through printed, online resources, social media, and personal communications.

Technical Assistance

EXPECTATIONS

- Collect data for conservation practices throughout the state.
- Hold workshops to provide expert resources for funding opportunities, assessments, and nonpoint source issues.
- Provide GIS support for maps and data analysis.
- Identify and prioritize projects based on efficiency, cost, and location.

Improving Partnerships & Collaboration

EXPECTATIONS

- Maintain open dialogs with partners for improved collaboration.
- Fostering relationships with diverse groups to enhance opportunities.
- Conduct annual networking meetings to focusing on water resources.

Financial

EXPECTATIONS

- Provide financial assistance through grants and cost share.
- Provide consistent funding for conservation planning and projects.
- Provide directed assistance as needed.

Stakeholder Analysis

Program Level

STAKEHOLDERS

- Who are the key stakeholder groups for the Nonpoint Source Program?
    - These are groups of people who have a vested interest in your services, and who have some stake in your success.

EXPECTATIONS

- What are the key expectations each stakeholder group has of the Nonpoint Source Program?
    - These are the key interests they have in what you do and how you do it – what is most important to their unique perspective?

STAKE-HOLDERS

Citizens & the Public	Local Jurisdictions
EXPECTATIONS	**EXPECTATIONS**
• Fund projects that will result in environmental or water quality improvements • Host and provide workshops/trainings on practices or programs to improve water quality. • Provide education/information on pollution prevention • Implementation of projects that have noticeable results for the public.	• Provide development, oversight, management and implementation of projects. • Provide funding for projects with minimal contribution. • Provide standardized templates for reporting.

State & Federal Governments	Local Conservation Groups
EXPECTATIONS	**EXPECTATIONS**
• Annually and semiannually report all activities for projects funded and leveraged through the program. • Develop and update management plans, watershed plans, and milestones for planning purposes. • Submit stories of success annually.	• Provide consistent and ongoing funding and technical support. • Attend, participate, and promote events hosted by partners. • Meet data demands and requests as needed.

Strategy Statement

The Nonpoint Source Program has four major goals associated with the program's management plan:

1. Support local conservation activities;
2. Better understanding the impacts of land use activities as it relates to water quality;
3. Improve collaboration with other programs, agencies, and organizations; and
4. Improve connections between assessment, planning, and implementation.

Strategies to meet these goals are further broken out under our four pillars.

Strategic Pillars – Foundational Strategies

The Nonpoint Source Program's Strategic Pillars were derived from the DNREC's Eight Strategic Priorities (https://dnrec.alpha.delaware.gov/mission/). The NPS Program determined which priorities aligned most closely with our major goals, broke out our goals based on the pillars, and identified strategies to meet these goals.

Pillar 1: Ensuring Clean Water:
DNREC Strategies:

Includes investing in clean water infrastructure andwatershed-based and cooperative restoration projects for the Delaware and Chesapeake Bays, the Nanticoke River, the Inland Bays, the Ocean shore, and other areas, supporting conservation cost-share projects for Delaware farmers, groundwater protection, removing toxics from Delaware waters, and supporting beneficial re-use of treated wastewater.

Nonpoint Source Program Strategies:

a. Determine the allocation of cost share funding based on competitive projects that provide the best cost/benefit analysis for water quality improvement;
b. Attend, participate in, and/or host regional meetings and workshops;
c. Maintain a willingness to collaborate with other programs, organizations, and agencies;
d. The NPS Program will develop and implement surveys or assessments to better identify and determine implemented Best Management practices and coverage throughout the state with primary focus on impaired watersheds,
e. Implement standardized load reductions numbers for BMPs statewide; and
f. In order to better understand water quality improvement efforts, the NPS Program staff will be trained in models and data analysis processes that are used to determine Delaware's progress in improving water quality.

