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Appendix C

STATE OF DELAWARE

NONPOINT SOURCE BEST MANAGEMENT PRACTICE IMPLEMENTATION DATA

QUALITY ASSURANCE PROJECT PLAN

January 2008

Delaware Department of Natural Resources and Environmental Control
Division of Water Resources
Watershed Assessment Section
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Dover, DE 19904-2464
302-739-9939

State of Delaware
Nonpoint Source Best Management Practice Implementation Data
Quality Assurance Project Plan

Group A – Project Management

A1 – Title and Approval Sheet

Plan Coverage: This *Nonpoint Source BMP Implementation Data Quality Assurance Project Plan* reflects the overall Quality Assurance Program framework and management systems necessary to assure that data reported by the Delaware Department of Natural Resources and Environmental Control-Division of Water Resources-Watershed Assessment Section (DNREC-DWR-WAS) are of acceptable quality to meet the needs of the United States Environmental Protection Agency's Chesapeake Bay Program Office (EPA-CBPO).

Name: Jennifer Volk
Title: DNREC-DWR-WAS, Grant Manager, Quality Assurance Manager

Signature: _____ Date: _____

Name: John Schneider
Title: DNREC-DWR-WAS, Program Administrator

Signature: _____ Date: _____

Name: Kelly Shenk
Title: U.S. EPA Project Officer

Signature: _____ Date: _____

Name: Rich Batiuk
Title: U.S. EPA Quality Assurance Officer

Signature: _____ Date: _____

Questions or comments regarding this QAPP should be referred to Jennifer Volk, 302-739-9939 or Jennifer.Volk@state.de.us.

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A2 – Table of Contents

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A3 – Distribution List

This document is being provided to the following:

Kelly Shenk, EPA-Chesapeake Bay Program Office (CBPO), Project Officer
Mary Ellen Ley, USGS / EPA-CBPO, Quality Assurance Coordinator
Terry Simpson, EPA Region 3, Regional Quality Assurance Manager
Jeffrey Sweeney, University of Maryland / EPA-CBPO, NPS Data Manager
John Schneider, DNREC-DWR-WAS
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Jennifer Volk, DNREC-DWR-WAS, *CBP Implementation Grant Manager, Quality Assurance Manager*
Dave Schepens, DNREC-DWR-Groundwater Discharges Section, Wastewater BMPs
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Kathy Bunting-Howarth, DNREC-DWR-Financial Assistance Branch, Wastewater BMPs
Robert Palmer, DNREC-Division of Soil and Water Conservation (DSWC) -Nonpoint Source Section
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Marianne Hardesty, New Castle Conservation District/NRCS, *Agriculture BMP Data Provider*
Timothy Riley, Kent Conservation District, *Agriculture BMP Data Provider*
Paula Long, Kent Conservation District, *Agriculture BMP Data Provider*
Debbie Absher, Sussex Conservation District, *Agriculture BMP Data Provider*
Lester Stillson, USDA, Delaware Natural Resources Conservation Service, Agriculture BMPs
William Rohrer, Delaware Department of Agriculture (DDA)-Nutrient Management Program (NMP)
Steven Hollenbeck, DDA-NMP, *Manure Relocation/Alternative Use Data Provider*
Heather Comegys, Perdue Agrirecycle, *Manure Relocation/Alternative Use Data Provider*
Wayne Hudson, Perdue Agrirecycle, *Manure Relocation/Alternative Use Data Provider*
Robert Coleman, DDA-NMP, *Nutrient Management Plan Data Provider*
Jamie Rutherford, DNREC-DSWC-Stormwater BMPs
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Wendy Polasko, Delaware Department of Transportation, Stormwater BMPs
Mike Harris, New Castle County, Stormwater BMPs
Ellie Mortazavi, New Castle County, Stormwater BMPs
Don Nichols, New Castle Conservation District, Stormwater BMPs
Mike Sistek, City of Newark, Stormwater BMPs
Kelley Dinsmore, City of Newark, Stormwater BMPs
Morris Deputy, Town of Middletown, Stormwater BMPs
Jared Atkins, Kent Conservation District, *Stormwater BMP Data Provider*
Jessica Watson, Sussex Conservation District, Stormwater BMPs

A4 – Project / Task Organization

Best management practices (BMPs) to reduce nonpoint source (NPS) pollution are funded and installed by numerous federal, state, local, and private agencies within Delaware including the Department of Natural Resources and Environmental Control (DNREC), the Department of Agriculture, the Natural Resource Conservation Service (NRCS), three county Conservation Districts, counties and towns, and the Perdue AgriRecycle facility. The BMP data that is generated is maintained and undergoes quality assurance procedures by the implementing organization, which includes spot checks of installed BMPs.

Data is aggregated from these multiple groups and reported to funding agencies for tracking purposes. The Chesapeake Bay Program (CBP) Implementation Grant Manager compiles and organizes the data, serves as an independent quality assurance manager, and develops and maintains the official, approved Quality Assurance Project Plan (QAPP) covering all programs receiving funds from the CBP Implementation Grant. In addition, the CBP Implementation Grant Manager prepares and submits semi-annual reports to the EPA-Chesapeake Bay Program Office (CBPO) for inclusion in watershed model runs of progress towards reaching restoration goals. An organization chart showing reporting and quality assurance responsibilities is provided in Figure 1.

A5 – Problem Definition and Background

The tracking, reporting, and quality assurance of NPS BMPs are requirements of the Delaware CBP Implementation Grant from the EPA-CBPO. Data is provided to EPA-CBPO for inclusion in watershed model progress evaluations on or before July 15th and December 31st of each year or as otherwise stipulated in the grant documents.

Since this work involves the acquisition of environmental data generated from direct measurement activities, data collected from other sources, and data compiled from computerized information databases and systems, an approved QAPP must be in place. This technical document of quality assurance and control procedures and specifications serves as the QAPP in accordance with 40 CFR 30.54 and 31.45. This QAPP will support the quality of the data behind the CBP's annual *Restoration Assessment for Reducing Pollution*, will allow the EPA-CBPO to understand the sources of NPS BMP data and any analyses done by jurisdictions prior to submission to the EPA-CBPO, and will assist the EPA-CBPO in preparing for possible future scrutiny of all watershed model inputs under a Chesapeake Bay Total Maximum Daily Load (TMDL).

A6 – Project / Task Description

Data regarding the implementation of NPS BMPs are compiled in order to assess progress toward reaching water quality goals, which includes both State of Delaware prescribed TMDL reductions for nutrients and bacteria as well as CBP restoration goals for nutrients and sediment. Implementation is ongoing and data is reported to the EPA-CBPO semi-annually (on or before July 15th and December 31st each year) to reflect recent implementation activities. A full description of the quality assurance activities performed on these data sets is included in the following sections and this QAPP will be updated annually (on or before December 31st) to reflect any changes to field, sample handling and storage, laboratory, quality control, or data management activities.

A7 – Quality Objectives and Criteria

Details regarding the quality of the NPS BMP data reported by the DNREC-DWR-WAS to the EPA-CBPO for use in watershed modeling to estimate restoration

progress are contained in the following sections. All efforts have been made to produce data that is comparable to data collected previously and currently by other Chesapeake Bay Program grant recipients and partners.

A8 – Special Training / Certification

Any special training or certification required to implement or inspect NPS BMPs is determined and overseen by the implementing organization. Individuals involved with NPS BMP data management and data quality assurance and control procedures are not required to have any special training or certification, however in order to perform these functions effectively, training in spreadsheets, databases, and geographic information systems (GIS) may be necessary. Due to privacy concerns, BMP implementing organizations determine who may have clearance to complete data sets and in some situations restrict the transfer of personal and locational information.

A9 – Documents and Records

Implementing organizations will maintain NPS BMP data sets. Data included in EPA-CBPO semi-annual reports will be retained electronically and in paper format by the DNREC-DWR-WAS in perpetuity. The DNREC-DWR-WAS will send the QAPP electronically to all individuals on the distribution list (A3) on or before November 15th each year for annual review and comment. Any edits to reflect changes in status or procedure will be incorporated into the final document submitted to the EPA-CBPO on or before December 30th each year. The final, EPA-CBPO approved QAPP will be electronically distributed to the same individuals and will be retained in both electronic and paper format in perpetuity by the DNREC-DWR-WAS.

Group B – Data Generation and Acquisition

Sections B1 through B8 of this QAPP are not directly applicable to NPS BMP data tracking and reporting. Situations where implementing organizations generate data through sampling to answer research questions do occur. For example, soil samples are taken during the development of a nutrient management plan to determine appropriate fertilizer and manure application rates. Likewise, manure is sampled to determine nutrient content. In addition, samples may be taken to determine the performance level of a BMP, such as taking effluent samples from alternative and innovative onsite wastewater treatment and disposal systems. Details regarding any sampling protocols related to NPS BMPs will be incorporated in future versions of this QAPP.

B1 – Sampling Process Design (Experimental Design)

B2 – Sampling Methods

B3 – Sample Handling and Custody

B4 – Analytical Methods

B5 – Quality Control

B6 – Instrument / Equipment Testing, Inspection, and Maintenance

B7 – Instrument / Equipment Calibration and Frequency

B8 – Inspection / Acceptance of Supplies and Consumables

B9 – Non-direct Measurements

DNREC's Watershed Assessment Section obtains NPS BMP tracking data from both internal and external sources (See Figure 1), which are then reported to the EPA-CBPO for inclusion in model scenario runs. BMP data associated with stormwater fall

under the prevue of the nine delegated agencies under DNREC's Division of Soil and Water Conservation - Sediment and Stormwater Program. BMPs associated with wastewater treatment are implemented, tracked, and reported by DNREC's Division of Water Resources - Groundwater Discharges Section. BMP data associated with agriculture are implemented, tracked, and/or maintained by multiple agencies including the NRCS, DNREC's 319 Program, Delaware Department of Agriculture, the three county Conservation Districts, and the Perdue Agrirecycle company.

In the spring of 2007, DNREC's Divisions of Water Resources and Soil and Water Conservation contracted with URS Corporation to conduct an assessment of BMP data collection activities across the state. The resulting report, which summarizes the points of contact, type of BMP data maintained by each agency, data storage structures, data sharing limitations, and supporting software, can be found in Appendix A. The implementing agencies described in Appendix A are responsible for ensuring delivery of quality data and the independent Quality Assurance Manager reviews all data to ensure BMP reported levels reasonably reflect on-the-ground conditions.

B10 – Data Management

Currently, BMP data is requested on a semi-annual or more frequent basis from numerous agencies that implement, track, and/or maintain this type of data in the stormwater, wastewater, and agriculture-related sectors. Figure 1 depicts BMP data reporting and quality assurance responsibilities. The majority of data submitted to DNREC-DWR-WAS is done electronically in Excel spreadsheets, however, paper copies are occasionally submitted from reporting agencies. The Quality Assurance Manager reviews all data for reasonableness and errors and compiles BMP

implementation levels from all reporting agencies into a single Excel document, which is submitted to the EPA-CBPO on a semi-annual basis.

This current reporting procedure is inconvenient and time consuming for all involved and in order to improve accuracy and efficiency, the DNREC-DWR-WAS plans to develop an integrated BMP database and reporting system so that data can be directly reported to the EPA-CBPO through a network node. The inquiry to gather background information on BMP data conducted by URS Corporation (Appendix A) is the first step of this process. The DNREC-DWR-WAS has consulted with staff from the Pennsylvania Department of Environmental Protection and will review the schema that is currently in use by Maryland, Pennsylvania, and Virginia. Following this review, any modifications to the schema to fit Delaware's needs will be made and the DNREC-DWR-WAS will begin working with BMP implementing organizations to refine their data collection and reporting procedures to easily fit into the established schema.

Group C – Assessment and Oversight

C1 – Assessments and Response Actions

A variety of assessments are performed on the NPS BMP data that is reported to the EPA-CBPO for inclusion in model scenario runs. Depending on the type of BMP, field assessments may be performed and implementing organizations are responsible for ensuring that reported BMPs have indeed been installed. Procedures are in place for verifying implementation when cost share or permits are involved. In some situations though, adequate staff and resources are not available to inspect the upkeep and maintenance of long-term BMPs, such as stormwater ponds, on a regular basis and inspections may only occur if a problem is reported. Inspection frequencies can be found in Appendix A. If a BMP is found to be unsatisfactorily installed or maintained, cost share funds may be recouped if the BMP is not brought into compliance. In addition to field inspections, BMP data is regularly assessed by the Quality Assurance Manager to determine status and trends. This analysis will review any anomalies, errors, or questionable levels of implementation.

C2 – Reports to Management

Status and trends assessments of BMP implementation levels by the Quality Assurance Manager are done semi-annually as data is submitted, prepared, and reported to the EPA-CBPO. If anomalies, errors, or questionable levels of implementation are suspected, the Quality Assurance Manager will work directly with implementing organizations to verify and validate reported data.

Group D – Data Validation and Usability

D1 – Data Review, Verification, and Validation

It is the responsibility of the implementing organization to verify that all data reported to the DNREC-DWR-WAS is complete, correct, and complies with all rules and policies of that organization. The independent Quality Assurance Manager conducts an additional review of compiled NPS BMP data for completeness, anomalies, errors, or questionable levels of implementation through a status and trends evaluation as a validation procedure.

D2 – Verification and Validation Methods

During the Quality Assurance Manager's validation procedure, implementation levels over time and implementation rates in relation to the availability of funds will be evaluated. If implementation levels do not show an increase over time or match the level of funds invested, this may suggest that an error or change in reporting procedure has occurred and requires rectifying. The Quality Assurance Manager will work directly with the implementing organization to review raw data and their verification procedures to ensure complete and accurate data.

D3 – Reconciliation with User Requirements

The collection, tracking, and reporting of NPS BMP data is done to assess progress toward reaching water quality goals, including both State of Delaware prescribed TMDL reductions for nutrients and bacteria as well as CBP restoration goals for nutrients and sediment. The data is ultimately used in watershed and water quality models to project progress toward meeting goals to inform decision makers, so it is imperative that data is collected and reported in a usable format.

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Uncertainties in the data likely do exist and may result from input errors, inconsistent data input and management procedures, and uncoordinated reporting requirements. One example of data uncertainty is that there is currently no procedure in place to remove agriculture BMPs from records when a farm parcel is developed, which may result in the same parcel receiving additional reduction credits for stormwater or wastewater practices. The creation of an integrated database and reporting system, based on the schema developed by Maryland, Pennsylvania, and Virginia, should minimize and/or eliminate many of these uncertainties. This type of system with agreed upon data entry fields will minimize data entry errors, standardize data input and management procedures, and unify reporting from multiple agencies.

Appendix C

References

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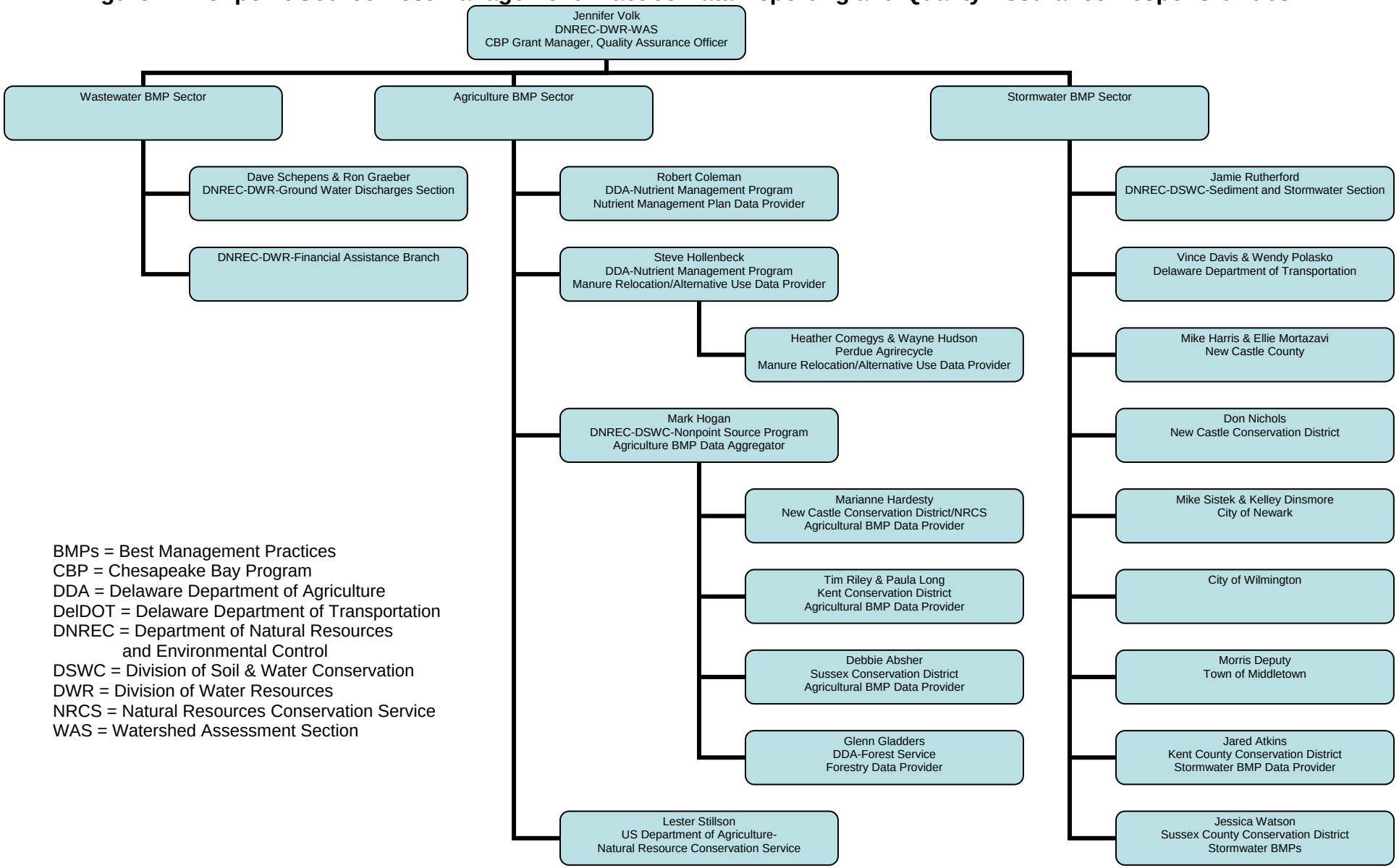
Appendix C