Pillar 2: Improving Delaware's Preparedness:
DNREC Strategies:

Includes investing in critical infrastructure such as dams, impoundments, dikes and other water control structures, wetland conservation to reduce flooding (and improve water quality and enhance wildlife and fisheries habitat), shoreline nourishment and beach protection, mitigation and adaptation planning for sea level rise and other effects of climate change, reducing the production of greenhouse gases, improving stormwater management, maintaining emergency response preparedness, and developing environmental indicators to track progress.

Nonpoint Source Program Strategies:

a. Work closely with the Drainage Program to determine, where effective, water quality could be incorporated into tax ditch projects; and
b. Work closely with the Sediment and Stormwater Program to determine, where effective, water quality could be incorporated into stormwater practices for water quantity/conveyance.

Pillar 3: Organizational Development:

DNREC Strategies:

Includes continued reevaluation, re-engineering, and improvement of DNREC functions, support for workforce diversity, training, and promotion, providing a safe workplace, building and supporting inter-agency collaboration and teamwork, and creating a culture of continuous improvement.

Nonpoint Source Program Strategies:

a. Improve communication between partnering agencies to effectively provide the best approaches necessary to support conservation activities.
b. Maintain membership in professional organizations (like AWRA, APA, and CWA) and participate in state collaborations (like RASCL).
c. Hold more effective meetings with clear objectives and expectations.

Pillar 4: Providing Core Services:

DNREC Strategies:

Includes meeting or exceeding permitting performance standards, maintaining core customer services, providing prompt, friendly, and effective assistance to the public, and maintaining agency-wide openness and transparency.

Nonpoint Source Program Strategies:

a. Continue providing technical assistance to partners, as needed.
b. Provide a chance for collaboration to help ensure partners are aware of funding opportunities.
c. Continue to be a technical expert and provide feedback on comprehensive plans to counties and municipalities, as needed.
d. The NPS Program will work to standardize data collection formatting and methodology to aid in reporting efforts from partners.

Goals

Strategic Pillar/Strategies	Long/Term Goals (3+ years)	Mid/Range Goals (1-3 years)	Short/Term Goals (1 year)
Focus: Ensuring Clean Water			
Determine the allocation of cost share funding based on competitive projects that provide the best cost/benefit for water quality improvement.	Maintain and update the analysis in order to have the most accurate information.	Utilize cost-share analysis to have consistent and reliable cost-share funds. Share analysis with collaborating partners so they can use it for project development, RFPs, etc.	Research and develop a cost-share analysis that would help prioritize projects.
Attend, participate in, and/or host regional meetings and workshops.	Host regional meetings/workshops for the 319 Program and the Chesapeake Bay Program.	Develop plans for a series of regional meetings/workshops for the 319 and CB programs.	Host a Chesapeake Bay Local Government Advisory Council meeting.
	Communicate information about upcoming meeting and events, encouraging attendance when appropriate.		
Maintain a willingness to collaborate with other programs, organizations, and agencies.	Develop an annual workshop with members of the Conservation Programs Section to share project highlights and activities. Develop an annual workshop with collaborators (agencies/divisions/programs/districts/NGOs) to highlight projects and activities. Have field days/trainings that give staff the opportunity to gain field experience outside of the office, increasing morale and productivity.		
The NPS Program will develop and implement surveys or assessments to better identify and determine implemented Best Management Practices and coverage throughout the state with primary focus on impaired watersheds.	Analyze gathered data and determine if other changes need to be made.	If new surveys are deemed worthwhile, develop a prototype and test collection methods. Implement survey(s).	Determine where to focus efforts – what types of surveys should be conducted. Examine existing survey efforts and determine if any modifications should be made – streamlining, changing, replacing, lengthen, etc.
Implement standardized load reductions numbers for BMPs statewide.	Utilize, maintain, and update the collected data.	Develop a tool for utilizing gathered information.	Research and review documentation for existing load reduction numbers. Discuss with other sections, departments, etc. existing information being used and determine best path forward for standardization of BPM load reduction numbers in Delaware.
	Share information with all relevant departments, agencies, collaborators.		
In order to better understand water quality improvement efforts, the NPS Program staff will be trained in models and data analysis processes that are used to determine Delaware's progress in improving water quality.	Have ongoing refresher trainings as needed on models and data analyses used to determine Delaware's progress in improving water quality.	Develop trainings on models and data analyses used to determine Delaware's progress in improving water quality.	Work with other sections to set up a meeting to demonstrate and explain the models and data analyses that are used to determine Delaware's progress in improving water quality.

Strategic Pillar/Strategies	Long/Term Goals (3+ years)	Mid/Range Goals (1-3 years)	Short/Term Goals (1 year)
Focus: Improving Delaware's			
Work closely with the Drainage Program to determine, where effective, water quality could be incorporated into tax ditch projects.	Collaboratively develop an Annual Program Sharing Workshop or Field Day so staff can learn about programs and projects. Develop a priority listing of BMP Implementation Projects on Tax Ditches and match with identified funding.	Work with the Drainage Program to enhance the database of drainage concerns. Potentially incorporating GIS capabilities and information for potential water quality improvements and BMPs. Develop a presentation or informational materials to highlight which BMP's are most cost/nutrient reduction effective on Tax Ditches.	Meet with the Drainage Program to determine which Tax Ditch Organizations are willing to incorporate water quality projects and where in the implementation process efforts can be incorporated.
Work closely with the Sediment and Stormwater Program to determine, where effective, water quality could be incorporated into stormwater practices for water quantity/conveyance.	Collaboratively develop an Annual Program Sharing Workshop or Field Day so staff can learn about programs and projects.	Work with the Sediment and Stormwater Program to develop/enhance a database of Stormwater concerns. Potentially incorporating GIS capabilities and make it available for everyone to examine particular projects. Review existing county and municipal codes and ordinances that will strengthen stormwater practices for water quantity/conveyance.	Meet with the Sediment and Stormwater Program to determine where adjustments can be made in the implementation process for better water quality including setbacks and/or conveyance systems.

Strategic Pillar/Strategies	Long/Term Goals (3+ years)	Mid/Range Goals (1-3 years)	Short/Term Goals (1 year)
Focus: Organizational Development			
Improve communication between partnering agencies to effectively provide the best approaches necessary to support conservation activities.	Continue workshops and/or newsletters and audits/reviews with partners.	Establish an annual or bi-annual workshop or informational newsletter explaining the existing or new programs, typical funding amounts and match requirements, timelines and due dates for funded projects. Establish an annual audit/review with partners to ascertain their current and future project needs.	Create a committee to develop a system for communicating. Set meetings with the partnering agencies/organizations to ascertain what conservation activities they are planning within the year and how progress should be assessed.
Maintain membership in professional organizations (like AWRA, APA, and CWA) and participate in state collaborations (like RASCL).	Maintaining memberships and participating in organizations is important for networking and professional development. Incorporate membership and active involvement in organizations into individual performance plans.		
Hold more effective meetings with clear objectives and expectations.	Attend facilitation training to help staff learn how to host effective meeting and utilize current facilitation methods. When hosting meeting establish and utilize clear agendas, share them ahead of time so attendees can prepare. Only hold meeting when needed and appropriate.		