Figure 1. Nonpoint Source Best Management Practice Data Reporting and Quality Assurance Responsibilities

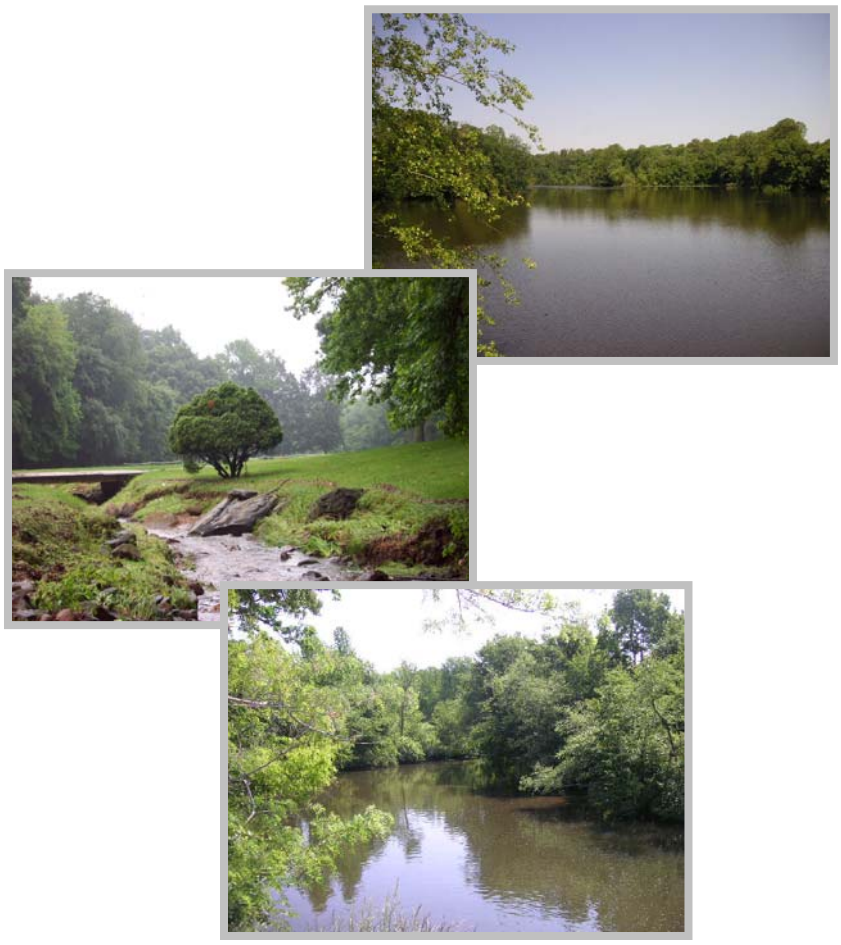


BMPs = Best Management Practices
CBP = Chesapeake Bay Program
DDA = Delaware Department of Agriculture
DelDOT = Delaware Department of Transportation
DNREC = Department of Natural Resources and Environmental Control
DSWC = Division of Soil & Water Conservation
DWR = Division of Water Resources
NRCS = Natural Resources Conservation Service
WAS = Watershed Assessment Section

Appendix C1

REPORT

DELAWARE STATEWIDE BEST MANAGEMENT PRACTICES DATABASE ASSESSMENT



- Division of Soil & Water Conservation
- Division of Water Resources

URS

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January 25, 2008

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In the spring of 2007, URS was contracted by the Delaware Department of Natural Resources and Environmental Control (DNREC) to perform an assessment of Best Management Practice (BMP) data collection throughout the state. The objective of the assessment was to determine how best to combine statewide BMP data into a single system that could be used within DNREC, and possibly externally to assist in the tracking and maintenance of BMPs. The project initially began with the Division of Soil and Water Conservation, and was soon expanded to include the Division of Water Resources. While this effort involved two separate contracts, the results are presented in this joint report due to the similarities between the two efforts.

During the summer and early fall of 2007, URS met with Delegated Agencies of the Division of Soil and Water Conservation and organizations that report BMP information to the Division of Water Resources. A standard questionnaire was used during each interview (Appendix 1) and results were tabulated in a Microsoft Access database for review and reporting purposes. Focused on the overall objective of the assessment, the questionnaire contained four sections and was designed to achieve the following:

1) Determine the types of BMP information currently collected throughout the state.
2) Determine how BMP information is stored and maintained.
3) Identify restrictions, limitations, and concerns regarding the sharing of data.
4) Identify what hardware and software is currently in use by managers of BMP information.

Interview results from each meeting are contained Appendix 2 of this report. The Points of Contact of the Soil and Water Conservation Delegated Agencies are identified in Table 1. Table 2 identifies the Points of Contact of Reporting Agencies for the Water Resources portion of the project.

In a general sense, BMPs that fall under the oversight of one of the Delegated Agencies of the Division of Soil and Water Conservation tend to be project related and are physical features that can be visited in the field and inspected. These BMPs include, but are not limited to, wet ponds, dry ponds, infiltration trenches / basins, filter strips, bio-retention areas, bio-swales, sand filters, sediment forebays, and check dams. In most cases these BMPs are inspected on a regular basis. The method of data storage does vary significantly from Delegated Agency to Delegated Agency however.

Each Delegated Agency, with the exception of the City of Wilmington, was interviewed. Numerous attempts were made to meet with representatives from the City, however a meeting was unable to be scheduled.

BMPs that fall under the oversight of the Division of Water Resources tend to be programmatic and geographic in nature. These BMPs are less likely to be discrete features that can be located in the field and do not lend themselves to a regular inspection program. Instead, these BMPs consist of the collection and tracking of information regarding the use and condition of lands throughout the state, and lend themselves to the

creation of Geographic Information Systems (GIS) shapefiles. Example BMPs include the tracking of manure management plans, the monitoring of forest preservation plans, and the monitoring of groundwater discharges and agricultural land use.

For purposes of this report, the results of the interview process are presented in two sections, one for the Division of Soil and Water Conservation and one for the Division of Water Resources. While the findings are similar, this format will allow each Division to better assess its BMP data collection process, requirements and needs.

TABLE 1: Points of Contact (Soil and Water Conservation)

Reporting Agency	*POC: Primay* *POC: Secondary*	*Phone: Primary POC* *Phone: Secondary POC*	*Email: Primary POC* *Email: Secondary POC*
City of Newark	Mike Sistek Kelley Dinsmore	(302) 366-7040 (302) 366-7040	pwoperations@newark.de.us kdinsmore@newark.de.us
DelDOT	Vince Davis Wendy Polasko	(302) 760-2180 (302) 760-2542	Vince.Davis@state.de.us Wendy.Polasko@state.de.us
DNREC	Jamie Rutherford	(302) 739-9921	Jamie.Rutherford@state.de.us
Kent Conservation District	Jared Adkins	(302) 741-2600	Jared.adkins@state.de.us
New Castle Conservation District	Don Nichols	(302) 832-3100	N/A
New Castle County	Mike Harris Ellie Mortazavi	(302) 395-5806 (302) 395-5802	MHarris@nccde.org EMortazavi@nccde.org
Sussex Conservation District	Jessica Watson	(302) 856-7219	Jessica.Watson@state.de.us
Town of Middletown	Morris Deputy	(302) 378-9120	mdeputy@middletownde.org

TABLE 2: Points of Contact (Water Resources)

Reporting Agency	*POC: Primay* *POC: Secondary*	*Phone: Primary POC* *Phone: Secondary POC*	*Email: Primary POC* *Email: Secondary POC*
Delaware Department of Agriculture: Forest Service	Glenn Gladders	(302) 698-4553	Glenn.gladders@state.de.us
Delaware Department of Agriculture: Nutrient Mgmnt Comm	Steve Hollenbeck	(302) 698-4500	Steven.hollenbeck@state.de.us
Delaware Department of Agriculture: Nutrient Mgmnt Plans	Bob Coleman	(302) 698-4556	Robert.coleman@state.de.us
DNREC: 319 Program	Mark Hogan	(302) 739-9922	Mark.hogan@state.de.us
DNREC: Coastal Program	Marcia Fox	(302) 739-9282	Marcia.fox@state.de.us
DNREC: Groundwater Discharges	Dave Schepens Ron Graeber	(302) 739-9948 (302) 739-9948	Dave.schepens@state.de.us Ronald.Graeber@state.de.us
Kent Conservation District	Tim Riley Paula Long	(302) 741-2600 (302) 741-2600	Timothy.riley@state.de.us Paula.long@state.de.us
NCCD (NRCS)	Marianne Hardesty	(302) 832-3100	Marianne.hardesty@de.usda.gov
Perdue Agricycle	Heather Comegys Wayne Hudson	(302) 943-2732 (410) 543-3919	Heather.comegys@perdue.com Wayne.hudson@perdue.com
Sussex Conservation District	Debbie Absher	(302) 856-3990	Debbie.Absher@de.nacdnet.net

Division of Soil & Water Conservation

Existing BMP Data

To gain an understanding of the types of BMP data currently collected, Delegated Agencies were asked to describe the types of BMPs that they maintain, whether the BMPs are regularly inspected, and the inspection periodicity. All but two of the Delegated Agencies, the Town of Middletown and the Sussex Conservation District, maintain an inventory of their BMPs. The Town of Middletown has a planner on staff and has set as a goal the development of a BMP inventory. The Sussex Conservation District is currently working with DNREC to develop a project tracking database that will have as a component a BMP inventory.

The type of data collected varies widely and only three of the Delegated Agencies inspect BMPs on a regular basis (typically yearly). DelDOT currently maintains two sets of inspection data. The first (structure) is data that is static, and not expected to change. This includes classification, dimensions, material, etc. The second (inspection) is expected to change over time, and a historical record is maintained.

Historical data provides a valuable history of not only the performance of a BMP but also changes in BMP condition over time. All but three of the Delegated Agencies maintain some from of historical data, however in many cases it is not maintained in an electronic format. The City of Newark for instance stores BMP data in a Microsoft Excel spreadsheet, and only maintains current data in an electronic format. Historical inspection reports are maintained by the City in a paper format. As a comparison, DelDOT stores historical data electronically, and does not overwrite any data.

An inventory, along with historical records, provides valuable data for the assessment of BMP condition and performance; however, this does not provide a complete picture of the individual BMP. Spatial data, combined with photographs, provide a convenient means to locate BMPs and review them without having to go into the field. Spatial data allows an individual to locate a BMP in relation to it's surroundings and better assess the area that it treats. Digital photographs provide a visual record of conditions at the time of inspection and aid in identifying trends in BMP condition and performance over time. Only four of the Delegated Agencies maintain spatial data and photographs. As with other data, there is variation between the Delegated Agencies in how they collect spatial data and tie photos to the overall inventory. DelDOT surveys the perimeter of each BMP while New Castle County, the Kent Conservation District, and the City of Newark survey the outlet of the BMP. Finally, not all inventories have photos directly linked to inspection data.

Table 3 summarizes the data collected by the Delegated Agencies.

Storage, Display and Maintenance of Data

In order to develop a composite BMP database, DNREC must know not only what data is collected, but also how it is stored. In addition, each Delegated Agency is a stakeholder in the BMP data process and will play a role in how the composite database is maintained

and updated. For this reason, attention was paid to the concerns of each Delegated Agency regarding the maintenance of BMP data.

Depending on the Delegated Agency, BMP data is stored in paper format, spreadsheets, one of several database systems, and in one case, Hansen. Only three Delegated Agencies link BMP data to a Graphical User Interface (GUI). In each case, an ESRI software product is used. It is important to note that although different software and database systems are in use, it will be possible to combine all the electronic data into a single database. The key is to have an electronic format, either as a database, spreadsheet or shapefile to allow for the conversion of data.

The final format of a composite BMP system will impact how data is maintained by the individual Delgated Agencies. When asked their preference for data maintenance (in-house or by an outside entity) there was near unanimous agreement that data should be maintained and updated locally and then forwarded to DNREC for inclusion in the composite BMP system. The two main concerns are network security and data integrity. Each Delegated Agency maintains their own computer network and from a security perspective would not be willing allow outside entities access. In addition, each Delegated Agency feels that they have the greatest understanding of their BMPs and inspection processes and thus prefer to maintain control of their data. There was little hesitation in terms of providing DNREC with periodic data updates for a composite BMP database.

Table 4 summarizes the storage, display and maintenance of BMP data.

Data Sharing

There is little concern among the Delegated Agencies about sharing Soil and Water Conservation BMP data. While some feel that a Freedom of Information Act (FOIA) request might be needed, the only real limitation is the resources needed to pull data together. There was some concern that the size of files, especially if digital photographs are included, could pose a problem with data transfer. There are a variety of alternatives available for the transfer of large data files, thus it is not likely that this will be a problem.

When asked how they envision shared BMP data in a composite system being used, a variety of items were mentioned including:

- A planning tool to help determine maintenance needs
- Support of watershed assessments
- PCS / TMDL development
- A tool to help monitor and assess BMP performance, and what other areas are doing

Table 5 summarizes the perceived issues involved with the sharing of BMP data.

Hardware and Software

Although the Division of Soil and Water Conservation initially intends to use the composite BMP database for internal purposes only, the possibility of it being made available to the Delegated Agencies does exist. In addition, the Delegated Agencies will be tasked with provided data updates to the composite system on a regular basis. For this reason, it is important to have an understanding of the comfort level each stakeholder has with key software and the IT resources that they have in place. The final portion of the interview focused on these areas and the results are summarized in Table 6.

Recommendations

BMP data collected by Delegated Agencies of the Division of Soil and Water relates to a common set of structures that are located in the field. For this reason, it will be beneficial to standardize data collection, processing and reporting. During the interview process it became apparent that specific guidance from DNREC would be desirable. This guidance would help to ensure that common data is collected allowing BMPs data collected and maintained by different Delegated Agencies to be compared and displayed in a common format.

To achieve this, the following steps should be taken:

1. *Develop a standard set of inspection forms to be used by each Delegated Agency.*
2. *Standardize the method by which photographs and spatial data is collected.*
3. *Develop a standard format for the storage of BMP data.*
4. *Develop a standard export format for BMP data to allow easy assimilation into the composite database.*

Each step is discussed in greater detail below.

1. *Develop a standard set of inspection forms to be used by each Delegated Agency.*

The nine Delegated Agencies all have the same requirements in terms of BMP maintenance and data collection. There is, however, a significant variation in the way each has chosen to implement their individual BMP monitoring program. In order to bring data from each Delegated Agency together it will have to be standardized. Not only does each need to look at a given BMP and ask the same questions, the answer needs to be standardized as well. The development of a standard set of BMP inspection forms will accomplish this.

Many of the Delegated Agencies have developed inspection forms that they are comfortable working with. While they do vary from one another, there is commonality which should be used as a starting point in the development of a common inspection form. By starting with existing forms, not only will changes be minimized, but the best aspects of each can be maintained and the individual Delegated Agencies will be more involved in the process and thus be able to add the value of their own experiences.

In addition to the different forms currently in use, there are differences in the depth of inspection. The development of a common inspection form implies the establishment of a minimum standard for inspection. While it is important to establish inspection requirements, it may not be reasonably feasible to achieve them right away. It would be reasonable to set an inspection standard, with a regular periodicity, and expect that the required level of data be collected within one inspection cycle. As an example the inclusion of the specific watershed that a BMP resides in could be accomplished over the next inspection cycle. Additional data, such as the drainage area served by a BMP should also be added as time and resources allow.

Finally, to minimize subjectivity and increase standardization, pre-defined selection lists should be established for each inspection point. This will ensure that data collected throughout the state can be compared regardless of who performed the inspection or where and when it occurred. In addition, set selection lists will add validity to condition assessments making sure that good is good and fair is fair.

2. *Standardize the method by which photographs and spatial data is collected.*

Currently available GPS survey equipment makes the collection of spatial data easy and reasonably cost-effective. Within a few seconds, a point can be located in the field, surveyed and added to a shapefile. The issue is what to actually survey in the field. While it is quite feasible to walk the perimeter of a pond and the line of a swale and actually survey the shape of the feature, this does not represent what many of the Delegated Agencies have done. To balance usefulness of data with cost of collection, the outfall of each BMP should be used as the survey point.

The outfall will locate the BMP in relation to its surroundings and provide a point to tie inspection data with photographs for a complete Graphical User Interface. In addition, many of the Delegated Agencies have already surveyed the outfall of their BMPs making this a reasonable common point. The survey of additional points such as drainage into the BMP, defects and the shape should not, however, be discouraged.

A series of photographs of each BMP should be collected to include landscape photos to show the overall BMP and its surroundings. Key features including the outfall and any defects should also be photographed. By numbering each photo with the unique identifier of the BMP, the photos and inspection data will be able to be linked in the final database.

3. *Develop a standard format for the storage of BMP data.*

BMP data is stored in different formats by the various Delegated Agencies. It is not necessary to require each to change to a common program (for example Microsoft Access). Instead, the data structure and naming of fields and columns must be standardized to allow data from different Delegated Agencies to be converted and stored in a common database. With each Delegated Agency maintaining BMP data, using the

same data structure processes to upload data into a common database can be put in place and common report formats developed.

4. *Develop a standard export format for BMP data to allow easy assimilation into the composite database.*

With standard data collection practices in place and a standardized data storage structure developed, processes can then be created to streamline the export and subsequent combination of BMP data. Data, once in an electronic format, can be converted from one format to another. In order to work with the greatest common factor, data should initially be delivered to DNREC in a Microsoft Excel format. Whether a Delegated Agency chooses to store data as a shapefile, or one of many database formats, an Excel file can be created and used to load data into the composite BMP database.

In addition to a standard export file, standard reports can be developed for submission to DNREC. Standard reporting has the potential to simplify the reporting process for the Delegated Agencies and will provide data to DNREC in a regular format allowing for comparison of different BMPs.

TABLE 3: Existing BMP Data (Soil and Water Conservation)

Organization	BMPs Maintained	Inventory	BackGround Data	Regular Inspection	Inspection Frequency	Historical Data	Spatial Data	Photos
City of Newark	Mostly extended detention basins, also have some ponds, bio-swales, bio-retention, sand filters, grass filter strips and structural BMPs. Some meet pre '91 regulations and some meet post '91 regulations.	Yes	No	Yes	Yearly	Yes	Yes	Yes
DelDOT	Wet ponds, dry ponds, infiltration trenches / basins, filter strips, bio-retention areas, bio-swales, sand filters, sediment forebays, check dams.	Yes	Yes	Yes	Under Development	Yes	Yes	Yes
DNREC	DNREC has statewide responsibility for all state and federal projects (Schools, Post Offices, etc) as well as remediation sites and contaminated sites.	Yes	No	No	N/A	Yes	No	No
Kent Conservation District	Stormwater BMPs (ponds, infiltration, bio-infil, sand filters, etc). County, Municipal and private BMPs fall under the KCD (all of Kent County except for federal and state facilities)	Yes	No	Yes	Yearly	Yes	Yes	Yes
New Castle Conservation District	Provide E&S review for 9 municipalities (all except Wilmington, Newark & Middletown). Existing BMPs are a grey area because a lot of the responsibility lies with HOAs or the Town / City	Yes	No	No	N/A	No	No	No
New Castle County	Sand Filters, Infiltration, Bio-retention, Bio-swales, Recharge Basins, Underground Detention, Wetlands, and Ponds.	Yes	No	Yes	Yearly	Yes	Yes	Yes
Sussex Conservation District	The SCD does not maintain SW practices, they provide inspection services and technical support. SCD maintains a listing of projects by name, when approved. Plans would then need to be pulled to see what BMPs might be on a given site.	No	No	No	N/A	No	No	No

TABLE 3: Existing BMP Data (Soil and Water Conservation)

Organization	*BMPs Maintained*	*Inventory*	*BackGround Data*	*Regular Inspection*	*Inspection Frequency*	*Historical Data*	*Spatial Data*	*Photos*
Town of Middletown	Dry ponds, wet ponds, infiltration ponds, some structural (underground systems) swales, bio-retention	No	No	No	N/A	No	No	No

TABLE 4: BMP Data Storage (Soil and Water Conservation)

Organization	How Data Is Stored	Where Data is Stored	Data Maintained By	Linked To GUI	GUI Software	Future Data Maintenance
City of Newark	Excel spreadsheets (inspection data) ARC 8.3 (mapping)	Shared City network drive	Data: Mike Sistek & Kelley Dinsmore. Network: IT	Yes	ArcView 8.3	Would like to be able to make changes locally. Local update and storage w/ periodic updates made to DNREC
DelDOT	Oracle	DelDOT server in Dover	DelDOT OIT	Yes	ESRI based	DelDOT would prefer to maintain their data
DNREC	MS Access. It is being migrated to SQL server	DNREC Server	DNREC IT	No	N/A	DNREC would prefer to maintain data themselves.
Kent Conservation District	MS Access	KCD server in Dover	KCD Program Staff	No	N/A	No preference, as long as the data is accessible.
New Castle Conservation District	Paper project files	NCCD building	Don Nichols	No	N/A	No Comments
New Castle County	Hansen: General descriptive information. Oracle based GUI for specific BMP information.	NCC Government center	NCC IT staff	Yes	ArcView 9.x	In house data management has several advantages, but for technical problems an outside player would be helpful.
Sussex Conservation District	MS Access	SCD building in Georgetown	In house staff member with DNREC IT support	No	N/A	SCD would prefer to input and maintain the data, if there are problems then they can go to IT. They would want to be able to control their data
Town of Middletown	Paper files	Town building		No	N/A	Prefer to maintain BMP information locally (both inspections and the data) then upload to a separate system (outside of the Town's) for sharing and distribution. Security is the main concern (along with data integrity).

TABLE 5: BMP Data Sharing Limitations (Soil and Water Conservation)

Organization	Sharing Limitations	How to Obtain BMP Data	Possible Stakeholder Use
City of Newark	Connecting into City computers is not likely to occur. The City connects to the web through U of D, although a new system is in discussion.	Just ask. The spreadsheets and inspection forms were readily shared for this project. The photos and mapping files are too big to easily share.	Making all BMP data available to residents could cause problems. Perhaps make basic data available to all (locations and types) but specifics on condition and maintenance should not be shared. Newark is focused on what they own and maintain thus little interest in data out of Newark, except maybe for City fringe areas.
DelDOT	A data request can be made, and DelDOT will determine the need. A FOIA request may be needed.	Ask. DelDOT would be able to release the data, although a spreasheet with basic data would liklely be provided first.	A planning tool to help determine maintenance needs. Display aerial photos and the user could look to see general data (approx size, year built, flow, drainage areas).
DNREC	There are limits on who can gain access (security). There are possible FOIA requirements as well due to the presence of correspondence.	Make a formal request, identify the data desired and DNREC would try to supply it.	Mainly internal requests, used for watershed assessments.
Kent Conservation District	None really exist	Request the data from the program manager	Not quite sure at this point
New Castle Conservation District	Has never been an issue. Nobody has ever really requested data from the NCCD. Sharing with state agencies is not an issue.	NCCD has not received any requests, however NCCD does reply to complaints.	NCCD does not feel that what the NCCD does lends itself to a computer application. NCCD focus is construction regulation. Once the BMP is built, maint & resp. falls to the HOA or town / city.
New Castle County	FOIA is a driver. The County likes to be consistent with distribution. Sharing with another government agency is not a problem. Many BMPs are owned by an HOA or Maint. Corp so there could be some privacy issues.	Make a FOIA request, there is a County employee who processes them	It would be helpful to have DelDOTs drainage collection system relative to the BMPs available. That would help with TMDLs as stakeholders. NCC could see private groups using the system to look for work opportunities, and that could pose a headache for maintenance corps.
Sussex Conservation District	Don't really have any issues sharing BMP data with other agencies. SCD would not mind working with Mosquito Control to get a better idea of which BMPs are breeding mosquitos, and which are not	FOIA request	In support of PCS / TMDLs with info provided on nutrient loading and removal rates. Simplification of the reporting process. If data is made available to all who need it, less time may need to be spent generating reports.
Town of Middletown	Do not want to let people into their network. Just ask (FOIA) and the data can be provided. Middletown is autonomous and does not share data in a digital format.	Just ask	Provide the ability to see what others are doing, and how BMPs are performing. Look at maintenance practices and a comparison of facilities, this will help determine if Middletown is keeping up.

TABLE 6: Software (Soil and Water Conservation)

Organization	Comfortable with MS Access	Comfortable with GIS Software	Current Software in Use	IT Staff	IT Staff Size
City of Newark	Yes	Yes	Excell & ArcView 8.3	Yes	2 people
DelDOT	Yes	Yes	ESRI	Yes	70 - 80 people
DNREC	Yes	Yes	Access, some GIS for individual cases	Yes	
Kent Conservation District	Yes	Yes	MS Access, some GIS	No	Rely on DNREC IT
New Castle Conservation District	No	No	Currently not tracking data electronically	No	N/A
New Castle County	Yes	Yes	Hansen, vb.net, Oracle	Yes	15-30 people
Sussex Conservation District	Yes	Yes	MS Access	No	N/A
Town of Middletown	Yes	No	Currently not tracking data electronically.	Yes	1 full-time professional

Division of Water Resources

Existing BMP Data

To gain an understanding of the types of BMP data currently collected and forwarded to the Division of Water Resources, Reporting Agencies were asked to describe the types of BMPs that they maintain, whether the BMPs are regularly inspected, and the inspection periodicity. All but two of the Agencies, the Delaware Department of Agriculture (DDA): Forest Service and the Kent Conservation District reported having some type of BMP inventory. The DDA Forest Service did state, however, that BMP data is maintained on forest specific BMPs.

BMP data reported to the Division of Water Resources tends to be both programmatic and geographic in nature. The BMPs are programmatic in that they involve rules and regulations related to the use of land. Permits are granted, land use designations are made and it is data that is collected and stored. The data is geographic in that a permit is good for a specific parcel of land, a preservation plan sets aside specific land. Examples include forest preservation plans, agricultural cover crop data, and nutrient management planning. As a result, background information in terms of areas served, waste removal, and physical location is typically available.

The inspection frequency of BMPs varies widely and is dependent on the type of BMP. Many of the practices are programmatic and do not lend themselves to physical inspection. As an example it would be somewhat impractical from a resource perspective to visit each farm in Sussex County to assess the use of cover crops. Therefore, in some cases, inspections occur at the time a permit or application is submitted, while in other cases inspections are random and might even be administrative in nature.

Historical data provides a valuable history of not only the performance of a BMP but also changes in BMP condition over time. Each Reporting Agency interviewed maintains some form of historical data, however, there is some variation in the amount of historical data maintained, with the majority having historical data back to 2001.

An inventory, along with historical records, provides valuable data for the assessment of BMP condition and performance. However, this does not provide a complete picture of the individual BMP. Spatial data, combined with photographs provide a convenient means to locate BMPs and review them without having to go into the field.

Spatial data is particularly important when looking at the relationship of various programs and how they can combine to affect overall water quality in an area. The ability to view forest preservation plans, crop rotation and cover plans along with the location of more physical BMPs (i.e. ponds) greatly enhances the ability to assess, plan and manage various BMP practices. All but three of the interviewees reported having spatial BMP data. The three that do not maintain spatial data relate to agricultural land use that brings into question privacy issues. This is discussed in a later section on data sharing.

Only DNREC's Groundwater Discharge section and the New Castle and Kent Conservation Districts report having photos of BMPs. These agencies maintain more "physical" BMPs that can specifically be visited in the field. It would not be practical to maintain photos of every farm or track of forest in a preservation plan.

The Kent and Sussex Conservation Districts use the NRCS Toolkit to track BMP data and the Performance Review System (PRS) to generate reports. These are systems developed by the NRCS to track and maintain data on a national level. While it is not known at this time if DNREC would be allowed direct access to the system, it may be possible for reports to be generated and forwarded to the Division of Water Resources in an electronic format. This will need to be explored further with the local NRCS office in Delaware

Table 7 summarizes BMP data collected that is reported to the Division of Water Resources.

Storage, Display and Maintenance of Data

In order to develop a composite BMP database, DNREC must know not only what data is collected, but also how it is stored. In addition, each Reporting Agency is a stakeholder in BMP data process and will play a role in how the composite database is maintained and updated. For this reason, attention was paid to the concerns of each Reporting Agency regarding the maintenance of BMP data.

Depending on the Agency, BMP data is stored in paper format, spreadsheets, one of several database systems and in the case of the Kent and Sussex Conservation Districts, the NRCS Toolkit and PRS. Four of the 10 Agencies interviewed link BMP data to a Graphical User Interface (GUI), with two using ESRI software and two using PRS and Toolkit. It is important to note that although different software and database systems are in use, it will be possible to combine all the electronic data into a single database. The key is to have an electronic format, either as a database or spreadsheet, to allow for the conversion of data.

The final format of a composite BMP system will impact how data is maintained by the individual Reporting Agencies. When asked their preference for data maintenance (in-house or by an outside entity) there was near unanimous agreement that data should be maintained and updated locally and then forwarded to DNREC for inclusion in the composite BMP system. The two main concerns are network security and data integrity. Each agency maintains their own computer network and from a security perspective would not be willing to allow outside entities access. In addition, each Reporting Agency feels that they have the greatest understanding of their BMPs and inspection processes and prefer to maintain control of their data. There was little hesitation about providing DNREC with periodic data updates for a composite BMP database.

Table 8 summarizes the storage, display and maintenance of BMP data.

Data Sharing

Much of the BMP data is currently being reported to DNREC, thus there is little concern over sharing data with government agencies. If the data is to be made public, certain privacy issues will arise. A large amount of the BMP data is collected on agricultural practices and can thus be linked to individual farms and farmers. While data specific to a farm should be protected, there is general agreement that if data is provided on a watershed basis, and individual farmers are masked, then the data can be shared. In any case, a Freedom of Information Act (FOIA) request will likely be required.

Perdue Agricycle has an additional concern in that their list of farms served and the amount of product processed is also a client list. From a business perspective, they would not like to see their client list made public. They did agree, however, that if data about farms served is provided on a watershed basis, the issue would be avoided.

When asked how they envision BMP data in a composite system being used, a variety of items were mentioned including:

- An aid in the development of reports to DNREC. The system could consolidate information to simplify the reporting process.
- Support watershed assessments.
- Provide a data clearing house so data could be downloaded direct, instead of having to make a request to DNREC.
- Support the TMDL / PCS process by providing relevant data.

Table 9 summarizes the perceived issues involved with the sharing of BMP data.

Hardware and Software

Although it is initially intended that the Division of Water Resources will use the composite BMP database for internal purposes only, the possibility for it being made available to the general public does exist. In addition, the Reporting Agencies will be tasked with providing data updates to the composite system on a regular basis. For this reason, it is important to have an understanding of the comfort level each stakeholder has with key software and the IT resources that they have in place. The final portion of the interview focused on these areas and the results are summarized in Table 10.

Recommendations

Combining the BMP data collected and reported to the Division of Water Resources will be more complicated than for the Division of Soil and Water Conservation. There are three reasons for this:

- There is much more variation in the types of data collected. Some of the data is geographic in nature and is collected and maintained in a shapefile format. This

is the case for many of the forestry and crop management programs. Other data is collected in a tabular format and is stored in spreadsheets and data tables. This is the case for the nutrient management programs.

- Much of the BMP data relates to agricultural practices and there are concerns in the agricultural community with associating data with individual farms and farmers.
- Data that is collected and maintained by the Conservation Districts is managed within the NRCS Toolkit and Performance Review Systems (PRS). These systems are not integrated with state systems and further work will be required to determine what types of reports and data can be provided to DNREC.

With these limitations in mind, there are some steps that can be taken by DNREC to begin the process of developing a composite BMP database.

1. *Ensure that all available shapefile data is sent to DNRECs 319 Program*
2. *Encourage the attribution of watershed information to agricultural data*
3. *Work with the NRCS to determine what data can be released and what format it can be provided in.*

Each step is discussed in greater detail below.

1. *Ensure that all available shapefile data is sent to DNRECs 319 Program.*

Currently much of the BMP data that exists in shapefile format either resides with or is forwarded to DNRECs 319 Program. In addition to shapefile data for agricultural BMPs and forest preservation areas, the 319 Program also collects nutrient management data from the Department of Agriculture. The 319 Program could thus serve as the starting point in an effort to bring various BMP datasets together. By integrating data from DNRECs Groundwater Discharges Section and the NRCS it would be possible to create a multi-layed GIS that could be used to relate the various practices together and develop a more holistic view of water resource practices throughout the state.

2. *Encourage the attribution of watershed information to agricultural data.*

Privacy issues will likely remain a concern for as long as site specific data is collected on individual farms. While there is concern about releasing specific data on farms there is much less concern with making general data available. For example, the fact that there are 1,500 acres of farm land covered by nutrient management plans in a watershed would be acceptable, identifying the farms by name and address would not be. By tracking crop rotation, manure generation and other agricultural items at the watershed level, DNREC will be able to monitor and manage issues affecting water quality while the privacy of the agricultural community is maintained.

To accomplish this, a standard watershed breakdown must first be established. Next, watershed data must be made a part of the various data sets for the various agricultural BMPs. In this way DNREC will be able to track the number of manure capture devices

in watershed X, the acres of cover crop and watershed Y and the number of farms using manure recycling in watershed Z.

3. *Work with the NRCS to determine what data can released and what format it can be provided in.*

The Conservation Districts, in coordination with the NRCS, collect a significant amount of data within the state. This information is then stored and managed using the NRCS Toolkit and Performance Review System. As of this report, there was not a lot of interaction between the NRCS and DNREC. To make use of this data, DNREC must engage the NRCS, determine what data is available, how it is stored and how it might be made available to DNREC.

With these initial steps in place, it will be possible to begin the integration of the various data sets and create a composite system to review all Water Resources BMP data in a single location. The challenge will continue to be that, unlike the Soil and Water Conservation BMPs that are all of a similar type, the Water Resources BMPs each represent a different program, with its own unique objectives and data sets.