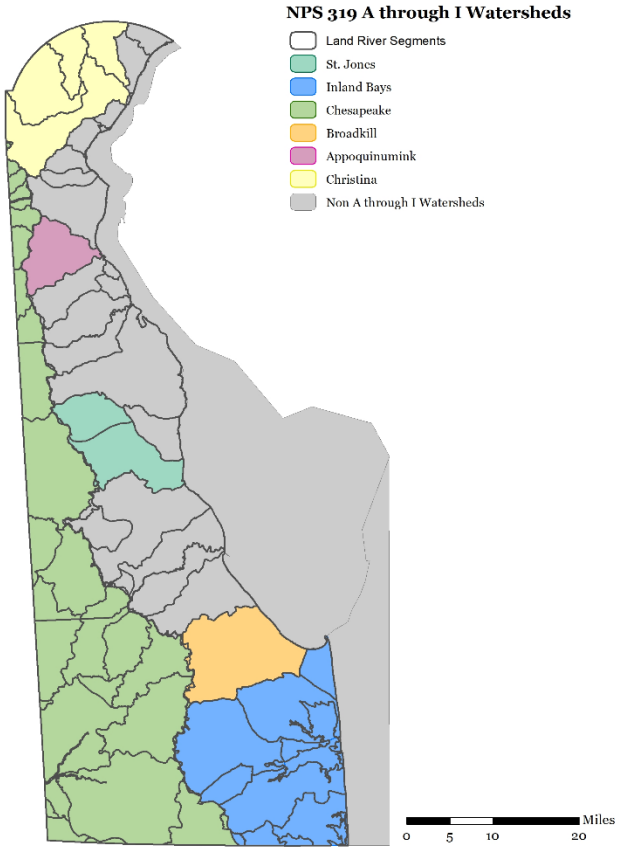
Strategic Pillar/Strategies	Long/Term Goals (3+ years)	Mid/Range Goals (1-3 years)	Short/Term Goals (1 year)
Focus: Providing Core Services			
Continue providing technical assistance to partners, as needed.	Continue annual review/audits with partners.	Have an annual review with partners to ascertain their current and future needs.	Develop a method to examine partner needs through a survey or scoring tool based on reporting metrics.
	Providing technical assistance to the partners is an ongoing process and metrics vary		
Provide a chance for collaboration to help ensure partners are aware of funding opportunities.	Develop a Project Priority List on a 1 to 5 year scale for current and future projects that NPS can potentially assist funding.	Establish a yearly/ bi-annual workshop or newsletter explaining the programs, timelines, typical funding amounts and match requirements. Have an annual review with partners to ascertain their current and future project needs.	Provide partners as much notice as possible prior to issuance of an RFP for preparation and planning (preferably a month or two). This would allow partners time to prepare, ask questions, and develop a strong proposal.
	Update and maintain information on the Nonpoint Source Program's website		
Continue to be a technical expert and provide feedback on comprehensive plans to counties and municipalities, as needed.	Continue to review comprehensive plans through the PLUS Process. Establish a working relationship with the municipalities and counties to assist in the development of the water quality/environmental components of their comprehensive plans prior to PLUS submittal.		
The NPS Program will work to standardize data collection formatting and methodology to aid in reporting efforts from partners.	Continue to collect new data and try to bring historical data into the data collection system(s).	Develop and test new format(s) for data collection in-house and then with partners. Get input on data collection tools and make modifications as needed. Implement the new data collection system(s).	Determine all types of data being reported. Examine formatting and develop a tool(s) that will meet the needs of NPS and be reasonable for the partners.

Appendix B

Progress Report on the Delaware 2014 Nonpoint Source Program Management Plan

Introduction

Delaware has made substantial progress in implementing pollution control strategies as part of the Nonpoint Source Program administered by the Delaware Department of Natural Resources and Environmental Control Division of Watershed Stewardship. The 2014 Watershed Management Plan set forth goals for grant funding, education, outreach, and partnership to address the nonpoint source pollution. The U.S. Environmental Protection Agency provided funding under the Clean Water Act's Section 319 grant program to support implementation of best management practices (BMPs). The level of funding has decreased over the past five years, yet progress has been made. Progress has been possible through leveraging funding from other sources, including Soil and Water Conservation Districts, NRCS, NFWF, and other sources. This report documents the progress that has been made as well as identifies challenges that must be addressed in the coming five-year period. The primary challenge is to more effectively track BMP implementation.



Funding expenditures

The level of funding from the 319 Program has decreased since 2009 (Table 1). With a constant level of funding from the 319 Program, it is anticipated that the level of BMP implementation also will remain constant leading to a plateauing of nonpoint source pollution reductions. Increased funding would accelerate Delaware's reductions in nonpoint source pollution controls. Despite decreases in core 319 funding the NPS program has worked with partners across the state to leverage funding from several other pollution control funding programs. For example, NPS has worked with the County Conservation Districts and NRCS to procure over $4M in NRCS RCPP funding within the past 5 years. Creating access to more conservation practices for rural landowners.

Table 18: Level of funding from the USEPA 319 program and change over time.

Fiscal Year	Dollars	Percent Change
2009	1,381,151	N/A
2010	1,525,448	-10.45
2011	1,244,384	-18.43
2012	1,123,000	-9.75
2013	1,825,000	+62.51
2014	1,934,346	+5.99
2015	1,907,844	-1.37
2016	1,154,706	-39.48
2017	1,265,500	+9.59
2018	1,174,612	-7.18
2019	1,174,612	0
2020 (Projected)	1,174,612	0

BMP implementation and load reduction

Data are available from multiple BMP data sources. These sources of information are described below. The descriptions include the type of BMPs, attributes associated with each BMP, date range available, and the funding source of the BMPs. Ultimately, data from the Grant Reporting and Tracking System (GRTS) was used to evaluate the change in nitrogen and phosphorus loads. The trend in BMP implantation and the change in loads over time are provided. The methods and data quality issues are described. Because the data quality issues are significant, recommendations are made for improved tracking and reporting of BMPs.

Data sources

There are multiple data systems used to track BMP implementation. Each of these systems serves a separate purpose. The information associated with each varies according to the data system's purpose. A list of the data systems with the characteristics of each is below.

MudTracker

MudTracker includes the urban stormwater BMP information for permitted projects by the DNREC Division of Soil and Water. The Department of Transportation projects are not included. The BMP name, acres treated, as-built date, year date, permit number, latitude, and longitude are included. The data include years 2010 to the present.

Chesapeake Bay Program Annual Progress

Data from multiple data sources including MudTracker, Delaware Department of Transportation, Delaware Department of Agriculture, and USDA are reported annually to the Chesapeake Bay Program office using the National Environmental Information Exchange Network (NEIEN). These data are for BMPs implemented in the Chesapeake Bay portion of Delaware. Data include the BMP name, acres treated, date, and locations that vary from a latitude and longitude to a county. The Bay Program only accepts certain BMPs that the Chesapeake Bay Partnership has determined to result in a nitrogen, phosphorus, and/or sediment reduction. The method of submission is complex and requires careful review of validation reports. Not all data submitted is used if the validation fails and rejects the data. As such, the Bay Program's annual assessments of progress may not reflect the actual implementation within the Chesapeake Bay watershed portion of Delaware. Data are reported for years 1985 to the present. There are multiple funders of the practices including NRCS, FSA-CREP, EPA 319, SRF, CBIG, CBRAP, NFWF, and local funding sources.

Cover Crop

Agricultural cover crop data is available for years 2013 to 2017. These data are tracked by DNREC's Division of Watershed Stewardship (Mark Hogan). These data include the USGS 12-digit hydrologic unit code (HUC) and the acres covered. The particular type of cover crop, such as wheat or rye, is not tracked. These BMPs are funded by EPA grants, state funds, and USDA.

U.S. Department of Agriculture Farm Service Agency Conservation Reserve Program (USDA-CRP)

Riparian buffers are funded by the USDA CRP and CREP programs. These data are tracked by DNREC's Division of Watershed Stewardship (Mark Hogan) and are available for the years 2013 to 2017. The data include new implementation that is still under contract and has not been put in a renewed contract. These data include the USGS 12-digit hydrologic unit code (HUC) and the acres covered.

Agricultural Nutrient Management and Manure Relocation

Agricultural nutrient management is tracked by the Delaware Department of Agriculture. The Administrator's Quarterly Report provides the acres under nutrient management and the costs for nutrient management programming. The practices recommended as part of the nutrient management plans are not included in this data source. Funding for this practice is provided by the NPS Program.

The same Administrator's report includes data on manure relocation, or transport. The Division of Water Stewardship also tracks manure relocation. The Water Stewardship data represents less manure than is tracked in the Administrator's report. The benefit of the Water Stewardship manure relocation data is that it is tracked by HUC-12.