TABLE 7: Existing BMP Data (Water Resources)

Organization	BMPs Maintained	Inventory	BackGround Data	Regular Inspection	Inspection Frequency	Historical Data	Spatial Data	Photos
Delaware Department of Agriculture: Forest Service	Forest Stewardship Plans (shapefiles); Timber Harvest Permitting (shapefiles); Urban Forestry Program (small component) reported as points vs areas because the areas are small (even though several trees might have been planted). All data is reported to DNREC's 319 Program.	No	Yes	No	N/A	Yes	Yes	No
Delaware Department of Agriculture: Nutrient Mgmnt Comm	Poultry manure tracking. Poultry is the main contributor in DE. Manure shipping is tracked in an Access database. Shipping permits are submitted, the data is put into the d/b and later exported to Excel. In-state shipments are tracked by watershed. Out of state the source is tracked by watershed but not the destination.	Yes	Yes	Yes	As apps are submitted	Yes	No	No
Delaware Department of Agriculture: Nutrient Mgmnt Plans	Nutrient Management Plan Program. All farms greater than 10 acres, or 8 animal units (~30,000 chicken) must submit a NMP. DDA reimburses farmers for the cost of the plans. Plans run in 3 year cycles, either 1 3-year plan, or 3 1-year plans.	Yes	Yes	Yes	Random admin. Reviews	Yes	No	No
DNREC: 319 Program	Cover Crop data (Kent & Sussex counties), CREP (Conservation Reserve Enhancement Program), Livestock BMPs (manure storage, incinerators, composters, animal waste handling, etc), Conservation reserve program.	Yes	Yes	Yes	Varies by program	Yes	Yes	No
DNREC: Coastal Program	The coastal program is a federal program that operates a little outside of the state agencies. They do not maintain any BMP data, and have turned tracking over to other groups.							
DNREC: Groundwater Discharges	On site waste water systems of all sizes (incl. spray irrigation): Over 80,000 on site septic systems, Several hundred > 2,500 gpd; Underground injection control program.	Yes	Yes	Yes	>2500 gpd: yearly	Yes	Yes	Yes

TABLE 7: Existing BMP Data (Water Resources)

Organization	BMPs Maintained	Inventory	BackGround Data	Regular Inspection	Inspection Frequency	Historical Data	Spatial Data	Photos
Kent Conservation District	The KCD does not really maintain BMP data on programs of their own. Instead, they support farmers that are tasked with meeting requirements. The data then goes to the appropriate agency to track.	No	Yes	Yes	varies by BMP	Yes	Yes	Yes
NCCD (NRCS)	Cover Crop Data, Horse Pastures and loading, No till Data, Some cost share from SWM, Some riparian buffers in urban areas, Filter Strips, Some E&S measures at the edge of Ag lands, Fragmites Control.		No	No	On construction & randomly	Yes	Yes	Yes
Perdue Agricycle	Tracks of the amount of waste taken from sites and the ultimate destination whether in or out of state. They serve most of the Kent and Sussex farming community (~1,400 farms.) PA does not have data on nutrient management plans, or if they are current. PA is told yes or no on if a plan exists, but not the expiration date.	Yes	Yes	No	N/A	Yes	No	No
Sussex Conservation District	SCD provides technical and financial assistance, they are not regulatory.	Yes	Yes	Yes	---		Yes	No

TABLE 8: BMP Data Storage (Water Resources)

Organization	How Data Is Stored	Where Data is Stored	Data Maintained By	Linked To GUI	GUI Software	Future Data Maintenance
Delaware Department of Agriculture: Forest Service	ARCView 9.2 & Access. Data is joined to the shapefiles.	Dover network & desktop.	Glenn Gladders	Yes	ARCView 9.2 and Access	Glenn would prefer to maintain and store the data locally.
Delaware Department of Agriculture: Nutrient Mgmnt Comm	MS Access	DDA Network	Steve Hollenbeck	No	N/A	Centralized data storage would work better, with local updating and maintenance.
Delaware Department of Agriculture: Nutrient Mgmnt Plans	MS Access & Excel	DDA network	Bob Coleman and Judy Burnes	No	N/A	DDA would prefer to maintain the data and provide updates as needed.
DNREC: 319 Program	ESRI with MS Access back-up	DNREC Network. Data on local drive.	DNREC IT	Yes	ArcGIS 9.x	Maintain in house, share the data.
DNREC: Coastal Program						
DNREC: Groundwater Discharges	MS Access, Adabase, file folders. Data being migrated to SQL server.	Dover & Georgetown	Groundwater Discharges section staff.	No	N/A	Dave would prefer for his group to manage and maintain the data, then upload it to a master system.
Kent Conservation District	File folders.	District facility	KCD staff	No	N/A	---
NCCD (NRCS)	Performance Review System (NRCS computer system).	National Server	NRCS IT	Yes	PRS/Toolkit	NRCS will maintain their data, then have it pulled. NRCS will not upload.
Perdue Agricycle	Exel spreadsheet	Perdue Agricycle factility	Perdue Agricycle staff	No	N/A	Perdue Agricycle would prefer internal management of data, especially since it is sensitive to the business practice and protection of customer base.
Sussex Conservation District	PRS & Toolkit	National server	NRCS IT	Yes	PRS/Toolkit	SCD would input data and maintain it. Problems go to IT, SCD wants to maintain control on their data.

TABLE 9: BMP Data Sharing Limitations (Water Resources)

Organization	Sharing Limitations	How to Obtain BMP Data	Possible Stakeholder Use
Delaware Department of Agriculture: Forest Service	The only requests for data come from the 319 program. It is reported at the watershed level. Individual land owners are masked in the report.	Likely no real issue with sharing data, but would like to know more. Individual names associated with data do not need to be made public.	To provide a method of mapping and reporting to DNREC.
Delaware Department of Agriculture: Nutrient Mgmnt Comm	None identified, the data is already sent to the 319 Program on a regular basis.	Ask Steve Hollenbeck. Data is already sent to the 319 Program on a regular basis.	Looking at data on a watershed basis.
Delaware Department of Agriculture: Nutrient Mgmnt Plans	Likely would need to remove names due to privacy concerns.	For DNREC and other state agencies they can call the NMC and ask for a report. For members of the general public, it would likely involve a FOIA request.	General watershed information. Bob does not see a need for individual farm info and acreage to be available, but tracking of the number of acreage in a watershed could be helpful.
DNREC: 319 Program	Mark does not like to give up point data for structural BMPs (privacy issue) however descriptive information is not a problem. Gov't groups: data sharing is not an issue.	Just ask Mark Hogan.	DNREC perform daily updates. An outside source would connect in to retrieve data and put it into a database that others can use. Thus, instead of going to Mark, parties would just go to the database.
DNREC: Coastal Program			
DNREC: Groundwater Discharges	No real restrictions. Tend to follow the lead of DNREC Water Resources. Sharing data with state agencies is not too big an issue.	Make a FOIA request. If the request for data is too large, the applicant may be asked to narrow it down.	Access based system with information to support the project at hand.
Kent Conservation District	Privacy Issues: farmers ID. FOIA request likely needed. If personal information is stripped out, it is ok to let the data go.	Likely see Mark Hogan (DNREC 319 Program), as the paper folders do not contain summary data.	Possibly adding photographs to the overall system.
NCCD (NRCS)	Specifics to a farm, by name or location is an issue, Can't give financial data, On a watershed basis, there are no issues with sharing data.	---	Tracking the acceptance of conservation practices, Calculations on nutrient management practice impacts, Input for state reports that need to be submitted.
Perdue Agricycle	Perdue Agricycle is concerned about what type of data is potentially made public as it is essentially a customer list. Data on manure removal on a watershed basis would not be as much of a problem as the customer base is masked.	It would depend on who it is, government agency would be ok. From a business perspective it really depends.	The end users (customers) are growing in number, and PA wants to protect that data. Identify how many growers are signed up as generators and end uses. Identify how many are growers / generators and not end users.

TABLE 9: BMP Data Sharing Limitations (Water Resources)

Organization	*Sharing Limitations*	*How to Obtain BMP Data*	*Possible Stakeholder Use*
Sussex Conservation District	Privacy issues with farmers. Don't mind sharing data but don't want to be too specific. Maps that are not to specific (ie don't tag BMPs to a parcel, but rather say there of XX of BMP YY in a watershed) would be ok.	FOIA request	Providing information for PCS & TMDLs, Simplify the reporting process by making data available to all who would need it.

TABLE 10: Software (Water Resources)

Organization	Comfortable with MS Access	Comfortable with GIS Software	Current Software in Use	IT Staff	IT Staff Size
Delaware Department of Agriculture: Forest Service	Yes	Yes	ARCView 9.2 & Access.	Yes	2 people
Delaware Department of Agriculture: Nutrient Mgmnt Comm	Yes	No	MS Access & Excel	Yes	2 people
Delaware Department of Agriculture: Nutrient Mgmnt Plans	Yes	No	MS Access & Excel	Yes	2 People
DNREC: 319 Program	Yes	Yes	ArcView 9.x & MS Access	Yes	Separate Department
DNREC: Coastal Program					
DNREC: Groundwater Discharges	Yes	Yes	Some Access, some Adabase	Yes	Separate Department
Kent Conservation District			---		---
NCCD (NRCS)	Yes	Yes	PRS & Toolkit	Yes	USDA IT
Perdue Agricycle	Yes	No	Excel	Yes	Corporate IT staff
Sussex Conservation District	Yes	Yes	PRS & Toolkit. Excel (state revolving funds)	Yes	USDA IT

Appendix 1

DNREC Best Management Practice (BMP) Assessment Questionnaire

Organization: **Phone Number:**

Point of Contact: **E-mail address:**

I. Existing BMP Information

1. What types of BMPs do you maintain?

2. Do you have an inventory listing each BMP? Is there inspection / description data associated with the listing?

3. Is background information on the BMPs (areas served, nutrient reduction observed, etc) available?

4. Are the BMPs inspected on a regular schedule?

5. How is the BMP data updated?

6. Is historical data maintained?

7. Do you have spatial (location) data for each BMP?

a. What format is the spatial data in?

b. What type of locational information is available (lat / long, state plane, address, etc)?

8. Have the BMPs been photographed?

a. If so, how are the photos catalogued and associated with BMP data?

II. Data / Information storage

1. What format is BMP data stored in?

2. Where (physically) is the data stored?

3. Who is responsible for storing and maintaining the data?

4. If BMP data is stored in an electronic format, is the data linked into a Graphical User Interface (GUI)?

   a. Is so, what software is used? version?

   b. What programming language (if any) was used in building the GUI?

   c. Who built the GUI?

5. In terms of future data maintenance, would you prefer to house and maintain BMP data yourself, or have an outside entity store and maintain it?

III. Data Sharing

1. What requirements or limitations do you have in place to control the distribution and sharing of data?

2. How would an interested party go about getting a copy of your BMP data?

3. How do you envision stakeholders / end users accessing and retrieving BMP information?

IV. Hardware / Software

1. Are you comfortable using MS Access? ESRI (or other) GIS software?

2. What software are you currently using to track BMP data?

3. Do you have an IT staff? If so, how large is it?

Appendix 2

Interview Summary

Organization City of Newark

Primary POC: Mike Sistek ***Phone:*** (302) 366-7040 ***Email:*** pwoperations@newark.de.us

Secondary POC: Kelley Dinsmore ***Phone:*** (302) 366-7040 ***Email:*** kdinsmore@newark.de.us

Exisiting BMP Information

BMPs Maintained:

Mostly extended detention basins, also have some ponds, bio-swales, bio-retention, sand filters, grass filter strips and structural BMPs. Some meet pre '91 regulations and some meet post '91 regulations.

Inventory: Yes ***Inventory Comments:*** sorted by private vs Newark & pre and post 1991

Background Data: No ***Regular Inspections:*** Yes ***Inspection Frequency:*** Yearly

How data is updated: Inspectors update the master spreadsheet each year following the inspection.

Historical Data: Yes ***Historical Data Comments:*** Spreadsheet has current data. Paper records maintained.

Spatial Data: Yes ***Spatial data format:*** Typically the outfall is GPSd. DE State Plane.

Photos: Yes ***How photos are catalogued:*** Linked using a common structure ID

Data and Information Storage

Storage Format: Excel spreadsheets (inspection data) ARC 8.3 (mapping)

Storage Location: Shared City network drive ***Maintained By:*** Data: Mike Sistek & Kelley Dinsmore. Network: IT

Data Linked To a GUI: Yes ***GUI Software:*** ArcView 8.3

GUI Language: --- ***GUI Built By:*** Kelley Dinsmore

Thoughts on Future Data Maintenance:

Would like to be able to make changes locally. Local update and storage w/ periodic updates made to DNREC

Data Sharing

Data Sharing Limitations: Connecting into City computers is not likely to occur. The City connects to the web through U of D, although a new system is in discussion.

How to Obtain Data: Just ask. The spreadsheets and inspection forms were readily shared for this project. The photos and mapping files are too big to easily share.

Thoughts on Stakeholder Use:

Making all BMP data available to residents could cause problems. Perhaps make basic data available to all (locations and types) but specifics on condition and maintenance should not be shared. Newark is focused on what they own and maintain thus little interest in data out of Newark, except maybe for City fringe areas.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** 2 people

Current Software: Excell & ArcView 8.3

Interview Summary

Organization DelDOT

Primary POC: Vince Davis ***Phone:*** (302) 760-2180 ***Email:*** Vince.Davis@state.de.us

Secondary POC: Wendy Polasko ***Phone:*** (302) 760-2542 ***Email:*** Wendy.Polasko@state.de.us

Exisiting BMP Information

BMPs Maintained:

Wet ponds, dry ponds, infiltration trenches / basins, filter strips, bio-retention areas, bio-swales, sand filters, sediment forebays, check dams.

Inventory: Yes ***Inventory Comments:*** ---

Background Data: Yes ***Regular Inspections:*** Yes ***Inspection Frequency:*** Under Development

How data is updated: Consultants submit design data in the same format as the inventory. DelDOT has two sets of data. The first (structure) is data that is static, and not expected to change. This includes classification, dimensions, material, etc. The second (inspection) is expected to change over time, and a historical record is maintained.

Historical Data: Yes ***Historical Data Comments:*** No data will be overwritten.

Spatial Data: Yes ***Spatial data format:*** DE State Plane

Photos: Yes ***How photos are catalogued:*** By BMP # and sorted by year.

Data and Information Storage

Storage Format: Oracle

Storage Location: DelDOT server in Dover ***Maintained By:*** DelDOT OIT

Data Linked To a GUI: Yes ***GUI Software:*** ESRI based

GUI Language: JAVA, SDE ***GUI Built By:*** GeoDecisions

Thoughts on Future Data Maintenance:

DelDOT would prefer to maintain their data

Data Sharing

Data Sharing Limitations: A data request can be made, and DelDOT will determine the need. A FOIA request may be needed.

How to Obtain Data: Ask. DelDOT would be able to release the data, although a spreasheet with basic data would liklely be provided first.

Thoughts on Stakeholder Use:

A planning tool to help determine maintenance needs. Display aerial photos and the user could look to see general data (approx size, year built, flow, drainage areas).

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** 70 - 80 people

Current Software: ESRI

Interview Summary

Organization DNREC

Primary POC: Jamie Rutherford ***Phone:*** (302) 739-9921 ***Email:*** Jamie.Rutherford@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

DNREC has statewide responsibility for all state and federal projects (Schools, Post Offices, etc) as well as remediation sites and contaminated sites.

Inventory: Yes ***Inventory Comments:*** Tied to project database. It lists what BMPs are on what site.

Background Data: No ***Regular Inspections:*** No ***Inspection Frequency:*** N/A

How data is updated: Regular updates do not occur.

Historical Data: Yes ***Historical Data Comments:*** Paper Records

Spatial Data: No ***Spatial data format:*** N/A

Photos: No ***How photos are catalogued:*** N/A

Data and Information Storage

Storage Format: MS Access. It is being migrated to SQL server

Storage Location: DNREC Server ***Maintained By:*** DNREC IT

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

DNREC would prefer to maintain data themselves.

Data Sharing

Data Sharing Limitations: There are limits on who can gain access (security). There are possible FOIA requirements as well due to the presence of correspondence.

How to Obtain Data: Make a formal request, identify the data desired and DNREC would try to supply it.

Thoughts on Stakeholder Use:

Mainly internal requests, used for watershed assessments.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:***

Current Software: Access, some GIS for individual cases

Interview Summary

Organization Kent Conservation District

Primary POC: Jared Adkins ***Phone:*** (302) 741-2600 ***Email:*** Jared.adkins@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Stormwater BMPs (ponds, infiltration, bio-infil, sand filters, etc). County, Municipal and private BMPs fall under the KCD (all of Kent County except for federal and state facilities)

Inventory: Yes ***Inventory Comments:*** ---

Background Data: No ***Regular Inspections:*** Yes ***Inspection Frequency:*** Yearly

How data is updated: The Access database is updated / verified with each inspection.

Historical Data: Yes ***Historical Data Comments:*** Some data is only available on the field form

Spatial Data: Yes ***Spatial data format:*** UTM (BMP location) Lat/Long (projects)

Photos: Yes ***How photos are catalogued:*** They are stored in an electronic project file, however they are not linked to the database.

Data and Information Storage

Storage Format: MS Access

Storage Location: KCD server in Dover ***Maintained By:*** KCD Program Staff

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

No preference, as long as the data is accessible.

Data Sharing

Data Sharing Limitations: None really exist

How to Obtain Data: Request the data from the program manager

Thoughts on Stakeholder Use:

Not quite sure at this point

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** No

Comfortable wth GIS Software: Yes ***IT Staff Size:*** Rely on DNREC IT

Current Software: MS Access, some GIS

Interview Summary

Organization New Castle Conservation District

Primary POC: Don Nichols ***Phone:*** (302) 832-3100 ***Email:*** N/A

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Provide E&S review for 9 municipalities (all except Wilmington, Newark & Middletown). Existing BMPs are a grey area because a lot of the responsibility lies with HOAs or the Town / City

Inventory: Yes ***Inventory Comments:*** No inventory, however an annual report is sent to DNREC.

Background Data: No ***Regular Inspections:*** No ***Inspection Frequency:*** N/A

How data is updated: No inventory to update

Historical Data: No ***Historical Data Comments:*** N/A

Spatial Data: No ***Spatial data format:*** N/A

Photos: No ***How photos are catalogued:*** N/A

Data and Information Storage

Storage Format: Paper project files

Storage Location: NCCD building ***Maintained By:*** Don Nichols

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

No Comments

Data Sharing

Data Sharing Limitations: Has never been an issue. Nobody has ever really requested data from the NCCD. Sharing with state agencies is not an issue.

How to Obtain Data: NCCD has not received any requests, however NCCD does reply to complaints.

Thoughts on Stakeholder Use:

NCCD does not feel that what the NCCD does lends itself to a computer application. NCCD focus is construction regulation. Once the BMP is built, maint & resp. falls to the HOA or town / city.

Hardware and Software

Comfortable with MS Access: No ***IT Staff:*** No

Comfortable wth GIS Software: No ***IT Staff Size:*** N/A

Current Software: Currently not tracking data electronically

Interview Summary

Organization New Castle County

Primary POC: Mike Harris ***Phone:*** (302) 395-5806 ***Email:*** MHarris@nccde.org

Secondary POC: Ellie Mortazavi ***Phone:*** (302) 395-5802 ***Email:*** EMortazavi@nccde.org

Exisiting BMP Information

BMPs Maintained:

Sand Filters, Infiltration, Bio-retention, Bio-swales, Recharge Basins, Underground Detention, Wetlands, and Ponds.

Inventory: Yes ***Inventory Comments:*** Inspection and Description data does is maintained

Background Data: No ***Regular Inspections:*** Yes ***Inspection Frequency:*** Yearly

How data is updated: There is a physical folder for each BMP that has plans, photos, historical inspections. Data is collected on laptops and uploaded wirelessly.

Historical Data: Yes ***Historical Data Comments:*** Back to 2004

Spatial Data: Yes ***Spatial data format:*** Typically the outfall of the structure

Photos: Yes ***How photos are catalogued:*** Not directly linked to BMP data

Data and Information Storage

Storage Format: Hansen: General descriptive information. Oracle based GUI for specific BMP information.

Storage Location: NCC Government center ***Maintained By:*** NCC IT staff

Data Linked To a GUI: Yes ***GUI Software:*** ArcView 9.x

GUI Language: vb.net & Oracle ***GUI Built By:*** NCC Staff

Thoughts on Future Data Maintenance:

In house data management has several advantages, but for technical problems an outside player would be helpful.

Data Sharing

Data Sharing Limitations: FOIA is a driver. The County likes to be consistent with distribution. Sharing with another government agency is not a problem. Many BMPs are owned by an HOA or Maint. Corp so there could be some privacy issues.

How to Obtain Data: Make a FOIA request, there is a County employee who processes them

Thoughts on Stakeholder Use:

It would be helpful to have DelDOTs drainage collection system relative to the BMPs available. That would help with TMDLs as stakeholders. NCC could see private groups using the system to look for work opportunities, and that could pose a headache for maintenance corps.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** 15-30 people

Current Software: Hansen, vb.net, Oracle

Interview Summary

Organization Sussex Conservation District

Primary POC: Jessica Watson ***Phone:*** (302) 856-7219 ***Email:*** Jessica.Watson@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

The SCD does not maintain SW practices, they provide inspection services and technical support. SCD maintains a listing of projects by name, when approved. Plans would then need to be pulled to see what BMPs might be on a given site.

Inventory: No ***Inventory Comments:*** Project tracker, not a BMP tracker, not NPDES driven.

Background Data: No ***Regular Inspections:*** No ***Inspection Frequency:*** N/A

How data is updated: The database itself is not updated. Individual reports are saved as word documents.

Historical Data: No ***Historical Data Comments:*** Maintenance reports and approved plans are saved.

Spatial Data: No ***Spatial data format:*** N/A

Photos: No ***How photos are catalogued:*** N/A

Data and Information Storage

Storage Format: MS Access

Storage Location: SCD building in Georgetown ***Maintained By:*** In house staff member with DNREC IT support

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

SCD would prefer to input and maintain the data, if there are problems then they can go to IT. They would want to be able to control their data

Data Sharing

Data Sharing Limitations: Don't really have any issues sharing BMP data with other agencies. SCD would not mind working with Mosquito Control to get a better idea of which BMPs are breeding mosquitos, and which are not

How to Obtain Data: FOIA request

Thoughts on Stakeholder Use:

In support of PCS / TMDLs with info provided on nutrient loading and removal rates. Simplification of the reporting process. If data is made available to all who need it, less time may need to be spent generating reports.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** No

Comfortable wth GIS Software: Yes ***IT Staff Size:*** N/A

Current Software: MS Access

Interview Summary

Organization Town of Middletown

Primary POC: Morris Deputy ***Phone:*** (302) 378-9120 ***Email:*** mdeputy@middletownde.org

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Dry ponds, wet ponds, infiltration ponds, some structural (underground systems) swales, bio-retention

Inventory: No ***Inventory Comments:*** A BMP inventory is a priority. Getting flooded by new development.

Background Data: No ***Regular Inspections:*** No ***Inspection Frequency:*** N/A

How data is updated: Currenlty not updated.

Historical Data: No ***Historical Data Comments:*** N/A

Spatial Data: No ***Spatial data format:*** N/A

Photos: No ***How photos are catalogued:*** N/A

Data and Information Storage

Storage Format: Paper files

Storage Location: Town building ***Maintained By:***

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

Prefer to maintain BMP information locally (both inspections and the data) then upload to a separate system (outside of the Town's) for sharing and distribution. Security is the main concern (along with data integrity).

Data Sharing

Data Sharing Limitations: Do not want to let people into their network. Just ask (FOIA) and the data can be provided. Middletown is autonomous and does not share data in a digital format.

How to Obtain Data: Just ask

Thoughts on Stakeholder Use:

Provide the ability to see what others are doing, and how BMPs are performing. Look at maintenance practices and a comparison of facilities, this will help determine if Middletown is keeping up.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: No ***IT Staff Size:*** 1 full-time professional

Current Software: Currently not tracking data electronically.

Interview Summary

Organization Delaware Department of Agriculture: Forest Service

Primary POC: Glenn Gladders ***Phone:*** (302) 698-4553 ***Email:*** Glenn.gladders@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Forest Stewardship Plans (shapefiles); Timber Harvest Permitting (shapefiles); Urban Forestry Program (small component) reported as points vs areas because the areas are small (even though several trees might have been planted). All data is reported to DNREC's 319 Program.

Inventory: No ***Inventory Comments:*** Forest specific BMPs related to Timber Permits are tracked.

Background Data: Yes ***Regular Inspections:*** No ***Inspection Frequency:*** N/A

How data is updated: As permits are issued data is entered into the database. Once a year the data is rolled up to look for items that were not entered and then the data is archived.

Historical Data: Yes ***Historical Data Comments:*** Back to 2005

Spatial Data: Yes ***Spatial data format:*** ARCView 9.2, DE State Plane

Photos: No ***How photos are catelogued:*** N/A

Data and Information Storage

Storage Format: ARCView 9.2 & Access. Data is joined to the shapefiles.

Storage Location: Dover network & desktop. ***Maintained By:*** Glenn Gladders

Data Linked To a GUI: Yes ***GUI Software:*** ARCView 9.2 and Access

GUI Language: N/A ***GUI Built By:*** Glenn Gladders

Thoughts on Future Data Maintenance:

Glenn would prefer to maintain and store the data locally.

Data Sharing

Data Sharing Limitations: The only requests for data come from the 319 program. It is reported at the watershed level. Individual land owners are masked in the report.

How to Obtain Data: Likely no real issue with sharing data, but would like to know more. Individual names associated with data do not need to be made public.

Thoughts on Stakeholder Use:

To provide a method of mapping and reporting to DNREC.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** 2 people

Current Software: ARCView 9.2 & Access.

Interview Summary

Organization Delaware Department of Agriculture: Nutrient Mgmnt Comm

Primary POC: Steve Hollenbeck ***Phone:*** (302) 698-4500 ***Email:*** Steven.hollenbeck@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Poultry manure tracking. Poultry is the main contributor in DE. Manure shipping is tracked in an Access database. Shipping permits are submitted, the data is put into the d/b and later exported to Excel. In-state shipments are tracked by watershed. Out of state the source is tracked by watershed but not the destination.

Inventory: Yes ***Inventory Comments:*** Tracking of manure shipping

Background Data: Yes ***Regular Inspections:*** Yes ***Inspection Frequency:*** As apps are submitted

How data is updated: Data is updated as applications or claims (as the state approves funding) are submitted.

Historical Data: Yes ***Historical Data Comments:*** Back to 2001.

Spatial Data: No ***Spatial data format:*** Sources change over time.

Photos: No ***How photos are catelogued:*** N/A

Data and Information Storage

Storage Format: MS Access

Storage Location: DDA Network ***Maintained By:*** Steve Hollenbeck

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

Centralized data storage would work better, with local updating and maintenance.

Data Sharing

Data Sharing Limitations: None identified, the data is already sent to the 319 Program on a regular basis.

How to Obtain Data: Ask Steve Hollenbeck. Data is already sent to the 319 Program on a regular basis.

Thoughts on Stakeholder Use:

Looking at data on a watershed basis.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: No ***IT Staff Size:*** 2 people

Current Software: MS Access & Excel

Interview Summary

Organization Delaware Department of Agriculture: Nutrient Mgmnt Plans

Primary POC: Bob Coleman ***Phone:*** (302) 698-4556 ***Email:*** Robert.coleman@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Nutrient Management Plan Program. All farms greater than 10 acres, or 8 animal units (~30,000 chicken) must submit a NMP. DDA reimburses farmers for the cost of the plans. Plans run in 3 year cycles, either 1 3-year plan, or 3 1-year plans.

Inventory: Yes ***Inventory Comments:*** Database with farm and farmer info.

Background Data: Yes ***Regular Inspections:*** Yes ***Inspection Frequency:*** Random admin. Reviews

How data is updated: At the time of the application, data is updated.

Historical Data: Yes ***Historical Data Comments:*** Back to 2001

Spatial Data: No ***Spatial data format:*** N/A

Photos: No ***How photos are catelogued:*** N/A

Data and Information Storage

Storage Format: MS Access & Excel

Storage Location: DDA network ***Maintained By:*** Bob Coleman and Judy Burnes

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

DDA would prefer to maintain the data and provide updates as needed.

Data Sharing

Data Sharing Limitations: Likely would need to remove names due to privacy concerns.

How to Obtain Data: For DNREC and other state agencies they can call the NMC and ask for a report. For members of the general public, it would likely involve a FOIA request.

Thoughts on Stakeholder Use:

General watershed information. Bob does not see a need for individual farm info and acreage to be available, but tracking of the number of acreage in a watershed could be helpful.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: No ***IT Staff Size:*** 2 People

Current Software: MS Access & Excel

Interview Summary

Organization DNREC: 319 Program

Primary POC: Mark Hogan ***Phone:*** (302) 739-9922 ***Email:*** Mark.hogan@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Cover Crop data (Kent & Sussex counties), CREP (Conservation Reserve Enhancement Program), Livestock BMPs (manure storage, incinerators, composters, animal waste handling, etc), Conservation reserve program.

Inventory: Yes ***Inventory Comments:*** GIS with an Access database with shapefiles for each program.

Background Data: Yes ***Regular Inspections:*** Yes ***Inspection Frequency:*** Varies by program

How data is updated: CREP: Ongoing process; Cover Crop: Data updated once a year; Livestock: updated once every six months. Data is provided to Mark, and he updates the GIS / database.

Historical Data: Yes ***Historical Data Comments:*** Back to about 1999

Spatial Data: Yes ***Spatial data format:*** Shapefiles, ArcGIS. DE State Plane

Photos: No ***How photos are catelogued:*** N/A

Data and Information Storage

Storage Format: ESRI with MS Access back-up

Storage Location: DNREC Network. Data on local drive. ***Maintained By:*** DNREC IT

Data Linked To a GUI: Yes ***GUI Software:*** ArcGIS 9.x

GUI Language: N/A ***GUI Built By:*** Glenn Gladders

Thoughts on Future Data Maintenance:

Maintain in house, share the data.

Data Sharing

Data Sharing Limitations: Mark does not like to give up point data for structural BMPs (privacy issue) however descriptive information is not a problem. Gov't groups: data sharing is not an issue.

How to Obtain Data: Just ask Mark Hogan.

Thoughts on Stakeholder Use:

DNREC perform daily updates. An outside source would connect in to retrieve data and put it into a database that others can use. Thus, instead of going to Mark, parties would just go to the database.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** Separate Department

Current Software: ArcView 9.x & MS Access

Interview Summary

Organization DNREC: Coastal Program

Primary POC: Marcia Fox ***Phone:*** (302) 739-9282 ***Email:*** Marcia.fox@state.de.us

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

The coastal program is a federal program that operates a little outside of the state agencies. They do not maintain any BMP data, and have turned tracking over to other groups.

Inventory: ***Inventory Comments:***

Background Data: ***Regular Inspections:*** ***Inspection Frequency:***

How data is updated:

Historical Data: ***Historical Data Comments:***

Spatial Data: ***Spatial data format:***

Photos: ***How photos are catelogued:***

Data and Information Storage

Storage Format:

Storage Location: ***Maintained By:***

Data Linked To a GUI: ***GUI Software:***

GUI Language: ***GUI Built By:***

Thoughts on Future Data Maintenance:

Data Sharing

Data Sharing Limitations:

How to Obtain Data:

Thoughts on Stakeholder Use:

Hardware and Software

Comfortable with MS Access: ***IT Staff:***

Comfortable wth GIS Software: ***IT Staff Size:***

Current Software:

Interview Summary

Organization DNREC: Groundwater Discharges

Primary POC: Dave Schepens ***Phone:*** (302) 739-9948 ***Email:*** Dave.schepens@state.de.us

Secondary POC: Ron Graeber ***Phone:*** (302) 739-9948 ***Email:*** Ronald.Graeber@state.de.us

Exisiting BMP Information

BMPs Maintained:

On site waste water systems of all sizes (incl. spray irrigation): Over 80,000 on site septic systems, Several hundred > 2,500 gpd; Underground injection control program.

Inventory: Yes ***Inventory Comments:*** Some file folders, some MS Access, some Adabase

Background Data: Yes ***Regular Inspections:*** Yes ***Inspection Frequency:*** >2500 gpd: yearly

How data is updated: Field techs perform inspections and update the database. Some is done remotely in the field, some in the office. Report forms are entered into the "non-haz" database.

Historical Data: Yes ***Historical Data Comments:*** ---

Spatial Data: Yes ***Spatial data format:*** Only on larger systems, DE State Plane.

Photos: Yes ***How photos are catelogued:*** In general, photos are not linked to the data.

Data and Information Storage

Storage Format: MS Access, Adabase, file folders. Data being migrated to SQL server.

Storage Location: Dover & Georgetown ***Maintained By:*** Groundwater Discharges section staff.

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

Dave would prefer for his group to manage and maintain the data, then upload it to a master system.

Data Sharing

Data Sharing Limitations: No real restrictions. Tend to follow the lead of DNREC Water Resources. Sharing data with state agencies is not too big an issue.

How to Obtain Data: Make a FOIA request. If the request for data is too large, the applicant may be asked to narrow it down.

Thoughts on Stakeholder Use:

Access based system with information to support the project at hand.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** Separate Department

Current Software: Some Access, some Adabase

Interview Summary

Organization Kent Conservation District

Primary POC: Tim Riley ***Phone:*** (302) 741-2600 ***Email:*** Timothy.riley@state.de.us

Secondary POC: Paula Long ***Phone:*** (302) 741-2600 ***Email:*** Paula.long@state.de.us

Exisiting BMP Information

BMPs Maintained:

The KCD does not really maintain BMP data on programs of their own. Instead, they support farmers that are tasked with meeting requirements. The data then goes to the appropriate agency to track.

Inventory: No ***Inventory Comments:*** ---

Background Data: Yes ***Regular Inspections:*** Yes ***Inspection Frequency:*** varies by BMP

How data is updated: No real updates, as things don't really change that much.

Historical Data: Yes ***Historical Data Comments:*** ---

Spatial Data: Yes ***Spatial data format:*** ---

Photos: Yes ***How photos are catelogued:*** Stormwater BMPs only.

Data and Information Storage

Storage Format: File folders.

Storage Location: District facility ***Maintained By:*** KCD staff

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

Data Sharing

Data Sharing Limitations: Privacy Issues: farmers ID. FOIA request likely needed. If personal information is stripped out, it is ok to let the data go.