Grant Reporting and Tracking System (GRTS)

The BMPs in the GRTS data system are solely funded by EPA 319 grants. Data may be queried from the GRTS data system multiple ways. At the time of this report, data was queried from GRTS for the 2000 to 2009 time period that includes either the program year or the watershed, but not both. Another set of data were for the time period of 1989 to 2018. These data did not include watershed. While BMP implementation was targeted to high priority watersheds, the data were assessed across the entire state. The GRTS data were used to assess the change in nitrogen and phosphorus loads over time because these data best represent the EPA 319 Program funding.

Load Reductions

The load reductions from BMPs recorded in GRTS from 2010 to 2018 have varying levels of implementation. For example, some years had no recorded manure relocation, while other years included records for manure relocation. The same is true of the agricultural nutrient management practice. With the uneven attribution of practices to years, the annual change in nitrogen and phosphorus loads fluctuate. This fluctuation makes it difficult to assess the progress toward the numerical targets in the 2014 Watershed Management Plan. The unevenness of records in the GRTS data system indicate that a high priority in moving forward is to better track BMP implementation. With better tracking, the change in loads over time can be more accurately assessed. The method of analysis and data quality issues are discussed in the following section.

Methods of analysis

Load reductions were calculated using the data available from GRTS for the 2010 to 2018 time period. This time period allows a comparison over the last two periods of the Watershed Management Plan. The GRTS data include the BMPs that are solely the EPA 319-funded pollution control practices. The load reductions were calculated using CAST, the Chesapeake Bay Program Partnership's model. The BMP names and measurement units in CAST are not the same as those in GRTS. However, the BMP names represent the same or similar practices. This allows the BMP names and measurement units to be crosswalked using the same relationship table that the Chesapeake Bay Program uses for assessing the annual progress toward the Chesapeake Bay TMDL. Even so, there were some BMPs that were not in the relationship table and these were added to the crosswalk used for this project (Appendix A).

The land use on which the BMP is implemented is required for estimating load reductions in CAST. This information is not available in GRTS. The largest group of land uses was selected for each BMP. For example, instead of putting a nutrient management plan on the Soybeans land use, it was put on the Agriculture without Open Space land use group.

The manure transfer records do not contain information about the source of the manure, or the location to which it is transported. It was assumed that all manure was transferred from Sussex County out of the Watershed.

Removing duplicate records and illogical amounts

There were some anomalies in the data that negatively impacted this analysis. There were no nutrient management records recorded in years 2012 and 2018. It is assumed that the nutrient management for those years was attributed to an adjacent year. However, it was not possible to reliably determine which year those nutrient management records could have been attributed.

The manure relocation data showed an anomaly similar to the nutrient management records. There was no manure relocation data for the 2010, 2013, and 2018 years. When estimating the load reductions from all the BMPs, the manure data from the previous year was used for those years. The fluctuation among years where there is data is substantial. The most manure transported was in 2008 with 63,272 tons and the least was in 2016 with 2,880 tons (Table 3). This appears to be a lack of data integrity rather than a reflection of actual changes in manure relocation.

Table 19: Sum of the tons of manure reported as transferred in the GRTS data by year from 2009 to 2018

Year	Amount
2003	26,900
2004	21,427
2005	3,800
2007	14,545
2008	63,272
2009	14,545
2010	0
2011	3,695
2012	3,142
2013	0
2014	42,619
2015	30,253
2016	2,880
2017	36,682
2018	0

The 2018 BMP data also was missing the BMPs that impact animals. These animal-related BMPs include waste management systems, biofilters, mortality composting, and others. For these animal-related BMPs, the same amount of implementation in 2017 was used for estimating load reductions for 2018.

In addition to missing data, there were some records that appear to be duplicates. These records were identified by the BMP name, unit and amount. There also were many records where Tree/Shrub Establishment and Windbreak/Shelterbelt Establishment were greater than 20,000 acres. These were illogical values and were removed.

Table 20: Adjustments made to GRTS data where values are not logical.