How to Obtain Data: Likely see Mark Hogan (DNREC 319 Program), as the paper folders do not contain summary data.

Thoughts on Stakeholder Use:

Possibly adding photographs to the overall system.

Hardware and Software

Comfortable with MS Access: ***IT Staff:***

Comfortable wth GIS Software: ***IT Staff Size:*** ---

Current Software: ---

Interview Summary

Organization NCCD (NRCS)

Primary POC: Marianne Hardesty ***Phone:*** (302) 832-3100 ***Email:*** Marianne.hardesty@de.usda.gov

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

Cover Crop Data, Horse Pastures and loading, No till Data, Some cost share from SWM, Some riparian buffers in urban areas, Filter Strips, Some E&S measures at the edge of Ag lands, Fragmites Control.

Inventory: ***Inventory Comments:*** Can only pull data at the HUC 8 level. Reporting mechanism:PRS.

Background Data: No ***Regular Inspections:*** No ***Inspection Frequency:*** On construction & randomly

How data is updated: Data is entered into Toolkit / PRS by field office.

Historical Data: Yes ***Historical Data Comments:*** In Toolkit, does not migrate to PRS.

Spatial Data: Yes ***Spatial data format:*** Lat/Long

Photos: Yes ***How photos are catelogued:*** Some have been photographed.

Data and Information Storage

Storage Format: Performance Review System (NRCS computer system).

Storage Location: National Server ***Maintained By:*** NRCS IT

Data Linked To a GUI: Yes ***GUI Software:*** PRS/Toolkit

GUI Language: N/A ***GUI Built By:*** NRCS

Thoughts on Future Data Maintenance:

NRCS will maintain their data, then have it pulled. NRCS will not upload.

Data Sharing

Data Sharing Limitations: Specifics to a farm, by name or location is an issue, Can't give financial data, On a watershed basis, there are no issues with sharing data.

How to Obtain Data: ---

Thoughts on Stakeholder Use:

Tracking the acceptance of conservation practices, Calculations on nutrient management practice impacts, Input for state reports that need to be submitted.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** USDA IT

Current Software: PRS & Toolkit

Interview Summary

Organization Perdue Agricycle

Primary POC: Heather Comegys ***Phone:*** (302) 943-2732 ***Email:*** Heather.comegys@perdue.com

Secondary POC: Wayne Hudson ***Phone:*** (410) 543-3919 ***Email:*** Wayne.hudson@perdue.com

Exisiting BMP Information

BMPs Maintained:

Tracks of the amount of waste taken from sites and the ultimate destination whether in or out of state. They serve most of the Kent and Sussex farming community (~1,400 farms.) PA does not have data on nutrient management plans, or if they are current. PA is told yes or no on if a plan exists, but not the expiration date.

Inventory: Yes ***Inventory Comments:*** Information to build a service map exists, it is sensitive business infor

Background Data: Yes ***Regular Inspections:*** No ***Inspection Frequency:*** N/A

How data is updated: PA weighs trucks when they deliver to the plant, that data is used to track loading. Grower info (data about the farm) is updated at time of service.

Historical Data: Yes ***Historical Data Comments:*** Back to 2001

Spatial Data: No ***Spatial data format:*** Database has farm addresses.

Photos: No ***How photos are catelogued:*** N/A

Data and Information Storage

Storage Format: Exel spreadsheet

Storage Location: Perdue Agricycle factility ***Maintained By:*** Perdue Agricycle staff

Data Linked To a GUI: No ***GUI Software:*** N/A

GUI Language: N/A ***GUI Built By:*** N/A

Thoughts on Future Data Maintenance:

Perdue Agricycle would prefer internal management of data, especially since it is sensitive to the business practice and protection of customer base.

Data Sharing

Data Sharing Limitations: Perdue Agricycle is concerned about what type of data is potentially made public as it is essentially a customer list. Data on manure removal on a watershed basis would not be as much of a problem as the customer base is masked.

How to Obtain Data: It would depend on who it is, government agency would be ok. From a business perspective it really depends.

Thoughts on Stakeholder Use:

The end users (customers) are growing in number, and PA wants to protect that data. Identify how many growers are signed up as generators and end uses. Identify how many are growers / generators and not end users.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: No ***IT Staff Size:*** Corporate IT staff

Current Software: Excel

Interview Summary

Organization Sussex Conservation District

Primary POC: Debbie Absher ***Phone:*** (302) 856-3990 ***Email:*** Debbie.Absher@de.nacdnet.net

Secondary POC: ***Phone:*** ***Email:***

Exisiting BMP Information

BMPs Maintained:

SCD provides technical and financial assistance, they are not regulatory.

Inventory: Yes ***Inventory Comments:*** Reports are made to the EPA on a watershed basis, there is a list of in

Background Data: Yes ***Regular Inspections:*** Yes ***Inspection Frequency:*** ---

How data is updated: Data is entered into PRS and the NRCS Customer Toolkit.

Historical Data: ***Historical Data Comments:***

Spatial Data: Yes ***Spatial data format:*** site not BMP specific. DE State Plane.

Photos: No ***How photos are catelogued:*** N/A

Data and Information Storage

Storage Format: PRS & Toolkit

Storage Location: National server ***Maintained By:*** NRCS IT

Data Linked To a GUI: Yes ***GUI Software:*** PRS/Toolkit

GUI Language: N/A ***GUI Built By:*** NRCS

Thoughts on Future Data Maintenance:

SCD would input data and maintain it. Problems go to IT, SCD wants to maintain control on their data.

Data Sharing

Data Sharing Limitations: Privacy issues with farmers. Don't mind sharing data but don't want to be too specific. Maps that are not to specific (ie don't tag BMPs to a parcel, but rather say there of XX of BMP YY in a watershed) would be ok.

How to Obtain Data: FOIA request

Thoughts on Stakeholder Use:

Providing information for PCS & TMDLs, Simplify the reporting process by making data available to all who would need it.

Hardware and Software

Comfortable with MS Access: Yes ***IT Staff:*** Yes

Comfortable wth GIS Software: Yes ***IT Staff Size:*** USDA IT

Current Software: PRS & Toolkit. Excel (state revolving funds)

Appendix C2

2007 BMP Data for Delaware

HUC-12	County Segment	Watershed	County	Nutreint Management Plans	Manure Relocation	Cover Crops	Conservation Tillage	Water Control Structures	AWMS: Livestock										
									Dairy Operations			Bovine Operations		Equine Operations		Swine		Goats
									Number of dairy operations	Number with animal waste handling systems	Number with manure sheds	Number of bovine (cow) operations	Number with manure sheds	Number of equine operations	Number with manure sheds	Number of hog operations	Number with manure sheds	Number of goat operations
				acres	tons	acres	acres	structures	operations	operations	operations	operations	operations	operations	operations	operations	operations	operations
20600020103	800010003	Perch Creek	New Castle County	0.00	0.00	0.00	50,158.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20600020201		C&D Canal West		4,061.09	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20600020202	370010003	Bohemia Creek		3,234.50	6,264.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20600020401	810010003	Sassafras River		3,390.03	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20600020602	380010003	Chester River		10,668.10	1,139.00	0.00		0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
20600020601	380010001	Chester River	Kent County			1,647.68	117,232.00	0.00	6.00	1.00	0.00	2.00	0.00	4.00	0.00	2.00	0.00	0.00
20600050101	770010001	Choptank River		23,878.30	854.00	1,205.00		0.00	7.00	1.00	0.00	10.00	0.00	10.00	1.00	0.00	0.00	3.00
20600050102						2,386.36		0.00	1.00	0.00	0.00	5.00	0.00	19.00	4.00	3.00	1.00	0.00
20600050103						0.00		0.00	2.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
20600050104	400010001					556.30		0.00	1.00	0.00	0.00	2.00	0.00	3.00	0.00	0.00	0.00	0.00
20600050106						1,092.00		0.00	1.00	0.00	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
20600050107						483.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20801090501	410010001	Marshyhope Creek				3,455.91		0.00	1.00	1.00	0.00	2.00	0.00	3.00	0.00	2.00	0.00	1.00
20801090502						5,722.79		0.00	4.00	4.00	1.00	2.00	0.00	11.00	2.00	2.00	2.00	0.00
20801090101	780010001 / 780010005	Nanticoke River				2,145.58		0.00	3.00	2.00	0.00	6.00	1.00	5.00	0.00	0.00	0.00	1.00
20801090102	780010005	Gum Branch	Sussex County	9,282.77	338.00	1,076.00	184,864.00	0.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
20801090503	410010005	Marshyhope Creek		32,086.80	3,493.00	1,244.27		0.00	4.00	2.00	1.00	1.00	0.00	2.00	0.00	0.00	0.00	0.00
20801090504						263.20		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20801090505						69.50		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20801090103		Gravelly Branch		7,569.31	977.00	933.90		0.00	0.00	0.00	0.00	3.00	0.00	2.00	0.00	0.00	0.00	0.00
20801090301		Deep Creek		16,250.65	71.00	678.10		0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	1.00	1.00	1.00
20801090302						737.60		0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00	1.00	0.00	0.00
20801090401		Broad Creek		39,294.03	12,114.00	234.80		0.00	0.00	0.00	0.00	5.00	1.00	4.00	0.00	0.00	0.00	0.00
20801090402						170.80		0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
20801090403						261.30		0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	3.00	0.00	0.00
20801090404						203.20		0.00	0.00	0.00	0.00	3.00	0.00	2.00	0.00	1.00	0.00	0.00
20801090405						899.90		0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
20801090104		Nanticoke River		52,588.88	13,958.00	1,227.20		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20801090303						1,436.00		0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00	0.00
20801090304						93.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20801090601						464.00		0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
20801090604						134.60		0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00	0.00	0.00	0.00
20600070101	420010005	Wicomico River		404.80	2,478.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
20600090101	430010005	Pocomoke River		10,154.08	9,718.00	233.50		0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00	3.00	2.00	0.00
TOTAL				212,863.33	51,404.00	29,055.49	352,254.00	0.00	32.00	12.00	5.00	51.00	4.00	79.00	8.00	23.00	7.00	7.00
Notes				Data not available by HUC-12 or County Segment. See "NMP" for more information.	Data not available by HUC-12 or County Segment. See "ManureRelocation" and "ManureReceivers" for more information.	Total in-place on 12/31/06.	Total for year 2004. Most recent data available. Figures include all tillage where residue is 15% or greater. Numbers are County-wide totals, but could be prorated by polygon areas to estimate acres in each County Segment.	According to NRCS there has not been much change in numbers for the year 2004 from 2003. Each structure is assumed to "treat" 75 acres of cropland in the Delaware PCS process.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.	Total in-place as o 12/31/07.
Source				DE Nutrient Management Commission	DE Nutrient Management Commission	Delaware NPS Program / County Conservation Districts	USDA NRCS	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts

AWMS: Poultry										Other		CRP	CREP			
Poultry (# operations)					Poultry (Capacity- # Birds)											
Number of poultry operations	Number with manure sheds	Number with dead bird composters	Number with dead bird incinerators	Number with heavy use area protection	Capacity of all operations	Capacity served by manure sheds	Capacity served by composters	Capacity served by dead bird incinerators	Capacity served by heavy use area protection	Poultry House Windbreaks	Stream fencing	Retirement of Highly Erodible Land / CRP	Hardwood trees - riparian buffers (CREP)(CP22&CP3A)	Hardwood trees - wetland restoration (CREP)(CP23)	Grassed buffers (CREP)(CP21)	Wildlife habitat (CREP)(CP4D)
operations	operations	operations	operations	operations	birds	birds	birds	birds	birds	sites	feet	acres	acres	acres	acres	acres
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.10	6.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.90	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	10.10	0.00	8.90	22.60
3.00	4.00	4.00	0.00	1.00	389,336.00	389,336.00	197,336.00	0.00	389,336.00	0.00	0.00	86.90	18.50	3.20	19.60	30.10
19.00	12.00	10.00	0.00	0.00	1,165,383.00	866,674.00	805,339.00	0.00	0.00	0.00	0.00	137.90	45.00	0.00	42.90	1.10
9.00	6.00	7.00	0.00	4.00	658,672.00	378,670.00	510,404.00	0.00	202,669.00	0.00	0.00	38.00	98.50	35.10	16.70	12.30
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.60	0.00	11.00	4.00
7.00	7.00	7.00	0.00	4.00	586,668.00	554,668.00	554,668.00	0.00	373,334.00	0.00	0.00	63.40	17.60	29.10	18.00	9.90
3.00	3.00	3.00	0.00	1.00	256,003.00	256,003.00	256,003.00	0.00	58,668.00	0.00	0.00	0.00	47.00	0.00	0.00	4.70
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80	5.00
14.00	10.00	6.00	0.00	17.00	762,676.00	570,674.00	477,340.00	0.00	437,339.00	0.00	0.00	62.80	122.10	6.50	113.40	44.40
34.00	25.00	22.00	0.00	18.00	2,360,016.00	1,778,679.00	1,498,677.00	0.00	840,005.00	2.00	0.00	84.40	162.30	44.60	250.60	51.30
41.00	31.00	28.00	0.00	29.00	2,304,018.00	1,541,346.00	1,605,346.00	0.00	594,670.00	1.00	0.00	5.10	388.60	82.10	45.90	39.00
36.00	26.00	20.00	2.00	48.00	2,144,011.00	1,250,675.00	1,050,671.00	0.00	824,002.00	0.00	0.00	5.00	217.20	30.00	0.00	20.00
22.00	17.00	17.00	1.00	15.00	1,312,011.00	1,048,008.00	1,112,008.00	0.00	290,669.00	0.00	0.00	4.50	124.50	9.60	2.70	19.00
7.00	6.00	6.00	0.00	1.00	661,343.00	597,343.00	613,343.00	0.00	176,004.00	1.00	0.00	0.00	32.70	8.80	7.20	20.10
4.00	3.00	3.00	0.00	0.00	277,334.00	248,000.00	248,000.00	0.00	0.00	0.00	0.00	0.00	13.20	0.00	0.00	2.30
16.00	15.00	12.00	1.00	22.00	1,320,013.00	1,218,677.00	968,005.00	0.00	546,669.00	0.00	0.00	1.70	164.40	5.40	0.00	16.60
14.00	10.00	7.00	0.00	2.00	1,445,368.00	480,004.00	458,670.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	4.00
44.00	29.00	26.00	0.00	46.00	2,634,689.00	1,504,014.00	1,586,678.00	0.00	730,672.00	2.00	0.00	25.60	42.80	0.00	0.00	5.00
29.00	22.00	21.00	0.00	30.00	1,685,342.00	1,354,672.00	1,301,340.00	0.00	701,336.00	0.00	0.00	0.00	17.50	0.00	0.00	2.40
53.00	25.00	32.00	2.00	41.00	3,176,029.00	1,520,017.00	1,986,684.00	130,667.00	696,005.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65.00	44.00	42.00	1.00	38.00	3,584,032.00	2,568,020.00	2,552,021.00	42,667.00	749,337.00	2.00	0.00	5.00	0.00	0.00	0.00	0.00
63.00	26.00	37.00	0.00	37.00	3,847,038.00	1,957,351.00	2,615,024.00	0.00	1,045,340.00	2.00	0.00	3.60	141.10	0.00	0.00	22.10
43.00	25.00	29.00	0.00	15.00	3,040,023.00	1,738,679.00	2,200,017.00	0.00	800,007.00	1.00	0.00	5.00	89.10	0.00	0.00	8.80
34.00	21.00	27.00	0.00	21.00	2,778,688.00	1,616,014.00	2,370,682.00	0.00	597,337.00	1.00	0.00	23.20	63.30	0.00	43.40	36.00
48.00	31.00	34.00	0.00	51.00	3,829,626.00	2,701,616.00	2,789,617.00	0.00	1,533,343.00	2.00	0.00	0.00	151.00	36.00	27.20	43.90
2.00	2.00	2.00	0.00	0.00	154,667.00	154,667.00	154,667.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.00	16.00	20.00	0.00	35.00	1,773,349.00	1,197,347.00	1,289,078.00	0.00	573,336.00	1.00	0.00	5.60	0.00	0.00	0.00	4.80
8.00	4.00	5.00	0.00	4.00	512,004.00	237,335.00	336,003.00	0.00	53,334.00	1.00	0.00	1.10	43.10	0.00	0.00	0.00
6.00	2.00	3.00	0.00	1.00	328,002.00	96,000.00	248,001.00	0.00	64,000.00	0.00	0.00	0.00	24.40	0.00	0.00	0.00
69.00	47.00	46.00	0.00	56.00	4,666,717.00	3,088,034.00	2,858,699.00	0.00	989,880.00	1.00	0.00	0.00	78.80	13.00	69.60	33.40
719.00	469.00	476.00	7.00	537.00	47,653,058.00	30,912,523.00	32,644,321.00	173,334.00	13,267,292.00	17.00	0.00	628.90	2,121.40	303.40	689.00	469.10
Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/07.	Total in-place as of 12/31/06.	Installed during calendar year 2003.	Total in-place as of December 31, 2006.	Total in-place as of December 31, 2007. Includes practices CP22 and CP3A.	Total in-place as of December 31, 2007. Practice CP23.	Total in-place as of December 31, 2007. Practice CP21.	Total in-place as of December 31, 2007. Practice CP4D.
Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County Conservation Districts	Delaware NPS Program / County USDA Service Centers	Delaware NPS Program	Delaware NPS Program	Delaware NPS Program	Delaware NPS Program

Delaware Watershed Net Report For Manure Relocation			
	Tons	Tons	Net Tons
Name	Exported	Imported	Exported/Imported
Amy Creek	0.00	0.00	0.00
Appoquinimink River	0.00	1,046.00	1,046.00
Assawoman	719.00	0.00	-719.00
Blackbird Creek	0.00	0.00	0.00
Bohemia Creek	6,264.00	0.00	-6,264.00
Brandywine Creek	0.00	0.00	0.00
Broad Creek	12,114.00	1,333.00	-10,781.00
Broadkill River	1,656.00	9,613.00	7,957.00
Buntings Branch	328.00	0.00	-328.00
C & D Canal East	0.00	0.00	0.00
C & D Canal West	0.00	0.00	0.00
Cedar Creek	0.00	228.00	228.00
Chester River	1,139.00	0.00	-1,139.00
Choptank River	854.00	796.00	-58.00
Christina River	0.00	0.00	0.00
Deep Creek	71.00	0.00	-71.00
Delaware Bay	0.00	0.00	0.00
Delaware River	0.00	0.00	0.00
Dragon Run Creek	0.00	0.00	0.00
Elk Creek	0.00	0.00	0.00
Gravelly Branch	977.00	0.00	-977.00
Gum Branch	338.00	0.00	-338.00
Indian River	1,390.00	314.00	-1,076.00
Indian River Bay	10,282.00	169.00	-10,113.00
Iron Branch	768.00	0.00	-768.00
Leipsic River	915.00	0.00	-915.00
Lewes Rehoboth Canal	0.00	0.00	0.00
Little Assawoman	0.00	0.00	0.00
Little Creek	0.00	0.00	0.00
Marshyhope Creek	3,493.00	1,227.00	-2,266.00
Mispillion River	3,109.00	165.00	-2,944.00
Murderkill River	2,615.00	0.00	-2,615.00
Naamans Creek	0.00	0.00	0.00
Nanticoke River	13,958.00	2,862.00	-11,096.00
Perch Creek	0.00	0.00	0.00
Pocomoke River	9,718.00	47.00	-9,671.00
Red Clay Creek	0.00	0.00	0.00
Red Lion Creek	0.00	1,634.00	1,634.00
Rehoboth Bay	0.00	0.00	0.00
Sassafras River	0.00	311.00	311.00
Shellpot Creek	0.00	0.00	0.00
Smyrna River	0.00	5,097.00	5,097.00
St. Jones River	1,618.00	2,282.00	664.00
White Clay Creek	0.00	0.00	0.00
Wicomico	2,478.00	0.00	-2,478.00
Totals	74,804.00	27,124.00	-47,680.00
Piedmont Basin	0.00	0.00	0.00
Delaware Bay Basin	9,913.00	20,065.00	10,152.00
Chesapeake Bay Basin	51,404.00	6,576.00	-44,828.00
Inland Bays/Atlantic Ocean	13,487.00	483.00	-13,004.00

* Net Exported if number is negative, otherwise Net Imported

Sender Watershed	Sender Basin	Receiver Town	Receiver State	Claim Tons
Nanticoke River	Chesapeake Bay Basin	Frankford	DE	72
Indian River	Inland Bays/Atlantic Ocean	Frankford	DE	50
Indian River	Inland Bays/Atlantic Ocean	Frankford	DE	47
Murderkill River	Delaware Bay Basin	Harrington	DE	237
Murderkill River	Delaware Bay Basin	Harrington	DE	597
Marshyhope Creek	Chesapeake Bay Basin	Harrington	DE	370
Nanticoke River	Chesapeake Bay Basin	Harrington	DE	71
Nanticoke River	Chesapeake Bay Basin	Harrington	DE	23
Mispillion River	Delaware Bay Basin	Laurel	DE	193
Nanticoke River	Chesapeake Bay Basin	Laurel	DE	424
Broadkill River	Delaware Bay Basin	Laurel	DE	47
Broadkill River	Delaware Bay Basin	Laurel	DE	300
Indian River	Inland Bays/Atlantic Ocean	Laurel	DE	47
Broad Creek	Chesapeake Bay Basin	Laurel	DE	119
Indian River Bay	Inland Bays/Atlantic Ocean	Laurel	DE	250
Broad Creek	Chesapeake Bay Basin	Lewes	DE	207
Broad Creek	Chesapeake Bay Basin	Magnolia	DE	545
Broad Creek	Chesapeake Bay Basin	Marydel	DE	725
Broad Creek	Chesapeake Bay Basin	Marydel	DE	987
Broad Creek	Chesapeake Bay Basin	Marydel	DE	781
Wicomico	Chesapeake Bay Basin	Marydel	DE	355
Pocomoke River	Chesapeake Bay Basin	Marydel	DE	326
Pocomoke River	Chesapeake Bay Basin	Marydel	DE	420
Bohemia Creek	Chesapeake Bay Basin	Middletown	DE	1775
Bohemia Creek	Chesapeake Bay Basin	Middletown	DE	99
St. Jones River	Delaware Bay Basin	Middletown	DE	219
Nanticoke River	Chesapeake Bay Basin	Milford	DE	228
Nanticoke River	Chesapeake Bay Basin	Milford	DE	171
Broad Creek	Chesapeake Bay Basin	Milford	DE	318
Broad Creek	Chesapeake Bay Basin	Milford	DE	696
Pocomoke River	Chesapeake Bay Basin	Milford	DE	233
Pocomoke River	Chesapeake Bay Basin	Milford	DE	380
Assawoman	Inland Bays/Atlantic Ocean	Milford	DE	323
Nanticoke River	Chesapeake Bay Basin	Millsboro	DE	24
Indian River Bay	Inland Bays/Atlantic Ocean	Millsboro	DE	290
Mispillion River	Delaware Bay Basin	Milton	DE	165
Mispillion River	Delaware Bay Basin	Milton	DE	174
Nanticoke River	Chesapeake Bay Basin	Milton	DE	516
Nanticoke River	Chesapeake Bay Basin	Milton	DE	265
Nanticoke River	Chesapeake Bay Basin	Milton	DE	89
Nanticoke River	Chesapeake Bay Basin	Milton	DE	861
Nanticoke River	Chesapeake Bay Basin	Milton	DE	400
Nanticoke River	Chesapeake Bay Basin	Milton	DE	228
Nanticoke River	Chesapeake Bay Basin	Milton	DE	262
Nanticoke River	Chesapeake Bay Basin	Milton	DE	378
Gravelly Branch	Chesapeake Bay Basin	Milton	DE	48
Broadkill River	Delaware Bay Basin	Milton	DE	252
Broad Creek	Chesapeake Bay Basin	Milton	DE	439
Broad Creek	Chesapeake Bay Basin	Milton	DE	420
Broad Creek	Chesapeake Bay Basin	Milton	DE	449
Wicomico	Chesapeake Bay Basin	Milton	DE	433
Wicomico	Chesapeake Bay Basin	Milton	DE	167
Pocomoke River	Chesapeake Bay Basin	Milton	DE	125
Pocomoke River	Chesapeake Bay Basin	Milton	DE	432
Pocomoke River	Chesapeake Bay Basin	Milton	DE	163
Pocomoke River	Chesapeake Bay Basin	Milton	DE	825
Iron Branch	Inland Bays/Atlantic Ocean	Milton	DE	225
Iron Branch	Inland Bays/Atlantic Ocean	Milton	DE	46
Indian River Bay	Inland Bays/Atlantic Ocean	Milton	DE	517
Indian River Bay	Inland Bays/Atlantic Ocean	Milton	DE	311
Indian River Bay	Inland Bays/Atlantic Ocean	Milton	DE	122
Indian River Bay	Inland Bays/Atlantic Ocean	Milton	DE	290
Bohemia Creek	Chesapeake Bay Basin	New Castle	DE	1118
Marshyhope Creek	Chesapeake Bay Basin	New Castle	DE	516
St. Jones River	Delaware Bay Basin	Seaford	DE	618
St. Jones River	Delaware Bay Basin	Seaford	DE	492
Murderkill River	Delaware Bay Basin	Seaford	DE	439

Sender Watershed	Sender Basin	Receiver Town	Receiver State	Claim Tons
Murderkill River	Delaware Bay Basin	Seaford	DE	74
Murderkill River	Delaware Bay Basin	Seaford	DE	79
Murderkill River	Delaware Bay Basin	Seaford	DE	106
Murderkill River	Delaware Bay Basin	Seaford	DE	209
Mispillion River	Delaware Bay Basin	Seaford	DE	488
Mispillion River	Delaware Bay Basin	Seaford	DE	974
Mispillion River	Delaware Bay Basin	Seaford	DE	272
Mispillion River	Delaware Bay Basin	Seaford	DE	470
Marshyhope Creek	Chesapeake Bay Basin	Seaford	DE	22
Marshyhope Creek	Chesapeake Bay Basin	Seaford	DE	180
Nanticoke River	Chesapeake Bay Basin	Seaford	DE	56
Nanticoke River	Chesapeake Bay Basin	Seaford	DE	231
Nanticoke River	Chesapeake Bay Basin	Seaford	DE	752
Nanticoke River	Chesapeake Bay Basin	Seaford	DE	632
Nanticoke River	Chesapeake Bay Basin	Seaford	DE	40
Nanticoke River	Chesapeake Bay Basin	Seaford	DE	561
Gravelly Branch	Chesapeake Bay Basin	Seaford	DE	516
Gravelly Branch	Chesapeake Bay Basin	Seaford	DE	298
Gum Branch	Chesapeake Bay Basin	Seaford	DE	292
Broadkill River	Delaware Bay Basin	Seaford	DE	443
Broadkill River	Delaware Bay Basin	Seaford	DE	64
Broadkill River	Delaware Bay Basin	Seaford	DE	486
Deep Creek	Chesapeake Bay Basin	Seaford	DE	24
Indian River	Inland Bays/Atlantic Ocean	Seaford	DE	252
Indian River	Inland Bays/Atlantic Ocean	Seaford	DE	102
Indian River	Inland Bays/Atlantic Ocean	Seaford	DE	321
Indian River	Inland Bays/Atlantic Ocean	Seaford	DE	77
Broad Creek	Chesapeake Bay Basin	Seaford	DE	239
Broad Creek	Chesapeake Bay Basin	Seaford	DE	249
Pocomoke River	Chesapeake Bay Basin	Seaford	DE	25
Pocomoke River	Chesapeake Bay Basin	Seaford	DE	34
Iron Branch	Inland Bays/Atlantic Ocean	Seaford	DE	15
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	321
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	72
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	295
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	832
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	606
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	247
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	378
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	75
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	316
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	109
Indian River Bay	Inland Bays/Atlantic Ocean	Seaford	DE	671
Buntings Branch	Inland Bays/Atlantic Ocean	Seaford	DE	263
Chester River	Chesapeake Bay Basin	Townsend	DE	365
Chester River	Chesapeake Bay Basin	Townsend	DE	508
Chester River	Chesapeake Bay Basin	Townsend	DE	266
Murderkill River	Delaware Bay Basin	Townsend	DE	311
Murderkill River	Delaware Bay Basin	Townsend	DE	260
Indian River Bay	Inland Bays/Atlantic Ocean	Townsend	DE	202
Wicomico	Chesapeake Bay Basin	Worton	DE	48
Choptank River	Chesapeake Bay Basin	Wyoming	DE	576
Pocomoke River	Chesapeake Bay Basin	Wyoming	DE	96
Iron Branch	Inland Bays/Atlantic Ocean	Wyoming	DE	192
Indian River Bay	Inland Bays/Atlantic Ocean	Wyoming	DE	873
Marshyhope Creek	Chesapeake Bay Basin	Chaptico	MD	551
Marshyhope Creek	Chesapeake Bay Basin	Chaptico	MD	236
Broad Creek	Chesapeake Bay Basin	Chaptico	MD	655
Broad Creek	Chesapeake Bay Basin	Charlotte Hall	MD	163
Bohemia Creek	Chesapeake Bay Basin	Chestertown	MD	522
Bohemia Creek	Chesapeake Bay Basin	Chestertown	MD	373
Bohemia Creek	Chesapeake Bay Basin	Chestertown	MD	450
Bohemia Creek	Chesapeake Bay Basin	Chestertown	MD	183
Bohemia Creek	Chesapeake Bay Basin	Chestertown	MD	362
Broad Creek	Chesapeake Bay Basin	Chestertown	MD	603
Pocomoke River	Chesapeake Bay Basin	Chestertown	MD	413
Pocomoke River	Chesapeake Bay Basin	Chestertown	MD	545
Pocomoke River	Chesapeake Bay Basin	Chestertown	MD	454

Sender Watershed	Sender Basin	Receiver Town	Receiver State	Claim Tons
Pocomoke River	Chesapeake Bay Basin	Chestertown	MD	494
Pocomoke River	Chesapeake Bay Basin	Chestertown	MD	187
Pocomoke River	Chesapeake Bay Basin	Chestertown	MD	369
Indian River Bay	Inland Bays/Atlantic Ocean	Chestertown	MD	423
Indian River Bay	Inland Bays/Atlantic Ocean	Chestertown	MD	324
Assawoman	Inland Bays/Atlantic Ocean	Chestertown	MD	396
Nanticoke River	Chesapeake Bay Basin	Clements	MD	92
Nanticoke River	Chesapeake Bay Basin	Clements	MD	237
Nanticoke River	Chesapeake Bay Basin	Denton	MD	492
Iron Branch	Inland Bays/Atlantic Ocean	Denton	MD	72
Broad Creek	Chesapeake Bay Basin	Drayden	MD	303
Murderkill River	Delaware Bay Basin	Easton	MD	24
Bohemia Creek	Chesapeake Bay Basin	Elkton	MD	526
Bohemia Creek	Chesapeake Bay Basin	Elkton	MD	277
Bohemia Creek	Chesapeake Bay Basin	Galena	MD	234
Leipsic River	Delaware Bay Basin	Galena	MD	915
Broad Creek	Chesapeake Bay Basin	Gambrills	MD	172
Pocomoke River	Chesapeake Bay Basin	Hampstead	MD	221
Nanticoke River	Chesapeake Bay Basin	Hurlock	MD	22
Indian River Bay	Inland Bays/Atlantic Ocean	Hurlock	MD	115
Marshyhope Creek	Chesapeake Bay Basin	Lexington Park	MD	286
Nanticoke River	Chesapeake Bay Basin	Lexington Park	MD	186
Nanticoke River	Chesapeake Bay Basin	Loveville	MD	955
Nanticoke River	Chesapeake Bay Basin	MarDela Springs	MD	145
Marshyhope Creek	Chesapeake Bay Basin	Mechanicsville	MD	139
Nanticoke River	Chesapeake Bay Basin	Mechanicsville	MD	73
Nanticoke River	Chesapeake Bay Basin	Mechanicsville	MD	575
Nanticoke River	Chesapeake Bay Basin	Mechanicsville	MD	48
Broad Creek	Chesapeake Bay Basin	Mechanicsville	MD	510
Nanticoke River	Chesapeake Bay Basin	Morganza	MD	209
Nanticoke River	Chesapeake Bay Basin	Nanjemoy	MD	1021
Bohemia Creek	Chesapeake Bay Basin	North East	MD	115
Broad Creek	Chesapeake Bay Basin	Park Hall	MD	566
Indian River	Inland Bays/Atlantic Ocean	Powellville	MD	147
Indian River	Inland Bays/Atlantic Ocean	Powellville	MD	67
Marshyhope Creek	Chesapeake Bay Basin	Prince Frederick	MD	567
Broad Creek	Chesapeake Bay Basin	Rhodedale	MD	718
Nanticoke River	Chesapeake Bay Basin	Rhodesdale	MD	407
Nanticoke River	Chesapeake Bay Basin	Rhodesdale	MD	72
Nanticoke River	Chesapeake Bay Basin	Ridge	MD	48
Pocomoke River	Chesapeake Bay Basin	Rock Hall	MD	848
Nanticoke River	Chesapeake Bay Basin	St. Inigoes	MD	280
Bohemia Creek	Chesapeake Bay Basin	Warwick	MD	230
St. Jones River	Delaware Bay Basin	Worton	MD	240
Iron Branch	Inland Bays/Atlantic Ocean	Worton	MD	71
Indian River Bay	Inland Bays/Atlantic Ocean	Worton	MD	122
Nanticoke River	Chesapeake Bay Basin	Worton	MD	96
Broad Creek	Chesapeake Bay Basin	Bridgeton	NJ	49
Broad Creek	Chesapeake Bay Basin	Cecil	NJ	40
Indian River Bay	Inland Bays/Atlantic Ocean	Cecil	NJ	108
Marshyhope Creek	Chesapeake Bay Basin	Elmer	NJ	49
Broad Creek	Chesapeake Bay Basin	Elmer	NJ	26
Pocomoke River	Chesapeake Bay Basin	Elmer	NJ	70
Murderkill River	Delaware Bay Basin	Elmer	NJ	24
Mispillion River	Delaware Bay Basin	Elmer	NJ	52
Indian River	Inland Bays/Atlantic Ocean	Elmer	NJ	26
Pocomoke River	Chesapeake Bay Basin	Monroeville	NJ	277
Broad Creek	Chesapeake Bay Basin	Pilesgrove	NJ	123
Pocomoke River	Chesapeake Bay Basin	Pilesgrove	NJ	522
Indian River Bay	Inland Bays/Atlantic Ocean	Pilesgrove	NJ	519
Choptank River	Chesapeake Bay Basin	Avondale	PA	111
Choptank River	Chesapeake Bay Basin	Avondale	PA	143
Murderkill River	Delaware Bay Basin	Avondale	PA	46
Murderkill River	Delaware Bay Basin	Avondale	PA	48
Mispillion River	Delaware Bay Basin	Avondale	PA	24
Mispillion River	Delaware Bay Basin	Avondale	PA	21
Mispillion River	Delaware Bay Basin	Avondale	PA	68
Mispillion River	Delaware Bay Basin	Avondale	PA	43