BMP	Years	Change	Reason
Land Retirement to Ag Open Space	2010-2014	Delete 1 record where amount is 13,146	Duplicate
Tree Planting (Tree/Shrub Establishment and Windbreak/Shelterbelt Establishment)	2010	Delete 12 records	Records>20,000 acres are illogical
Stream Restoration	2011	Deleted 2 duplicate records	Duplicates
Tree Planting (Tree/Shrub Establishment and Windbreak/Shelterbelt Establishment)	2011-2012	Delete 28 records	Records >20,000 acres are illogical
Stream Restoration	2012-2018	Deleted 1 duplicate record	Duplicates; same amount of 3,200 feet
Tree Planting (Tree/Shrub Establishment and Windbreak/Shelterbelt Establishment)	2013-2018	Delete 34 records	Records >20,000 acres are illogical
Heavy Use Area Access Area, Air Management, Pest Management, Pet Waste Management, Water Harvesting Catchment, and Watershed Management Plan	Any	Removed	CAST does not provide nutrient or sediment reduction credits for these practices.

Some BMPs had ambiguous or no measurement units. Some BMP units were shown as “count” and it was not clear what was counted. Other BMPs had units listed as “N/A”. In both cases, the same BMP had more understandable units such as acres as well as N/A or count. Records with measurement units that had ambiguous or no measurement units were not used in assessing the load reductions.

Future BMP Tracking needs

This report on the 2014 NPS Management Plan has highlighted the need to more effectively track BMP implementation. To effectively track BMP implementation and the associated load reductions, a comprehensive data management system should be developed. Improved tracking and reporting would allow a quantitative assessment of progress toward achieving the Watershed Management Plan for Nonpoint Sources. A data management system also would improve planning. Such a system would show where implementation has been concentrated in the past, and so implementation could be focused where most needed and effective. Such a system would include data from DelDOT and other agencies and departments. The data would be uploaded to the DNREC system with validation to maintain data integrity.

Appendix A – Crosswalk of 319 BMPs to Chesapeake Assessment Scenario Tool

GRTS_BMPType	GRTSUnitOf Measure	NEIEN_BMPName	SB_BMP	TARGET _UNIT
Air Management	UNITS	NULL	NULL	NULL
Alternative Septic System	systems	Alternative Septic System	SepticDeCon	systems
Alum Treatment of Poultry Litter	animal count	Alum Treatment of Poultry Litter	litamend	animal count
Animal Mortality Facility	systems	Animal Mortality Facility	MortalityComp	systems
Composting Facility	systems	Composting Facility	MortalityComp	systems
Comprehensive Nutrient Management Plan (CNMP)	acres	Comprehensive Nutrient Management Plan (CNMP)	ConPlan	acres
Conservation Cover	acres	Conservation Cover	LandRetireOpe n	acres
Conservation Crop Rotation	acres	Conservation Crop Rotation	ConPlan	acres
Conservation Tillage Residue Management	acres	Conservation Tillage Residue Management	ConserveTill	acres
Constructed Wetland	acres	Constructed Wetland	WetPondWetla nd	acres
Cover Crop	acres	Cover Crop	CoverCropTrad WLO	acres
Cover Crop	UNITS	NULL	NULL	NULL
Critical Area Planting	acres	Critical Area Planting	LandRetireOpe n	acres
Ditch Stabilization	feet	Ditch Stabilization	NonUrbStrmRe st	feet
Fence	feet	NULL	NULL	NULL
Filter Strip	acres	Filter Strip	GrassBuffers	acres
Forage Harvest Management	acres	NULL	NULL	NULL
Grassed Waterway	acres	Grassed Waterway	GrassBuffers	acres
Heavy Use Area Protection	acres	NULL	NULL	NULL
Heavy Use Area Protection	N/A	NULL	NULL	NULL
Heavy Use Area Protection	UNITS	NULL	NULL	NULL
Incinerator (see Animal Mortality Facility)	systems	Incinerator (see Animal Mortality Facility)	MortalityComp	systems
Irrigation System-Microirrigation	acres	Irrigation System-Microirrigation	CropIrrMgmt	acres
Irrigation System-Sprinkler	acres	Irrigation System-Sprinkler	CropIrrMgmt	acres
Irrigation Water Management	acres	Irrigation Water Management	CropIrrMgmt	acres
Lake Stabilization - Structural	acres	Lake Stabilization - Structural	st	acres
Manure (Waste) Transfer	dry tons	Manure (Waste) Transfer	ManureTransp ort	dry tons
Nutrient Management Core N	acres	Nutrient Management Core N	nmcoren	acres
Nutrient Management Core N	TONS	NULL	NULL	NULL
Nutrient Management Core N	UNITS	NULL	NULL	NULL

Onsite Waste Water Treatment System (New/Existing)	systems	Onsite Waste Water Treatment System (New/Existing)	SepticPump	systems
Pasture & Hayland Management	acres	Pasture & Hayland Management	LandRetirePas	acres
Pest Management	acres	NULL	NULL	NULL
Pet Waste Management	UNITS	NULL	NULL	NULL
Pond	acres	Pond	DryPonds	acres
Pond	UNITS	NULL	NULL	NULL
Pre-Sidedress Nitrate Soil Test	acres	Pre-Sidedress Nitrate Soil Test	nmraten	acres
Raingarden/ bioretention basin	acres	Raingarden/ bioretention basin	BioRetUDAB	acres
Raingarden/ bioretention basin	UNITS	NULL	NULL	NULL
Riparian Buffers - Vegetative	acres	Riparian Buffers - Vegetative	GrassBuffers	acres
Riparian Forest Buffer	acres	Riparian Forest Buffer	ForestBuffers	acres
Shallow Water Management for Wildlife	acres	Shallow Water Management for Wildlife	WetlandCreate Headwater	acres
Stormwater Runoff Control	acres	Stormwater Runoff Control	ST	acres
Stormwater Wetland	feet	NULL	NULL	NULL
Stream Channel Restoration (Stream Bed/Habitat)	feet	Stream Channel Restoration (Stream Bed/Habitat)	UrbStrmRest	feet
Stream Channel Stabilization	feet	Stream Channel Stabilization	NonUrbStrmRest	feet
Stream Corridor Improvement	feet	Stream Corridor Improvement	UrbStrmRest	feet
Stream Exclusion Fencing	feet	Stream Exclusion Fencing	GrassBuffExcl	feet
Stream Habitat Improvement and Management	feet	NULL	NULL	NULL
Streambank & Shoreline Protection	feet	Streambank & Shoreline Protection	NonUrbStrmRest	feet
Street Sweeper	pounds	NULL	NULL	NULL
Structure for Water Control	acres	Structure for Water Control	WaterContStruc	acres
Tree/Shrub Establishment	acres	Tree/Shrub Establishment	TreePlant	acres
Tree/Shrub Establishment	N/A	NULL	NULL	NULL
Tree/Shrub Establishment	UNITS	NULL	NULL	NULL
Vegetative Buffer Strips	acres	Vegetative Buffer Strips	GrassBuffers	acres
Waste Management System	systems	Waste Management System	AWMS	systems
Waste Storage Facility	systems	Waste Storage Facility	awms	systems
Waste Storage Pond	systems	Waste Storage Pond	AWMS	systems
Waste Utilization	UNITS	NULL	NULL	NULL
Waste Water Irrigation	acres	Waste Water Irrigation	BarnRunoffCont	acres
Water & Sediment Control	acres	Water & Sediment Control	ConPlan	acres

Basin		Basin		
Water Harvesting Catchment	UNITS	NULL	NULL	NULL
Water Table Control	acres	Water Table Control	WaterContStruc	acres
Watershed Management Plan	UNITS	NULL	NULL	NULL
Wetland Creation	acres	Wetland Creation	WetlandCreateFloodplain	acres
Wetland Restoration	acres	Wetland Restoration	WetlandRestoreFloodplain	acres
Windbreak/Shelterbelt Establishment	acres	Windbreak/Shelterbelt Establishment	TreePlant	acres