Sender Watershed	Sender Basin	Receiver Town	Receiver State	Claim Tons
Marshyhope Creek	Chesapeake Bay Basin	Avondale	PA	94
Nanticoke River	Chesapeake Bay Basin	Avondale	PA	22
Nanticoke River	Chesapeake Bay Basin	Avondale	PA	75
Nanticoke River	Chesapeake Bay Basin	Avondale	PA	20
Nanticoke River	Chesapeake Bay Basin	Avondale	PA	74
Nanticoke River	Chesapeake Bay Basin	Avondale	PA	470
Gravelly Branch	Chesapeake Bay Basin	Avondale	PA	22
Broadkill River	Delaware Bay Basin	Avondale	PA	21
Deep Creek	Chesapeake Bay Basin	Avondale	PA	23
Indian River	Inland Bays/Atlantic Ocean	Avondale	PA	24
Indian River	Inland Bays/Atlantic Ocean	Avondale	PA	45
Indian River	Inland Bays/Atlantic Ocean	Avondale	PA	22
Indian River	Inland Bays/Atlantic Ocean	Avondale	PA	50
Indian River	Inland Bays/Atlantic Ocean	Avondale	PA	45
Broad Creek	Chesapeake Bay Basin	Avondale	PA	117
Broad Creek	Chesapeake Bay Basin	Avondale	PA	47
Broad Creek	Chesapeake Bay Basin	Avondale	PA	96
Wicomico	Chesapeake Bay Basin	Avondale	PA	24
Wicomico	Chesapeake Bay Basin	Avondale	PA	24
Pocomoke River	Chesapeake Bay Basin	Avondale	PA	22
Pocomoke River	Chesapeake Bay Basin	Avondale	PA	26
Pocomoke River	Chesapeake Bay Basin	Avondale	PA	50
Pocomoke River	Chesapeake Bay Basin	Avondale	PA	21
Pocomoke River	Chesapeake Bay Basin	Avondale	PA	543
Iron Branch	Inland Bays/Atlantic Ocean	Avondale	PA	73
Iron Branch	Inland Bays/Atlantic Ocean	Avondale	PA	49
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	25
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	74
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	70
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	48
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	44
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	52
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	117
Indian River Bay	Inland Bays/Atlantic Ocean	Avondale	PA	71
Buntings Branch	Inland Bays/Atlantic Ocean	Avondale	PA	45
Nanticoke River	Chesapeake Bay Basin	Booth Wynn	PA	255
Indian River Bay	Inland Bays/Atlantic Ocean	Booth Wynn	PA	161
Pocomoke River	Chesapeake Bay Basin	Kennett Square	PA	256
Broad Creek	Chesapeake Bay Basin	Toughkanamon	PA	263
Murderkill River	Delaware Bay Basin	Toughkenamon	PA	22
Murderkill River	Delaware Bay Basin	Toughkenamon	PA	22
Mispillion River	Delaware Bay Basin	Toughkenamon	PA	70
Nanticoke River	Chesapeake Bay Basin	Toughkenamon	PA	24
Nanticoke River	Chesapeake Bay Basin	Toughkenamon	PA	50
Gravelly Branch	Chesapeake Bay Basin	Toughkenamon	PA	46
Broadkill River	Delaware Bay Basin	Toughkenamon	PA	24
Broad Creek	Chesapeake Bay Basin	Toughkenamon	PA	23
Wicomico	Chesapeake Bay Basin	Toughkenamon	PA	284
Pocomoke River	Chesapeake Bay Basin	Toughkenamon	PA	25
Pocomoke River	Chesapeake Bay Basin	Toughkenamon	PA	542
Iron Branch	Inland Bays/Atlantic Ocean	Toughkenamon	PA	25
Indian River Bay	Inland Bays/Atlantic Ocean	Toughkenamon	PA	51
Indian River Bay	Inland Bays/Atlantic Ocean	Toughkenamon	PA	47
Indian River Bay	Inland Bays/Atlantic Ocean	Toughkenamon	PA	186
Choptank River	Chesapeake Bay Basin	West Grove	PA	24
St. Jones River	Delaware Bay Basin	West Grove	PA	49
Murderkill River	Delaware Bay Basin	West Grove	PA	23
Murderkill River	Delaware Bay Basin	West Grove	PA	23
Mispillion River	Delaware Bay Basin	West Grove	PA	95
Marshyhope Creek	Chesapeake Bay Basin	West Grove	PA	64
Nanticoke River	Chesapeake Bay Basin	West Grove	PA	24
Nanticoke River	Chesapeake Bay Basin	West Grove	PA	42
Gravelly Branch	Chesapeake Bay Basin	West Grove	PA	47
Indian River	Inland Bays/Atlantic Ocean	West Grove	PA	24
Broad Creek	Chesapeake Bay Basin	West Grove	PA	24
Broad Creek	Chesapeake Bay Basin	West Grove	PA	24
Broad Creek	Chesapeake Bay Basin	West Grove	PA	260
Broad Creek	Chesapeake Bay Basin	West Grove	PA	334

Sender Watershed	Sender Basin	Receiver Town	Receiver State	Claim Tons
Broad Creek	Chesapeake Bay Basin	West Grove	PA	824
Wicomico	Chesapeake Bay Basin	West Grove	PA	74
Wicomico	Chesapeake Bay Basin	West Grove	PA	302
Pocomoke River	Chesapeake Bay Basin	West Grove	PA	25
Pocomoke River	Chesapeake Bay Basin	West Grove	PA	51
Pocomoke River	Chesapeake Bay Basin	West Grove	PA	24
Pocomoke River	Chesapeake Bay Basin	West Grove	PA	553
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	411
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	25
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	44
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	74
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	24
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	161
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	92
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	25
Indian River Bay	Inland Bays/Atlantic Ocean	West Grove	PA	24
Pocomoke River	Chesapeake Bay Basin	Westgrove	PA	121
Indian River	Inland Bays/Atlantic Ocean	Bealeton	VA	22
Nanticoke River	Chesapeake Bay Basin	Center Cross	VA	443
Nanticoke River	Chesapeake Bay Basin	Center Cross	VA	564
Wicomico	Chesapeake Bay Basin	Colonial Beach	VA	191
Nanticoke River	Chesapeake Bay Basin	Dunnsville	VA	462
Murderkill River	Delaware Bay Basin	Heathsville	VA	71
Nanticoke River	Chesapeake Bay Basin	Heathsville	VA	121
Deep Creek	Chesapeake Bay Basin	Heathsville	VA	24
Indian River Bay	Inland Bays/Atlantic Ocean	Heathsville	VA	46
Nanticoke River	Chesapeake Bay Basin	Lovettsville	VA	70
Gum Branch	Chesapeake Bay Basin	Lovettsville	VA	46
Buntings Branch	Inland Bays/Atlantic Ocean	Lovettsville	VA	20
Marshyhope Creek	Chesapeake Bay Basin	Milford	VA	419
Wicomico	Chesapeake Bay Basin	Walkerton	VA	576
Broadkill River	Delaware Bay Basin	Harpers Ferry	WV	19
Indian River	Inland Bays/Atlantic Ocean	Harpers Ferry	WV	22
Indian River Bay	Inland Bays/Atlantic Ocean	Harpers Ferry	WV	22

Sum of Claim Tons from the Chesapeake Bay Basin			
Receiver State	**Receiver Town**	**Sender Basin**	**Total**
DE	Frankford	Chesapeake Bay Basin	72
	Harrington	Chesapeake Bay Basin	464
	Laurel	Chesapeake Bay Basin	543
	Lewes	Chesapeake Bay Basin	207
	Magnolia	Chesapeake Bay Basin	545
	Marydel	Chesapeake Bay Basin	3594
	Middletown	Chesapeake Bay Basin	1874
	Milford	Chesapeake Bay Basin	2026
	Millsboro	Chesapeake Bay Basin	24
	Milton	Chesapeake Bay Basin	6500
	New Castle	Chesapeake Bay Basin	1634
	Seaford	Chesapeake Bay Basin	4151
	Townsend	Chesapeake Bay Basin	1139
	Worton	Chesapeake Bay Basin	48
	Wyoming	Chesapeake Bay Basin	672
DE Total			23493
MD	Chaptico	Chesapeake Bay Basin	1442
	Charlotte Hall	Chesapeake Bay Basin	163
	Chestertown	Chesapeake Bay Basin	4955
	Clements	Chesapeake Bay Basin	329
	Denton	Chesapeake Bay Basin	492
	Drayden	Chesapeake Bay Basin	303
	Elkton	Chesapeake Bay Basin	803
	Galena	Chesapeake Bay Basin	234
	Gambrills	Chesapeake Bay Basin	172
	Hampstead	Chesapeake Bay Basin	221
	Hurlock	Chesapeake Bay Basin	22
	Lexington Park	Chesapeake Bay Basin	472
	Loveville	Chesapeake Bay Basin	955
	MarDela Springs	Chesapeake Bay Basin	145
	Mechanicsville	Chesapeake Bay Basin	1345
	Morganza	Chesapeake Bay Basin	209
	Nanjemoy	Chesapeake Bay Basin	1021
	North East	Chesapeake Bay Basin	115
	Park Hall	Chesapeake Bay Basin	566
	Prince Frederick	Chesapeake Bay Basin	567
	Rhodedale	Chesapeake Bay Basin	718
	Rhodesdale	Chesapeake Bay Basin	479
	Ridge	Chesapeake Bay Basin	48
	Rock Hall	Chesapeake Bay Basin	848
	St. Inigoes	Chesapeake Bay Basin	280
	Warwick	Chesapeake Bay Basin	230
	Worton	Chesapeake Bay Basin	96
MD Total			17230
NJ	Bridgeton	Chesapeake Bay Basin	49
	Cecil	Chesapeake Bay Basin	40
	Elmer	Chesapeake Bay Basin	145
	Monroeville	Chesapeake Bay Basin	277
	Pilesgrove	Chesapeake Bay Basin	645
NJ Total			1156
PA	Avondale	Chesapeake Bay Basin	2024
	Booth Wynn	Chesapeake Bay Basin	255
	Kennett Square	Chesapeake Bay Basin	256
	Toughkanamon	Chesapeake Bay Basin	263
	Toughkenamon	Chesapeake Bay Basin	994
	West Grove	Chesapeake Bay Basin	2696
	Westgrove	Chesapeake Bay Basin	121
PA Total			6609
VA	Center Cross	Chesapeake Bay Basin	1007
	Colonial Beach	Chesapeake Bay Basin	191
	Dunnsville	Chesapeake Bay Basin	462
	Heathsville	Chesapeake Bay Basin	145
	Lovettsville	Chesapeake Bay Basin	116
	Milford	Chesapeake Bay Basin	419
	Walkerton	Chesapeake Bay Basin	576
VA Total			2916

Chesapeake Watersheds

Name	NMP ENROLLED ACRES 2001-2007*	2002 Ag m2	2002 Ag Acres	%	Estimated NMP Acres
Bohemia Creek	3,234.50	16,466,332.99	4,068.92	79.49	3,234.50
Broad Creek	53,930.10	159,017,281.32	39,294.03	137.25	39,294.03
C & D Canal West	4,266.80	16,434,650.92	4,061.09	105.07	4,061.09
Chester River	10,668.10	44,511,978.30	10,999.15	96.99	10,668.10
Choptank River	23,878.30	125,509,796.26	31,014.15	76.99	23,878.30
Deep Creek	24,860.00	65,764,031.92	16,250.65	152.98	16,250.65
Elk Creek	0.00	113,305.35	28.00	0.00	0.00
Gravelly Branch	16,706.30	30,631,919.95	7,569.31	220.71	7,569.31
Gum Branch	15,834.80	37,566,040.73	9,282.77	170.58	9,282.77
Marshyhope Creek	32,086.80	137,928,770.60	34,082.94	94.14	32,086.80
Nanticoke River	56,398.60	212,819,630.04	52,588.88	107.24	52,588.88
Perch Creek	0.00	1,166,691.32	288.30	0.00	0.00
Pocomoke River	18,267.80	41,092,101.41	10,154.08	179.91	10,154.08
Sassafras River	4,668.10	13,718,960.70	3,390.03	137.70	3,390.03
Wicomico	404.80	2,160,331.79	533.83	75.83	404.80
Total	265,205.00	904,901,823.60	223,606.11	118.60	212,863.33

*DE's Nutrient Management Law requires NMPs for farms with 8 or more animal units and farms applying nutrients to 10 acres or more. Enrollement was phased beginning in 2002 and reached 100% in 2007. The DE Department of Agriculture maintains a dataset of acres enrolled in NMPs, however, this dataset may include duplicate acres from early cooperators and therefore misrepresent actual acres on the ground with plans. In order to determine acres on the ground with plans, the cummulative NMP enrollement acres from 2001-2007 were compared to the acres classified as agriculture in the State's 2002 Land Use and Land Cover data set (http://stateplanning.delaware.gov/information/gis_data.shtml). [NOTE: development has affected land use acreages; the 2007 LULC data set is anticipated in early 2008, at which time this analysis can be repeated] When enrolled acres are less than the total acres of agriculture in a watershed, "enrolled" acres are used; when "enrolled" acres exceed the acreage of agriculture in a particular watershed, it is assumed that re-enrollement has occured in the 2001-2007 time frame (plans are developed for 1, 2, and 3 year periods) and the acreage from the LULC data set is used to infer actual acres of NMPs.

HUC-12	County Segment	Watershed	County		Stormwater Management							
				Erosion and Sediment Control	Extended Detention (Dry Pond)	Retention Ponds (Wet Pond)	Sand Filters	Infiltration Trenches/Basins	Biofiltration	Bioretention	Filtration	Level Spreader
				sites	systems	systems	systems	systems	systems	systems	systems	systems
20600020103	800010003	Perch Creek	New Castle County		9.00	28.00			7.00	1.00	1.00	2.00
20600020201		C&D Canal West		1.00								
20600020202	370010003	Bohemia Creek		1.00								
20600020401	810010003	Sassafras River										
20600020602	380010003	Chester River										
20600020601	380010001	Chester River	Kent County									
20600050101	770010001	Choptank River			1.00	1.00		2.00				
20600050102								1.00				
20600050103				1.00				1.00				
20600050104	400010001											
20600050106												
20600050107												
20801090501	410010001	Marshyhope Creek		1.00								
20801090502												
20801090101	780010001/ 780010005	Nanticoke River		11.00	5.00	8.00		2.00				
20801090102	780010005	Gum Branch	Sussex County	1.00								
20801090503	410010005	Marshyhope Creek										
20801090504												
20801090505												
20801090103		Gravelly Branch		1.00				1.00				
20801090301		Deep Creek		1.00	5.00	7.00	2.00					
20801090302					2.00	2.00	2.00					
20801090401		Broad Creek		1.00				1.00				
20801090402								3.00				
20801090403						1.00						
20801090404				8.00	13.00	5.00		3.00				
20801090405						1.00		1.00				
20801090104		Nanticoke River		10.00	11.00	16.00		13.00				
20801090303				4.00	9.00	3.00	3.00	10.00				
20801090304												
20801090601												
20801090604												
20600070101	420010005	Wicomico River		1.00	1.00		1.00					
20600090101	430010005	Pocomoke River										
TOTAL				42.00	56.00	72.00	8.00	38.00	7.00	1.00	1.00	2.00
Notes				Total new active sites in 2004.	Represents systems constructed through 2001 in Kent and Sussex Counties. New Castle County data (not yet broken out by co-seg) through 2006. The Conservation Districts are in the process of developing improved databases to track stormwater BMPs.							
Source				DNREC Sediment and Stormwater	DNREC Sediment and Stormwater	DNREC Sediment and Stormwater	DNREC Sediment and Stormwater	DNREC Sediment and Stormwater	DNREC Sediment and Stormwater			

Open Space				Wastewater	
Forest Management Plan Implementation	Forest Harvesting Practices	Urban Tree Planting	Stream Restoration	Septic Connections / Hookups	Septic Eliminated
acres	acres	acres	linear feet	systems	
25.00	0.00				
100.00	0.00				
0.00	91.00				
60.00	164.00				
171.00	0.00				
70.00	0.00				
176.00	156.00				
142.00	74.00				
0.00	0.00				
18.00	0.00				
0.00	0.00				
73.00	0.00				
915.00	109.00				
904.00	217.00				
1,600.00	104.00				
1,538.00	163.00				
934.00	21.00				
240.00	21.00				
118.00	0.00				
2,296.00	328.00				
1,427.00	73.00				
1,141.00	89.00				
1,254.00	257.00				
557.00	57.00				
456.00	255.00				
679.00	20.00				
345.00	26.00				
276.00	44.00				
568.00	45.00				
373.00	14.00				
388.00	21.00				
265.00	17.00				
35.00	15.00				
1,245.00	112.00				
18,389.00	2,493.00	0.00	0.00	0.00	0.00
Active plans as of 12/31/06.	During calendar year 2006.	Cumulative through end of 2004. Includes park planting, forested buffers, community open space, and street trees.	During calendar year 2004.		
DDA Forest Service	DDA Forest Service	DDA Forest Service	Delaware NPS Program	DNREC Water Resources	DNREC Water Resources